first, is then fire-polished until almost closed before it is brought up against the bubble of special electrode glass. If the electrode proves water tight when dipped in water, a little 0.1 N HCl is run into the electrode tube and the tube is stood in a beaker of water which is brought to a boil. This removes the air trapped in the tip of the electrode and at the same time relieves its electrical stresses, so that the electrode can be used as soon as finished. A silver chloride electrode (equilibriated to .1 N HCl) is then fastened in place with a bit of adhesive tape, leaving however a vent for air expansion, and a coat of paraffin is applied to the top of the electrode. It is then ready for use.

In work on the pH of the blood a difference of .01 is not considered a very significant change. This corresponds to an accuracy of voltage measurement of .6 millivolts. Any given filling can be measured with an accuracy of about .2 millivolts, but at times the variations, between fillings, of the charge held by the electrode may considerably reduce this accuracy. However, sufficient accuracy can be maintained without great difficulty.

Below is given a protocol of the tests made with this equipment on August 8, 1932. All readings are at 38° C. Three blood samples were tested for comparison, A_1, A_2 and A_3. The standards buffer was standard acetate with a pH of 4.64 at 38° C.

Blood	Voltage readings		pH of blood
	Standard buffer	Blood	
	.1060 .1059		
A_1		.2721 .2720	
	.1068		
A_1		.2722	7.32
	.1067		
A_2		.2722	7.32
	.1065		
A_3		.2679	7.25+
	.1067		
A_3		.2682	7.26−
	.1067		

Note that the electrode reached sufficient stability before the first blood reading was taken.

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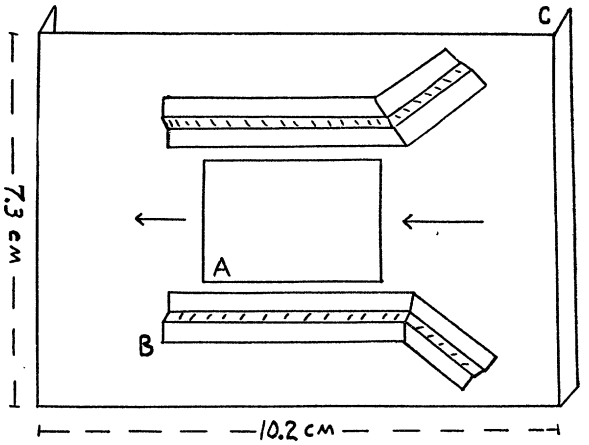
MOVING PICTURE FILM ADAPTER FOR ROLL FILM CAMERAS

IN work requiring a series of pictures, such as progressive development of symptoms of vitamine deprivation, neuro-surgical symptoms, complicated apparatus set-ups, operative steps in difficult experiments, duplicating for future reference pages from loaned references or for obtaining serial photos of any material, the following adapter will enable one to use the ordinary moving picture film in a regular roll film camera. The size adapter described here was used successfully in a camera designed for No. 120 roll film, although by a simple modification of measurements it could be used in larger or in smaller cameras.

The material used in construction was light sheet tin, painted a dull black to avoid reflection. The aperture A was cut 35 by 24 mm, although it could be made longer or shorter or even made to handle the narrow 16 mm film instead of the larger size. B indicates the guiding channels; these are shaped strips flared as shown and extended beyond the open window about a quarter of an inch to aid in giving the film flatness. These strips are easily soldered in place. C are the flanges to hold the adapter plate in place in the camera; these insert below the usual small metal rollers found in cameras. When in place the adapter does not interfere in changing film cartridges in daylight.



In preparing the film for use in the camera, old rolls of backing paper and film spools are obtained from the photographic supply house or from a developer of films. This is laid flat, black side down on a table and new numbers are placed about 26 mm apart in line with the old film numbers. These numbers should be spaced about 2 mm more apart than the length of the aperture A, to prevent possible fogging of adjacent film. Such spacing also marks off the exposures more clearly.

In the darkroom the film is cut as long as the regular film or about 80 cm. Gummed stickers are used to hold the film in position, and the film cartridge is then rolled and sealed with a sticker so as to be available for daylight loading of the camera.

Positives may be made from the negatives and these

then used in lantern slides, four pictures or less to a slide, or prints can be made from the negatives. Since the latitude of moving picture film is usually better than ordinary film, sharper results can be obtained.

In photographing pages of loaned articles, either enlargements can be made or a magnifying glass used to read the matter. Each roll of film gives 30–40 exposures; the prints are not expensive and the usual equipment can be used in developing the negatives.

If one is accustomed to a camera, using the adapter does not call for relearning the peculiarities of a new machine, and since the adapter plate is instantly removable, no alterations of the camera itself are necessary.

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ON THE PREPARATION OF HEMOLYTIC AND PRECIPITATING SERA

THE usual directions for the preparation of hemolytic and precipitating sera call for the use of washed red blood cells and serum respectively as antigens. Therefore, the majority of students in immunology leave their classes with the impression that red blood cells are required for the preparation of hemolysins and that serum is essential for the preparation of precipitins. The fact is, however, that an immune serum prepared by using clear serum as antigen will function perfectly as a hemolytic serum and that a hemolytic serum prepared by using washed red blood cells as antigen will do very well as a precipitating serum. One might also use whole blood as antigen in the preparation of these kinds of antibodies. Such a procedure may not always be successful, because rabbits are rather sensitive to fresh sheep serum. It is, therefore, necessary to heat sheep serum for one half hour at 56° C. and to remove fresh serum from the red blood cells by repeated washing in saline solution. Heating whole blood is not desirable. Neither whole blood nor washed red blood cells can be kept for any great length of time. Sterile serum or plasma, on the other hand, can be kept for months or years, thus offering a saving in time and effort, especially to those who may wish to work with hemolysins and precipitins without having ready access to sheep or goats.

Giving rabbits 2, 3, 4 and 4 cc of sheep serum intravenously, allowing 3 to 4 day intervals between injections and 8 to 10 days between the last injection and the bleeding, I have produced sera which, when used as precipitins, showed titers of better than 1:12800. The same sera used as hemolysins dissolved 0.5 cc of a 2 per cent. suspension of sheep erythrocytes in quantities of 0.01 cc of a 1 per cent. dilution and of 0.05 cc of a 0.5 per cent. dilution in the presence of 2 units of complement in 30 minutes at 37° C.

Hemolytic sera produced by injecting rabbits intravenously with 2.5, 3, 3.5 and 4 cc of washed sheep erythrocytes at 3 to 4 day intervals, allowing 8 to 10 days to elapse between the last injection and the drawing of the blood, have given titers as follows, when used as precipitins: slight precipitation in dilutions of 1:6400 in 10 minutes, marked precipitation in the same dilution in 20 minutes, and slight precipitation in dilutions of 1:12800 in 30 minutes. All precipitation tests ("ring tests") were made at room temperature. The hemolytic titers of these sera were almost exactly the same as those given above for the precipitating sera.

Both kinds of sera produce marked hemagglutination when inactivated and mixed with washed sheep erythrocytes.

Rather strong hemolytic and precipitating sera have also been obtained by using as antigen the clear saline solution in which blood cells had been washed, the solution from the fourth washing being about as effective antigenically as that from the first one.

Suspensions of liver and spleen tissue, as nearly as possible washed free from blood, proved inferior to the supernatant saline solution from washed sheep cells when used as antigens for the production of hemolytic and precipitating sera.

Some of the sera tested seemed to retain their hemolytic power longer than the precipitating properties. In others there was no difference in this respect.

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SPECIAL ARTICLES

AN EFFECT OF THE RECENT SOLAR ECLIPSE ON THE IONIZED LAYERS OF THE UPPER ATMOSPHERE

MEASUREMENTS of the virtual heights of the ionized layers of the atmosphere during the recent solar eclipse of August 31 indicate strongly that at least one ionizing agency effective in the lower layer comes from the sun and travels with a speed approaching that of light. It would seem then that ultra-violet light rather than neutral particles was the ionizing agency which caused the phenomena observed in these tests.

The measurements were made[1] at Deal, N. J., using three transmitters and receivers adjusted to the fol-

[1] For description of method and equipment used see J. P. Schafer and W. M. Goodall, *Proc. I. R. E.*, July, 1932.