preparations were considered to be formalin free if, after a 30-min period in the leuco-fuchsin reagent, the test slide remained completely colorless.

With this procedure, gelatin preparations containing DNA at 0.2, 0.5, 0.8, 1.0, 1.5, 2.0, and 3.0 mg/cc were tested. One drop of each preparation together with two or more DNA-free control drops were placed on a slide. These slides, each representing a test series, were hydrolyzed in 1N HCl at 55° C for from 3 to 39 min and then immersed for 1½ hrs in the leuco-fuchsin reagent. Color estimations were made after a quick rinse in distilled water and then two 10-min changes of water saturated with SO_2. The data from several test series are summarized in Table 1.

TABLE 1

Conc. DNA (mg/cc)	Hydrolysis in 1N HCl at 55° C (min) 0	3	5	7	9	11	13	15	17	19	22	27	34	39
0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0.8	0	0	0	0	1	2	2	1	2	3	2	1	1	2
1.0	0	0	0	1	1	2	2	1	1	2	3	3	3	3
1.5	0	1	1	2	2	2	3	4	4	4	4	4	4	
2.0	0	1	1	2	2	3	3	4	4	4	4	4	4	
3.0	0	1	1	2	2	3	3	4	4	4	4	4	4	

The values indicate the relative intensity of color developed in the gelatin drop: 0 = absence of color or, at most, a faint tinge, 1 = light lavender, 2 = lavender, 3 = light purple, 4 = deep purple.

No appreciable color was developed with small amounts of DNA, while within the middle range there was a gradual increase of color until a maximum intensity was reached. It should be pointed out that there was no further development of color with increasingly greater amounts of DNA. The intensification of the color of the drops that develops with increasingly longer periods of hydrolysis indicates that DNA was not lost in the process. With higher concentrations of DNA there was no increase or decrease in color intensity following periods of hydrolysis beyond those required for maximum color development. These observations indicate the necessity for a critical control of hydrolytic time.

The Feulgen reaction is quantitative only over a short range of DNA concentrations. At least 0.8 mg/cc of DNA must be present in order to produce an appreciable color. Beyond a concentration of 1.5 mg/cc no further intensification of color may be visually detected after an hydrolysis of 15 min or longer. Experiments are in progress to study the reaction by photometric methods.

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Photomicrography at Your Convenience[1]

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There can be no question but that photomicrography, using standard equipment and methods of the biological laboratory, is a proven and acceptable procedure. We should like to report an alternative which, after some use, appears particularly suited to our needs and which combines features not found in the more widely used methods. In such measure as the reader's problem parallels our own, we believe these suggestions will be of value.

Interests so diverse as plant pathology and cytogenetics necessitated the development of photographic equipment which would allow reasonably rapid change from one technique to another. It was desirable to take pictures not only at high magnifications through the compound microscope, but through the dissecting microscope, and at low magnifications by use of extension tubes.

One camera, the Kine Exakta 35-mm single lens reflex seems ideally constructed for the purpose. Especially valuable features of this machine are: attached magnifier for use with ground-glass focusing, shutter speeds from .001 to 12 sec, bayonet lens mount, focal plane shutter, and provision for removal of short lengths of exposed film. Except for the added light intensity obtainable for focusing, there is little advantage of the f 2.8 over the f 3.5 lens. This camera, if the tripod socket is fitted with the proper reducing insert, can be attached to the horizontal arm of any enlarger stand, either by the bolt used to hold the enlarger unit itself or by an ordinary ¼″ bolt of the proper length and of standard thread. For maximum speed and accuracy it is well to calibrate the vertical post of the enlarger stand in convenient units and to fix the height of the camera at will by use of a radiator hose coupling about the enlarger post. This hose coupling, if selected of the proper diameter, can readily be moved from one position to another, allowing the arm to swing freely in the horizontal plane (Fig. 1).

Probably the most effective way of joining the camera to the barrel of the microscope is by use of a 6″–8″ length of automobile radiator hose, which may be obtained in a size which snugly fits the extension tube. By slipping the rubber sleeve up over the metal tube, the eyepiece of the microscope is cleared, and the camera can be swung to one side. By slipping it down over the barrel of the microscope, an essentially lightproof seal is secured. The manipulations are completed by fixing the enlarger stand firmly to the working desk and marking the position of the base of the microscope and lamp.

Exposure time, inevitably a matter of trial and error, when once established, will be constant. The complexity of the lamp and optical equipment available will deter-

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mine the exact details, but in general it is necessary to standardize the diaphragm openings of both microscope condenser and light source, rheostat setting of the lamp,

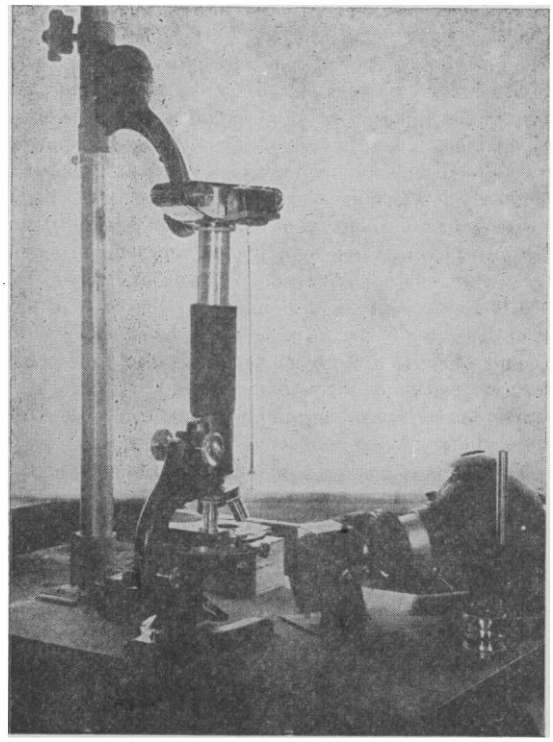

FIG. 1. The camera in position for taking a photomicrograph.

distance from lamp to microscope mirror, and height of camera above the eyepiece. Once this is done, it is no problem to establish proper exposure times for the several desired magnifications. Choice of film, filters, etc. are matters best left to the whims of the individual researcher.

Perhaps the only disadvantage of this apparatus is the high initial cost of the camera itself. We feel that this is more than offset by the following:

(1) Photomicrographs can be so quickly and effectively taken that the newly popular smear techniques in cytology are fully applicable. One can work at the microscope unimpeded, photographing with expenditure of but a few minutes whatever seems of interest.

(2) Cost of film is sufficiently low that large numbers of photomicrographs can be taken and records kept in this form, rather than as drawings or as stage vernier readings. There is decidedly less need for maintaining large stocks of old preparations.

(3) Kodachrome slides can be directly produced, and $2'' \times 2''$ black-and-white transparencies can be made simply by contact printing on a high contrast ortho film. For that matter, negatives of larger sizes can be photographed by transmitted light and reproduced as $2'' \times 2''$ transparencies.

(4) The same camera can be used for photomicrographs, for close-up photographs through dissecting microscope or extension tubes, for copying illustrations or microfilming books, and for ordinary work in the field. Frequently not even a change of film is necessary.

Use of the Dropping-Mercury Electrode for the Continuous Measurement of Dissolved Oxygen in Flowing Water[1]

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In connection with measurements of the basal metabolic rates of fishes, it was found desirable to obtain continuous records of the oxygen content of a stream of water issuing from the metabolism chamber. Giguère and Lauzier (*1*) have described a polarographic method for measuring the dissolved oxygen in flowing water, but the conditions necessary for its performance make it unsuitable for the present application. The polarized dropping-mercury electrode seemed to be more promising, particularly as employed by Manning (*3*), who obtained a continuous 24-hr record of the oxygen content of unmodified lake water. However, because of progressive changes in the surface of the quiet pool of mercury (the anode), this method could not be made to yield satisfactory results when applied to flowing tap water.[2] Although the oxygen content of the water did not change, the limiting current at constant voltage (1 v) decreased steadily throughout all trials. A calomel electrode with saturated KCl solution and an agar bridge (*2*) performed somewhat better, but the results were still not satisfactory, the limiting current continuing to diminish. A sealed calomel electrode with a fiber bridge gave the same result. Apparently the concentration of the salt across the bridge, or the pressure within it, undergoes a progressive change while the electrical current is flowing which alters the potential across the bridge.

The difficulty can be overcome by opening the bridge to an open reservoir containing a saturated solution of KCl and calomel, the reservoir being set at such a level that the pressure of the solution on the bridge is slightly greater than that driving water into the electrolysis cell. A pressure of a few centimeters of water is sufficient. Under these conditions there is an extremely slow flow of saturated solution through the bridge into the electrolysis cell (less than 0.4 ml in 24 hrs), so that there is no change in potential across the bridge. With this modification of the calomel electrode, the limiting current remains constant for extended periods, sometimes for as long as a week. Experimental changes in the oxygen content of the water flowing through the cell are accompanied

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[2] Charcoal-filtered, aerated city water.