matter having been considered, attention was turned to specific investigations and stock was taken of researches in progress or in contemplation. At present under way are the following: Archeological work at Chichen Itza, under direction of Dr. Morley, now in its seventh year; excavations at Uaxactun, Department of the Peten, Guatemala, under direction of Mr. O. G. Ricketson, Jr., fifth year; heiroglyphic research by Dr. Morley; ceramic survey of the Maya area by Carnegie Institution, being inaugurated during the present year by Mr. Roberts (all the foregoing are projects of Carnegie Institution); medical survey of the Yucatan peninsula by Harvard University and Carnegie Institution, now in its second year; records of Chichen Itza clinic administered by Miss MacKay, third year; biological reconnaissance (1930) by University of Michigan, Dr. Gaige; ethnological reconnaissance (1930) for Carnegie Institution by Dr. Redfield, of the University of Chicago; studies of Maya linguistics at Chichen Itza by University of Chicago, Dr. Andrade (1930).[1]

Proposed activities of the Carnegie Institution are: historical work on the Conquest and the Colonial Period; retranslation and collation of the books of Chilam Balam; investigation in physical anthropology by Department of Genetics; air-survey of Maya area. All the above were discussed, and consideration was given to the relation to various aspects of the project of climatology, geology, sociology, psychology, etc. Advantage was taken of the presence of Messrs. Tozzer, Hay and Vaillant to review in detail the local archeological investigations of the institution, to consider its wider implications and to solicit their advice as to future activities.

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[1] Summaries of the results of these units of work will appear in the Year Book of the Carnegie Institution in December, 1930.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

LABORATORY AND TEACHING DEVICES MADE FROM PLASTER OF PARIS

OCCASIONS in the teaching and research laboratory often arise when an irregularly shaped vessel or chamber is desired or when one wishes to construct a teaching model which will greatly resemble the original. For this purpose plaster of Paris has long been used. Several decades ago A. Edmunds[1] used it for the construction of kidney and intestinal oncometers. More recently the writer has had occasion to employ it for both teaching and research apparatus.

Some time ago while teaching a general course in hygiene and public health at the summer session of a normal school, the writer discussed the utility and necessity of septic tanks in rural or semi-rural communities. The difficulties in explaining the various features of septic and Imhoff tanks were well-nigh unsurmountable. This led to the idea of constructing small models of these tanks.

Using the proportions given in the standard text and reference books, but greatly reducing the dimensions, foundations were made from wire cloth such as is used in screen doors; the corners were either bound with fine wire or soldered. It was found best to use small wooden strips as stretchers inside of the frame until after the first, external, coat of plaster had hardened. These stretchers were then removed and a coat of plaster was applied to the internal surface of the wire. After this coat had hardened, irregularities were removed by scraping with a knife, rubbing with coarse sandpaper or by the application of a thin mixture of plaster of Paris rubbed down with the fingers. Small brass pipes were used at the points where the inflow and outflow pipes are regularly found.

When constructing Imhoff tanks, it was found best to make the floor and side walls of the settling or upper chamber of glass plates in order to render the interior of the sludge chamber visible. The sludge pipe was made from a piece of ⅜-inch brass pipe to which was soldered a short length of the same sized pipe at a 15° angle. This latter short piece of pipe was passed through a hole made in the side wall of the model after which repairs to the wall were made with plaster.

Recently during an investigation of the circulation of the liver,[2] the writer found it necessary to construct an air-tight chamber suitable for receiving the livers of cats, dogs and rabbits in their natural position while fluid was being perfused through them. In this case a V-shaped box was made from ¼-inch wire netting, the corners soldered, and this box was covered with plaster of Paris in the manner described above. Here, however, the open edge was built up well above the wire frame and nearly an inch wide. When the plaster was well hardened, the box was held in the obverse position and the edges about the open end were ground smooth with sand paper so that a piece of glass would form a closely fitting cover. A beeswax-vaseline mixture of proper melting-point was

[1] A. Edmunds, *Journal of Physiology*, 22: 380, 1898.

[2] A. R. McLaughlin, *Journal of Pharmacology and Experimental Therapeutics*, 34: 147, 1928.

found satisfactory for tightly sealing the cover on the hepatic oncometer and cotton saturated with this mixture was used to seal the openings provided for the inlet and outlet cannulae. The oncometer was rendered impervious to air and water by means of the methods described below.

These models may be rendered air- and water-proof by heating them in an oven or hot air sterilizer until they are thoroughly dried. While still so hot that they must be handled with cloths, melted paraffin is poured into the model. By rotating the model, melted paraffin may be made to permeate all parts of the plaster, thus rendering it air- and water-tight, or it may be painted with spar varnish or brushing lacquer both inside and outside. This varnish treatment is most satisfactory for the models of the septic tanks since they may then be handled without being soiled. Dust may also be removed without leaving the plaster in a smeared condition.

SUMMARY

A method has been described whereby models of septic tanks for teaching public health and oncometers for physiological demonstration and research may be constructed by employing a wire frame and covering it with plaster of Paris.

These models should prove especially useful to teachers in rural and suburban communities and to extension workers whose task it is to keep a vast number of our population informed as to the best measures of protecting their health.

These models may be rendered impervious to air and water by means of paraffin, varnish or brushing lacquer.

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ELIMINATING OPAQUING BY ALTERNATING BLACK AND WHITE BACKGROUNDS WHILE MAKING A PHOTOGRAPH[1]

PHOTOGRAPHS of most biological subjects are more pleasing if the finished print has a white background. Such backgrounds are ordinarily secured by placing a piece of white cardboard or an illuminated ground-glass behind the object to be photographed. Unsatisfactory ones are often "blocked out" with some opaquing material, but this procedure is always tedious and, in the case of some biological subjects, impossible. Unfortunately many subjects whose print value would be enhanced by a white background refuse to yield satisfactory negatives when photographed against white backgrounds. Thus, such subjects as yellow, hairy, dark-spotted caterpillars, or sections through diseased potatoes, when photographed against a piece of black cloth yield negatives that present the object with excellent detail and gradation, but the resulting picture (print) will have a drab tone because of the black background. The loss of detail when using a white background is accountable chiefly to the great difference in exposure required by the background as compared with the object itself. Obviously it requires far less time to photograph a piece of white paper than a dark object. The white background literally overexposes a large portion of the negative as a result of the additional time required to record the object itself. Hence the white background induces sufficient halation and "fog" to obscure both the detail and color value of the outer portion of the object.

The writer's method for avoiding this difficulty consists in using a black background (black cloth) during most of the exposure, but towards the end of the time required by the object itself, inserting a piece of white cardboard so that a white background will result in the finished print. By experience it has been determined that for ordinary lighting conditions a pure white background is insured by inserting a white cardboard as background for not more than one third the total time required by the object. At first both backgrounds were used in the same plane, but after several trials better results were obtained by placing the white cardboard closer to the object and keeping it in position for only one fourth the total exposure required. This method almost entirely eliminates halation and records the desirable qualities in the negative which one expects from a black background, but insures a white background in the finished print.

The technique for carrying out the black-white background procedure is very simple. The object to be photographed is placed on a piece of plate glass mounted conveniently beneath the camera. A piece of black velvet photographic cloth is stretched at a distance of about six inches beneath the object on the glass, and the camera is then stopped down so that the exposure for the object itself will require at least twenty seconds. A large square of cardboard is held in readiness for insertion during exposure. First the shutter is opened and the negative exposed for from two thirds to four fifths the required time; then, at the end of this period, the white cardboard is put in position about two inches beneath the glass and, at the end of the total exposure, the shutter is closed. For example, if twenty-five seconds is required for optimum exposure of the object, the first seventeen seconds should be with black cloth only, and the last eight with the white cardboard inserted. For large objects, such as a potted plant, the same

[1] This method was developed at the Virginia Truck Experiment Station, Norfolk, Virginia.