

spects that of the actual soil solution, should be the first consideration.

To the soil bacteriologist the solution obtained under great pressures would be of doubtful value. Many bacteria are destroyed by high pressures (25,000 to 100,000 pounds). In fact high pressures alone have been employed successfully in the sterilization of fruits and vegetables.⁵ Studies of the microorganisms surviving these enormous pressures would be probably only a matter of curiosity and of no immediate value or utility.

It seems that Dr. Lipman should have made a thorough comparative study of the soil solution obtained from the same soils by the two methods under discussion before he could be justified in making the statements set forth in his preliminary article.

ZAE NORTHRUP

BACTERIOLOGICAL LABORATORY,
MICHIGAN AGRICULTURAL COLLEGE,
EAST LANSING, MICH.

DRAWINGS ON LANTERN SLIDES

PROFESSOR GUNTHERP'S letter in *SCIENCE* for April 12 in regard to drawings on lantern slides seemed to the writer to be an attempt to solve the problem of writing upon clear glass when the ordinary coated slides were not available. The letter by Mr. Benton in the issue for May 17 goes further into the solution of this problem, and the suggestion of using india ink is a good one, but the idea of pasting paper to a slide to secure a purchase for the foot of a compass would lead one to suspect that the use of coated glass had not been tried. Even though this supposition is in error the use of ordinary unexposed lantern slides, fixed in the dark room, or of old slides reduced by successive immersions in "hypo" and Farmer's solution, may be new to some and is worthy of mention. The transparency of the prepared slide is all but perfect, the coated side can be written, drawn or ruled upon at will, areas can be shaded or colored,

⁵ Hite, B. H., Giddings, N. J., and Weakley, Chas. E., Jr., "The Effect of Pressure on Certain Microorganisms Encountered in the Preservation of Fruits and Vegetables," West Virginia Station Bulletin 146, 1914.

errors can be removed by the simple expedient of scratching away the gelatin (and the remaining scar is surprisingly insignificant when the slide is thrown upon the screen) and dividers or compass can be used without danger of slipping. In writing, the finer and firmer the point, and the less ink, the better, as a thick line will crack up into a mosaic; and experience has shown that ordinary fountain pen ink is much less liable than india ink to crack in this way or to "ball" at the ends of the strokes. Waterproof inks must be used, however, if the slides are to be wet. If it is desired to render large areas opaque, and it is impracticable to use successive thin coatings, cover them with india ink, preferably using a brush, and when the surfaces have dried and cracked cover them again.

In coloring slides drawing inks may be used and the surfaces so colored will not crack if the ink is applied in thin enough coats. Higgins's carmine will be found less suitable than the other reds because of its heaviness of body and rapidity of drying. A simple method of improving one's chances of securing a smooth result, however, is to soak the drafted slide in water and then allow it to dry until there is no free moisture present, until it is sticky, before the colors are applied. If these precautions are taken and the wash is not too thick an even uncracked surface will result. Water colors, especially the stains and "lakes," are highly transparent and generally preferable to many of the drawing inks. For blended outlines the colors should be put on while the slides are covered with water in the customary way, but for the sharp outlines which will usually be desired in drafted slides the latter should be approximately or entirely dry.

Lantern slides prepared in this way need not be covered to preserve the writings or figures from abrasion, always a troublesome feature when clear glass is used. Fingermarks will show, though a slide pinched between the fingers will take a mark more readily upon the clear than upon the coated side, but these can be removed from the latter, almost irrespective of the ink or coloring materials used, by washing with pure alcohol. The ounce of pre-

vention is to paste a border of ordinary black binding tape on the coated side before work upon the slide is begun. This is an easy method also of inhibiting any tendency to write upon more of the slide than can be shown upon the ordinary screen.

LANCASTER D. BURLING

GEOLOGICAL SURVEY,
OTTAWA, CANADA

CELLOIDIN-PARAFFIN METHODS

THE review of Apáthy's¹ celloidin-paraffin method published in *SCIENCE* by S. I. Kornhauser the present writer chanced upon, although actively interested between the years 1912-1915 in similar methods of imbedding plant tissues.

During research studies in plant anatomy, bulbs of *Cooperia Drummondii* were found to be particularly troublesome material to imbed. The delicate scales contain starch, calcium oxalate crystals and a mucilaginous slime which may coagulate during killing and fixation. These scales are attached to a base or axis formed of parenchyma, it is true, yet of parenchyma of an entirely different structure from that of the scales. The difficulties encountered because of the included materials plus the variance in structure of the bulb axis and its attached scales caused a wide search for a suitable imbedding medium. The choice at last was a combination of celloidin and paraffin, the advantageous qualities of which can not be emphasized too strongly. As Dr. Kornhauser points out, celloidin in contact with the object prevents shrinkage of the material on cooling and paraffin allows of serial sections which can be readily spread on the slide. Whether there are advantages or disadvantages in Apáthy's oil mixture I do not know, having never tried it, but I do know that entirely satisfactory results can be obtained with material which can be handled neither in paraffin, in celloidin, in agar-agar, nor

in rubber and paraffin, by a much more simple celloidin-paraffin method than that of Apáthy's. The technique planned and followed out by the present writer was simply as follows: Material is treated to the celloidin process of imbedding up to the point where the object would usually be set in a block. Instead all surplus celloidin is removed from the object which with the adhering and infiltrated celloidin is hardened in 70 per cent. alcohol and later placed for clearing in chloroform for two hours. The next step is to place the object in 85 per cent. alcohol and from there on to follow the paraffin method. Material thus treated cut with an unusual smoothness, making it possible to obtain serial sections 10 μ in thickness with an ease that was a surprise and also a great comfort.

If one desires to cut serial sections of objects too large for the block of a rotary microtome or to be handled in paraffin, such large objects imbedded in celloidin (mature bulbs) can be cut into sections 50-75 μ thick with the sliding microtome, and placed immediately in 70 per cent. alcohol, from which they can be carried through the alcohols and imbedded in paraffin. It seems probable that Apáthy's oil mixture would be a valuable asset here because in cases where it is necessary to retain considerable celloidin, *e. g.*, in handling bulbs where the scales ordinarily fall apart on cutting, it would prevent the shrinkage caused by the drying effect of the alcohols and the heat from the bath.

There are surely two advantages to the celloidin-paraffin method as commonly used by the writer, (1) its simplicity and (2) the removal of surplus celloidin, a substance affected by the drying effect of the higher alcohols and heat and also inert itself in histological value and yet troublesome because of its affinity greater than that of plant tissues for stains such as gentian violet and safranin.

MARGARET B. CHURCH

ALLIGATORS AS FOOD

AN article by the writer on "Reptiles as Food," which appeared in the December, 1917, number of *The Scientific Monthly*, having

¹ Apáthy, S., 1912, "Neuere Beitrage zur Schneidetechnik," *Zeitschr. wiss. Mikr.*, Bd. XXIX., S. 449-515, 4 textfiguren.

² Kornhauser, S. I., "Celloidin Paraffin Method," *SCIENCE*, N. S., Vol. XLIV., No. 1134, pp. 57-58, July 14, 1916.