Flexible Transparency Technique

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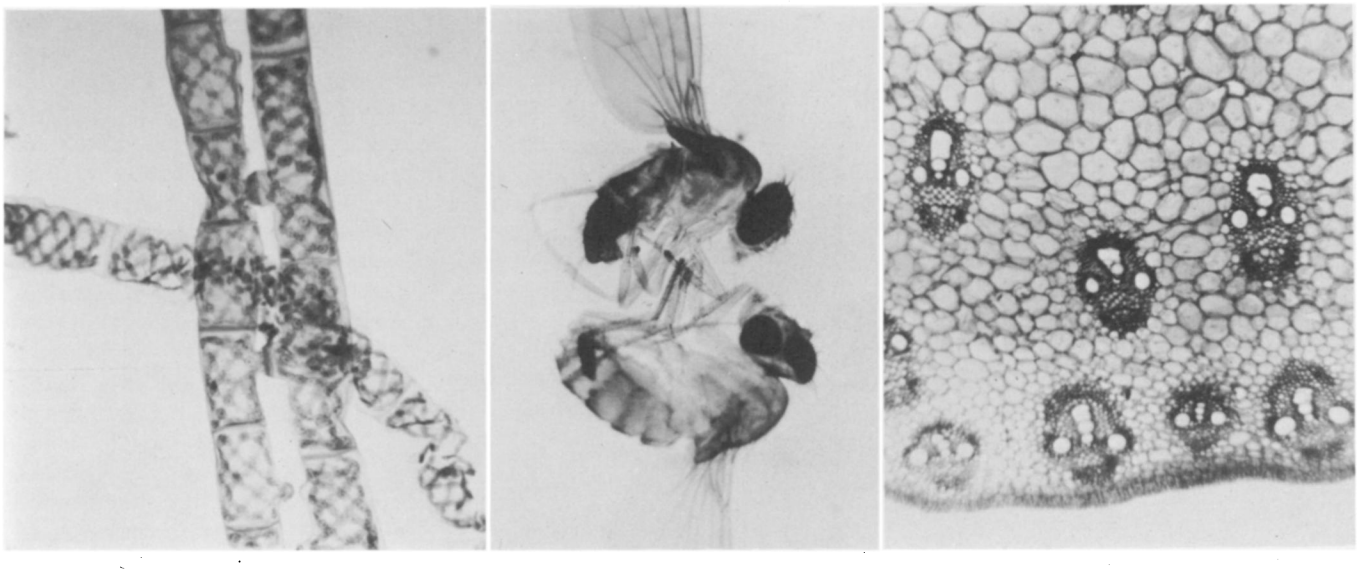
The 2 x 2 transparency has long been recognized as an indispensable teaching aid to the science teacher in presenting new material. Now with this flexible transparency technique the slide takes on a more specialized meaning. With the camera at his side the alert teacher can focus in on his students at work and within an hour, if desired, the picture can be used for testing and review.

When one remembers the time it takes to set up lab quizzes, with the confusion of moving pins and dried organs, the ease of projecting the previously snapped transparency is greatly appreciated. The science curriculum is much more flexible when plants plentiful in spring can be studied in the fall, and lab experiments performed in October can be reviewed in May before the yearly finals.

If the flexible transparency technique could only be used in testing and reviewing, camera knowledge and its use in these directions would be well worth the effort; but there are many other exciting possibilities.

Pictures in magazines and books that cannot be shown to a class without the use of a heavy opaque projector can easily be copied. (Be sure to check with the publisher for permission.) This practice enables the teacher to study with more interest, animals and plants that the student would not see naturally.

Microscopic pictures can be flashed on the screen



during a lab class in order to point out a tissue or organ that students might be having a difficult time finding. This practice shows the student what he should see without the teacher actually doing the microscopic work for the student.

Pictures showing the students at work are very effective in creating a great deal of interest in science areas.

Taking pictures with a 35mm camera and a microscopic attachment is a great deal "trial and error," but here are a few hints that can save the beginner some time and film.

1. The lower the magnification the sharper the picture. Don't take a picture with 430X if 100X will do just as well.
2. Always use the same light source. A substage lamp usually works fine.
3. The beginning teacher should select one type of film to use and stick with it. Every time you change film you must go through the trial and error again.
4. When color film is used we suggest the less expensive 25 ASA outdoor type.
5. High quality microscopic slides should be used.
6. Only experience can determine the correct speed at which to take the pictures, but with a typical substage lamp a speed of one second is average for most pictures.
7. Most important of all, keep records. For each roll of film, record type of film, ASA, shutter speed, light source and exactly what each picture should be. Accurate records save time and money. For instance, if a picture is successful at ½ second with ASA 50 film, it should be a success at 1 second with ASA 25 film.

Exposing the Film

The Camera: Several hundred different makes of 35 mm cameras, ranging in price from $20 to $500, are available. The 35mm camera best suited for the job can only be determined by the teacher and the condition of his pocket book. Good used 35mm cameras (such as an Argus C-3) may be purchased for as little as $20. This camera can be used effectively to photograph indoor and outdoor scenes, bulletin boards, student dissecting exercises, and a limited amount of copy work. The main limitation to this camera is a minimum focus distance of 3 feet.

A new type of camera that permits focusing through the lens has revolutionized the 35mm field in recent years. The focusing through the lens feature is especially useful for microscopic and close range photography. This camera, called a single lens reflex camera, is available in the $100 and up price range. The single lens reflex camera is well suited and highly recommended for close range photography described in this article. It might be well to remember that this camera may be used for general recreational photography, in addition to the teaching aspects.

Type of Film: Selection of film, color or black and white, is determined primarily by the finished product.

Recommended color films are Kodachrome-X and Agfachrome. Lower priced color film is also available from mail order companies such as; Sears Roebuck and Montgomery Ward. Complete exposure instructions are provided with each film.

Color slides are by far the easier of the two methods, for all one must do is expose the film and return it for processing. On the other hand, the use of black and white film allows the wonderful opportunity of processing and preparing your own slides. Eastman Kodak Panatomic-X 35mm film will produce very satisfying results for home film processing.

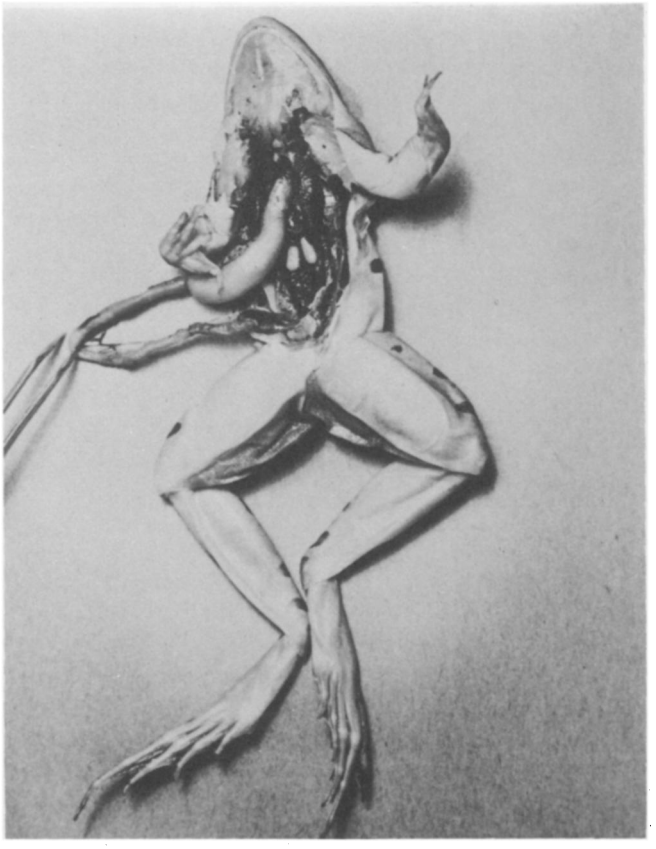
Once the teacher has discovered the joy and usefulness of preparing his own slides, direct positive film can be purchased by the 100 ft. roll. Direct positive film will give somewhat better results and cost considerably less per slide than that purchased by the 20 exposure roll.

Slide Reversal Procedure

Preparation for Reversal: It is recommended that this article and all instruction sheets be thoroughly read before beginning the reversal procedure. With this small amount of preparation, satisfactory results will be obtained on the first roll of film. Several minutes of reading and practice will avoid many frustrating minutes in a dark closet.

A "do it yourself" method of film reversal, using Kodak D-11 developer, available at camera stores, and a reversal solution can be mixed by the science teacher.

Note: This reversal solution is prepared in two steps; (a) dissolve 28 grams of potassium dichromate in 850cc of water, (b) add 50cc of concentrated sul-

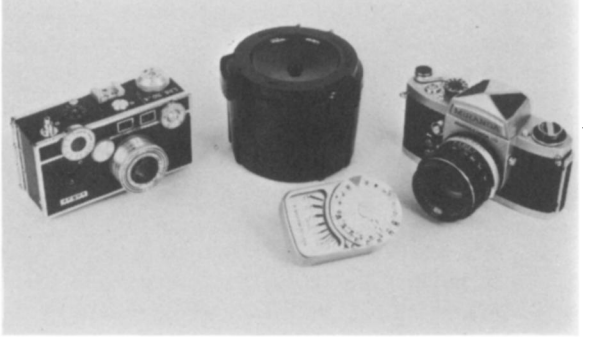


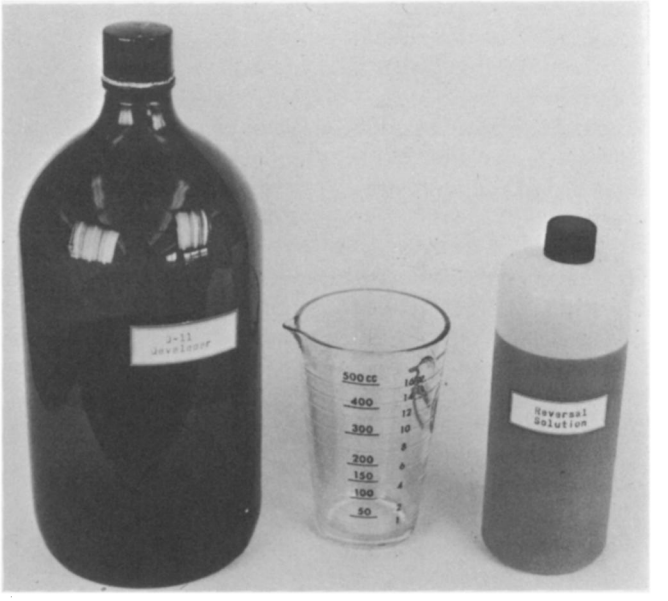
furic acid. Caution: add acid to water slowly and stir as considerable heat is liberated.

Loading the Daylight Tank: The film must be transferred from the 35mm film cartridge to the daylight developing tank. This part of the process must be completed in total darkness. A closet with the door closed and the adjoining room lights turned off will serve as a darkroom.

Note: A simple test as to the effectiveness of the closet is to spend several minutes in the closet holding a piece of white paper in front of you. If, after several minutes, you can still not see the paper you can be relatively sure the closet will serve as a darkroom.

Just as soon as the cover has been placed upon the daylight developing tank, the remainder of the process can be completed in a fully lighted work area (e.g., a bathroom, kitchen, or an area with running water).





First Development: (a) Pour the D-11 developer which has been previously mixed according to package instructions into the developing tank. The developer must be of sufficient depth to cover the film. (b) Agitate the film by rotating the reel briefly every minute. A ten minute development of the film has proven most satisfactory. (c) At the completion of development, the film developer should be returned to the stock bottle from which it was taken.

Wash: The film should be washed from 3 to 5 minutes allowing a stream of water to flow into the developing tank through the hole in the cover.

Film Reversal: (a) Dilute the reversal solution that was previously prepared (2 oz. of reversal solution diluted with water to form 10 oz. of total solution). (b) Add the diluted reversal solution to the tank and reverse for 10 minutes with brief agitation every minute. (c) The developing tank cover may be removed

Summary of Transparency Process

1.	Load Film into Daylight Tank	
2.	1st Development	
	D-11	10 Minutes
3.	Wash	
	Water	3-5 Minutes
4.	Reversal	
	Reversing Solution	10 Minutes
5.	Wash	
	Water	3-5 Minutes
6.	Reversal by Light	
	60 Watt Lamp	1 Minute
7.	2nd Development	
	D-11	10 Minutes
8.	Wash	
	Water	5 Minutes
9.	Wetting Agent	
	Photo-flo	1 Minute
10.	Dry and Mount	

upon the completion of this step. *All remaining steps may be completed in the lighted room with the cover off the tank.* (d) Discard the dilute reversal solution.

Wash: The film should be washed 3 to 5 minutes with running water.

Reversal Exposure: (a) Remove the film from the reel and expose the film to a light. An ordinary 60 watt light bulb or a desk reflector lamp will work very well for this operation. (b) Slowly move the film back and forth in front of the light for one minute to insure even and complete exposure. (c) Reload the film on the reel.

Note: If the wet film sticks, immerse the reel and film into water. The water will act as a lubricant and permit easier loading.

Second Development: (a) Add D-11 developer (same as used in the first step of the procedure) to just cover the film and reel. (b) Develop for ten minutes with brief agitation every one minute.

Note: The used developer should be discarded after this step.

Wash: Wash the film 5 to 10 minutes in running water.

Finishing: (a) For best results the film should be placed in a wetting agent (Kodak photo-flo) for one minute. This will reduce the surface tension of any clinging wash water and allow the film to dry free of water spots. (b) Hang the film in a dust free area to dry. (c) The slides are now ready for mounting and projection.

The transparencies can be mounted in Kodak cardboard 2 x 2 holders. These can be purchased at any camera store.

RECORDINGS OF FEEDING FISH

The ultimate fish lure may have been developed by Japanese scientists who have drawn fish to waiting nets by broadcasting through the water sounds of feeding fish schools. The sonic lure may prove a boon to commercial fishermen for it can be employed selectively, since schools of different species produce feeding noises peculiar to their own kind.

The underwater sound technique was described by Tomiju Hashimoteo and Yoshinobu Maniwa of the Japanese government Fisheries Agency.

Essentially, the sonic lure works on the same principle as the "moose horn" sounded by hunters to attract game. The scientists toss bait into the water, then record the sounds made by fishes which swarm to the bait. When the sounds are replayed beneath the surface, they attract fish of the same species as those which were recorded.

The technique hinges on selection of the sound produced by the desired species from a bleary garble of underwater noise. "If the luring sound can be picked out and classified, control of fish shoals in a considerable large area is quite possible," the scientists said.

Initial studies of the method were made in January 1962, at Ingashira Park, Tokyo. The scientists threw flour bait into a fish pond and, using a hydrophone as a noise collector, recorded the sounds of feeding carp.

"About forty carp which were swimming freely in the pond before the experiment turned their attention toward the sound projector when playback was emitted," the scientists told their colleagues at the seminar. The carp quickly swam toward the projector, the researchers added.

When the sound was increased, however, the carp veered away from the projector.

Another experiment, a year after the first, produced similar results. When tapes of fish feeding in a pond were played in the water, fish of several species, carp, dace, and trout, responded.

"The pond owner and local people who came to witness the experiment mentioned that they had never noticed such vigorous response of fish so instantly, even to real baits," the Japanese researchers said.

In a follow-up experiment, the scientists used the sonic lure to trap carp which had been released in an artificial lake. The fish swam into a wooden net trap after a projector, stationed at the mouth of the net, played feeding sounds.

A similar experiment was conducted on the open sea, with equally successful results.

The scientists also reported on a sound technique whereby some species of fish can be driven into nets, as land game is flushed by beating the brush. The scientists broadcast sounds of a dolphin which preys on many species of fish. Large numbers of barracuda and jack mackerel were pressured into nets by the dolphin noises.

DOGS AND TOOTH DECAY

Dog's teeth are apparently very resistant to tooth decay. Dr. Thompson M. Lewis, Seattle, Washington, reported that during a two-year study of dogs exposed to artificial inducement of caries lesions, caries never was manifested clinically, radiographically or histologically. Previous studies, however, have sometimes shown carious lesions in dogs.