

test, place about 5 cc of the water in a test tube and add 5 drops of the 0.04 per cent. indicator solution. Now, pour the water back and forth from one test tube to another for a minute or two, so that the water may come to complete equilibrium with the carbonic acid of the air, and then compare with proper standards. If the water is of good quality and the air is of average outdoor purity, the water should assume a pH of 5.6 to 5.8. If the pH is higher than this, it is a good indication that either the water or laboratory air contains appreciable amounts of ammonia. On continuing to pour back and forth for some time there may be a gradual rise in the pH, due to slow but gradual absorption of ammonia. The water comes to equilibrium with the carbonic acid of the air very much more rapidly than with the ammonia, so that, usually, the factor of ammonia in the air may be ignored. It may, however, be desirable to repeat the test at an open window or door or even entirely outdoors. At times even outdoor air contains sufficient ammonia to appreciably affect the test. The test is so extremely sensitive that it is easily possible to detect the difference in the ammonia content of air before and after a rain or snow.

The test may also be made in the complete absence of carbonic acid and ammonia by bubbling a current of air, purified so as to be free of these gases, through the test solution. The pH of good water under these conditions should approach near 7. For most purposes, however, it suffices to make the test after allowing the water to come to complete equilibrium with the air and recognizing that under these conditions pure distilled water has a pH of 5.6 to 5.8.

It is important to emphasize that pure water has practically no buffer capacity and that minute amounts of impurities may be sufficient to markedly alter the pH of it. In making conductivity tests of water, the same principles should be followed as in pH tests, namely, the water should either be in complete equilibrium with the air, or else carbonic acid and ammonia should be completely removed and excluded during the tests, and the results interpreted accordingly.

EMIL TRUOG

DEPARTMENT OF SOILS,
UNIVERSITY OF WISCONSIN

A METHOD OF COPYING KYMOGRAPHIC RECORDS

THE physiologist or pharmacologist who during the course of a year accumulates a hundred yards or so of kymographic records must often wish, especially when he starts to write a paper, that he had in some way secured copies of those parts which are particularly convincing and illustrative, and had filed these under appropriate headings.

It is not always convenient to cut up the original records, and usually it will be found best to file in one place all the tracings made during several hours of experiment on one animal. Yet during that time several different phenomena may have been observed, several different experiments may have been tried, and several drugs may have been administered.

Many years ago it occurred to me that the cheapest method of obtaining a copy would be to make a print on fast bromide paper, using the smoked tracings as a negative. The method is so simple that it does not seem likely that I could have been the first to think of it, but I can not remember ever having heard of any one who used it. If the kymograph paper is well and evenly smoked and not handled overly much by greasy fingers the copy may be more clearcut and better suited for publication than is the original.

WALTER C. ALVAREZ

DIVISION OF MEDICINE,
THE MAYO CLINIC,
ROCHESTER, MINNESOTA

APPARATUS FOR OBSERVATION OF A SMALL OBJECT WHILE FLOODED WITH VARIOUS SOLUTIONS

IN attempts to study the effects of various solutions upon individual nematode ova and coccidia, need has been felt for an apparatus which would allow continuous observation of an individual object before, during and after it was subjected to the action of chemical solutions. Following is a description of such an observation cell which has proved to be very satisfactory for this purpose:

Two small trough-like depressions, (A, A'), about 0.4 mm deep are ground into the surface of an ordinary microscope slide. This is quickly done by hold-

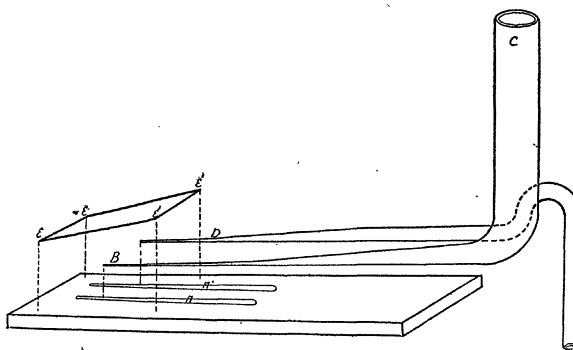


FIG. 1

ing the surface of the slide against the edge of a small carborundum wheel. Next, a glass tube of approximately 5 mm in diameter is heated and a portion drawn to a diameter of about 0.5 mm, while at the same time the portion of the tube at the constriction is bent to form a right angle. The smaller portion of the tube (B) serves as the inlet to the observation