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Photography

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Natural history photography is one of the most interesting branches of this already widespread hobby of taking pictures. Girls and boys who belong to the school Camera Club or who are interested in taking pictures should be encouraged to adapt their hobby to biology. This topic can be discussed under two headings—field photography and photomicrography.

Field photography: In this category there is an untold wealth of material in the back yard, park, on the hike, at summer camp, and during week-end trips afield. A lifetime's work can be outlined for the person really interested in natural history photography. All sorts of plants and animals and their habits can be recorded on film. The outstanding prerequisite is patience. Lacking this, a person equipped with the best cameras, exposure meters, and filters can bring back only mediocre results.

For field work the student needs a camera with which he is able to get within inches of his subject. The camera should be of the plate and film-pack variety with a double extension bellows, and it should be used on a tripod at all times. A plain background is often desired, and this can be obtained by using brown wrapping paper or a large gray blotter. Sometimes the black focusing cloth can be pressed into service.

For color work the student will find little better than an A2F Argus—using this camera on a tripod also, and stopping down the iris diaphragm for better depth and definition. This camera will focus on objects at 15 inches without supplementary lenses. Thirty-five millimeter Kodachromes of flowers taken with this outfit can be mounted between 2×2 glass slides and will project beautifully in the classroom. A tape measure is a necessity when setting up the small camera for close work, and a tilting top will enable one to swing the camera through many angles. The writer and his students are building up a collection of wild-flower pictures using the camera described above.

Photomicrography: The simplest set-up for taking photomicrographs is shown in Figure 1. Here a small camera is fastened directly to the tube of the

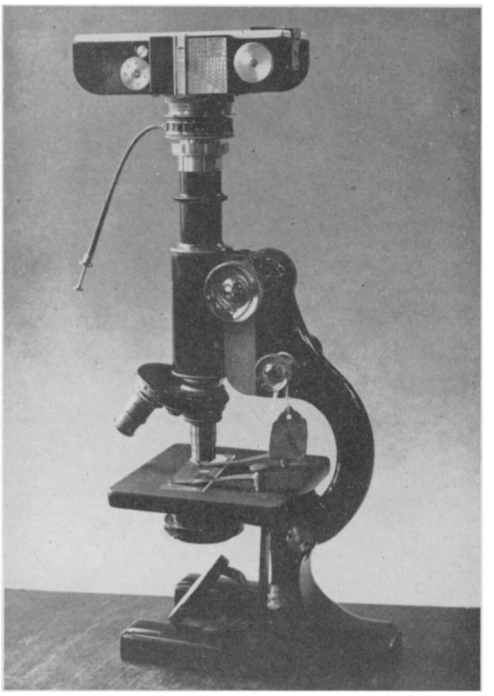

FIG. 1. Showing set-up for taking photomicrographs using adapter for Argus camera on Spencer microscope.

microscope with a special adapter made especially to fit the camera lens to the microscope. This combination can be used to make pictures of stained materials from which 4×5 or 5×7 enlargements can be produced. These can be pasted in the pupil's notebook and parts of the picture correctly labeled. Or they can be bound under glass, making a permanent mount for classroom use.

Larger cameras can be used with microscopes if a horizontal set-up is arranged. A homemade adapter for making a light-tight connection between microscope and camera can be evolved from various sizes of mailing tubes.

The source of light for photomicrography may be a lantern slide projector or a 100-watt electric light bulb in the student-made microscope light shown in Figure 2.

Trial exposures must be made to determine the correct time. Carefully compiled notes on the nature of the light source, its distance from the camera, the type of objective used, the nature of the slide photographed, and kind of film, will help the student succeed in producing excellent pictures.

DOS AND DONT'S

1. In shooting flowers, wait until the wind dies down, or use a cellophane tent. Never "steady" a stalk or branch with the hand, because this will only introduce more motion rather than less.

2. Try to get pictures of plants in their natural habitat—bring them inside only for special purposes. Maneuver around so that the background is in shadow.

3. A mirror to reflect sunlight into a bird's nest will help make a better picture.

4. Use side-lighting to give third-dimensional effects—*i.e.*, have the line of sight from the camera to the subject and the line of light from the sun come together at a 40° angle on the subject. A

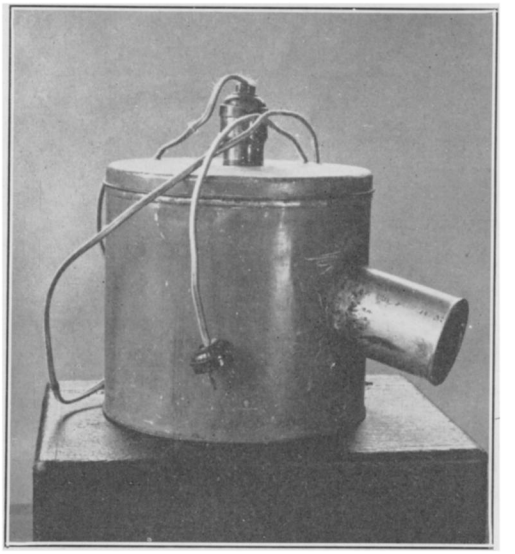

FIG. 2. Microscope illuminator made from two tin cans, by high school student. A 60- or 100-watt bulb suspended in larger can has its rays directed downward at an angle by the smaller can soldered over a hole cut in the larger one.

piece of white cardboard should be used to reflect light into the shadow side of the subject.

5. Stop down the iris diaphragm to about f.16 or f.22 for sharp detail and depth of field.

6. A panchromatic film (such as Panatomic, Panatomic X, Iospan, or Super Pan Supreme) gives best results for flowers and autumn coloring. Fast films are not necessary unless pictures of living animals call for fast shutter speeds.

7. In winter, keep camera under the clothing, and do not leave outside too long as shutter mechanism may contract and stick. Also look out for fogging of the lens from condensed moisture or breath.

8. An exposure meter of the photo-electric type will save much film by preventing over- or under-exposure.

9. When using double-extension on a camera for very close work, allow about double normal exposure.

10. In photographing insects, calm them down with a short sojourn in the refrigerator. They won't be so nervous after a brief cooling!

11. When photographing bird or animal tracks in snow, set the camera on a tripod at a height of about 18 inches to 2 feet above the snow surface. Focus on the second track or foot print and stop the iris-diaphragm down to f.22 or smaller. Under-expose slightly to save surface detail. Aim almost into the sun or quartering into it. Shield the lens. Use a yellow filter. Take this type of picture when the sun is low, either early in the morning or late in the afternoon. Orthochromatic film is best here.

12. It is advisable in some shots to include something which will indicate the size of the object photographed. This "something" may be a ruler, steel tape, a pencil, or even a person's hand or finger. One of the prettiest natural color shots of dandelion blossoms, taken at a distance of 15 inches, looms so large on the projection screen that some folks exclaim "What pretty chrysanthemums"—just because there's nothing to show relative size.

13. Vibration is the bug-a-boo in photomicrography. The opening and closing of a shutter serves to introduce more of the same. Avoid it by doing as follows: hold a piece of black paper between objective lens on microscope and the slide (or other material being photographed). Open shutter, withdraw black paper and count the number of seconds necessary to make the proper exposure, insert black paper again and close shutter. Remove paper. Advance film for next exposure (or if using plate camera, replace dark slide and remove plate holder).

Things to Shoot: Flat pictures or lantern slides for class-room projection can be made by pupils from negatives of:

1. Trees—shade trees, local forest trees, hard woods, evergreens, deciduous. Shoot them winter and summer to get general shape and appearance. Photograph close-up of trunk to show texture. Record twigs to show bud arrangement, leaves to show leaf type, flowers, fruits. Using Kodachrome, record the changes in autumn coloration on one maple tree. Repeat year after year and see if a tree goes through the same color changes every fall.

2. Flowers—best done in color. A collection of local wild flowers. A series on local garden species.

3. Weeds and poisonous plants—an excellent project.

4. Seed dispersal—many interesting adaptations in fruits for scattering their seeds can be recorded.

5. Habitat groups or plant associations—a collection of photos to show

desert, swamp, forest, sand-dune, marsh, sea-beach, and high altitude association calls for a lot of interesting work. An especially useful series can be photographed seasonally—a few pictures being taken during each of the four seasons.

6. Insects—there is a wealth of material here for the photographer in getting pictures of life stages, nature of injury to the host, peculiar adaptations, control methods for pests, activities in a bee-hive and so on.

7. Birds—nests, eggs and young are comparatively easy to get. Adult birds can be photographed if the student has a lot of time and more ingenuity and still more patience.

8. Wild animals—this branch of work calls for a great deal of time out-of-doors, quick thinking and acting, a knowledge of the animal's habits and the ability to live out-of-doors. Flashlight set-ups may be baited and operated in the manner of trapping the animals. Also visit the local zoo.

9. Farm animals—types and breeds of domesticated animals provide a most interesting project.

10. Pets—don't forget these, and they are right around home.

11. Fungi — mushrooms, toad-stools and bracket-fungi offer a rich field for the photographer.

12. Fish—a collection of local game fishes in natural color makes a challenging project for any youngster. It might be well to "tie-up" with some experienced fisherman.

13. Freaks—the unusual in nature make a fascinating photo hobby. Trees or plants growing in peculiar places, such as pines on boulders, twisted trunks, branches growing in odd shapes and roots growing through other plant parts make interesting pictures. Monstrosities such as double-headed turtles and animals with extra legs should be recorded on film.

14. Photomicrographs of plant and animal tissues studied in the laboratory are always instructive and fun to take. Try Kodachrome on stained slides.

15. Tracks of animals in snow or sand can be photographed early in the morning or late in the afternoon when the sun is low enough to render good shadow pattern. It is best to catch these trails soon after they have been made. This study often leads to some interesting detective work as in the case of a fox track on snow following that of a mouse; or the wing marks of an owl at the end of a rabbit trail. Set up the camera so that it will shoot into the sun or quartering into it. Shield the lens so that the sun's rays do not strike it. This method allows for deep shadows in the footprints, and makes them stand out more distinctly against snow or sand.

16. Industries—any industry involving biological processes will present a large number of interesting possibilities. Commercial fisheries, lobstering, shell-fishing are a few sea-shore industries. Dairying, orcharding, forestry, gardening (victory type just now) all make use of many biological fundamentals. Baking, brewing, wineries, distilleries should show commercial uses of enzymes and ferments, and if the foreman or superintendent of one of these is approached, he could arrange for some picture taking.

IT IS A SOURCE OF REGRET that it was not possible to obtain, for the photography issue, an article dealing with the use of amateur movies in biological science. Several teachers who were known to have some experience along this line were contacted. Three of these had joined the service or were about to be inducted; others were unable for various reasons to take the time to work up an article. If you have some experiences with the use of movies in the teaching of biology and if you want to share them with the readers of THE AMERICAN BIOLOGY TEACHER, why not write them up and submit them to any member of the editorial staff?