As may be seen from the diagram (Fig. 1), the device is composed of parts already available in the laboratory. It is essentially a water manometer, the entire system from intestinal balloon to manometer float being filled with water. The manometer consists of an inverted Kimble retempered glass culture tube (No. 45070), 15 by 150 mm (or similar tube of uniform bore with or without the side arm indicated). This size has been found suitable for use in cats. In

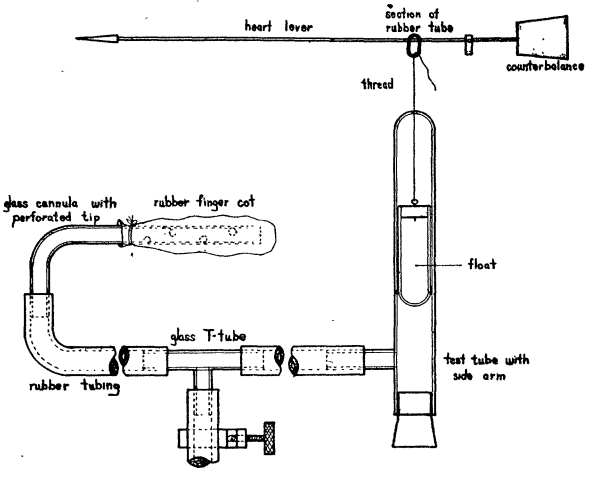

FIG. 1.

the bottom of the tube a pin hole is blown centrally through which a silk thread may pass freely. A manometer float is made either of a hypodermic syringe piston or of a Kahn tube, the size being selected by trial and error to fit so snugly that only a thin film of water separates the float from the manometer wall. Such close fitting insures accurate float reproduction of water level changes. The top of the float is closed with a rubber stopper about 5 mm thick to the center of which is attached a silk thread. The other end of the thread, after passing through the hole in the inverted tube, pierces the wall of a narrow section of rubber tubing which is also pierced by the writing arm of a Harvard heart lever. This latter arrangement makes possible quick adjustment of amplification of the water column height without the necessity of moving the lever relative to the recording surface, and without the use of clamps on the lever or knots in the thread. The recording lever is suitably counterweighted with a small rubber stopper. The intestinal balloon is of the conventional finger-cot variety, throughout the length of which runs a glass tube with several perforations. The perforations allow collapse of the balloon on one side or the end of the tube without interfering with transmission of pressure changes to the manometer. The system is preliminarily filled with water and after the balloon has been placed *in situ* the level of the float is adjusted by a syringe via the side arm of the T-tube.

We have found this device very easy to maintain and to adjust for operation. It is obvious that alignment of the manometer with the recording surface is not critical, and with the use of the gravity-type heart-lever little or no attention is required during the course of an experiment. With the dimensions described, excursion of several centimeters of the writing point per cc volume change is easily achieved. The inherent frictional inertia of the manometer is not a serious drawback to its use for the relatively slow changes in activity seen in the stomach and intestine. The device should prove useful for recording changes in volume of kidney and spleen.

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USE OF A DOUBLE-NOZZLED SPRAY APPARATUS FOR THE APPLICATION OF DDT OR OILS

DURING studies of methods of applying DDT (1-trichloro-2,2-bis(p-chlorophenyl)ethane), a deposit superior in quantity and quality was obtained by combining the water and DDT solution after they leave the spray nozzle. This was done by combining a spray of each from a pair of nozzles converging at an angle of approximately 35 degrees. A DDT solution was sprayed from a small atomizer into a water spray coming from a suction type paint sprayer. The droplets of the two sprays mixed by collision about 2 to 4 cm away from the nozzles.

When the DDT solutions were prepared with water-miscible solvents such as acetone, dioxane or alcohol, the insecticide was deposited as "nascent precipitates," some liquid and some solid. The DDT was precipitated when the droplets of the organic solution mixed with the droplets of water, and was immediately deposited on the sprayed surface.

Deposits on glass were found to consist of small particles well distributed over the surface, and it was possible to vary the type of the particle by varying the DDT concentration or the solvent. Oranges and apples were also successfully sprayed by this method.

Solutions of DDT in solvents other than those miscible with water were also successfully dispersed in this apparatus. Microscopic examination of the sprayed droplets showed that liquids, such as mineral oil, were dispersed in the water phase very much as if the oil had been emulsified, but in such an unstable condition that the oil deposited on the glass or fruit surface, leaving the water to drain off. The instability of the oil-in-water dispersion makes it possible to build a heavy deposit of oil on the surface

without losing much of it in the water that is draining away.

The deposits of DDT on glass were extremely resistant to water applied as drops similar to rainfall. The effect on the surface of an apple was more difficult to observe precisely, but there was no evidence that the DDT washed off the apples any more readily than from the glass. Some nascent precipitate of DDT from acetone spray on glass was not visibly decreased after 7 hours of pounding from rapidly dropping water.

Some of the advantages of using a multispray process over the spraying of a concentrated DDT solution alone may be revealed after the practical trials. At present it appears that inclusion of the water spray in the process should be useful as a carrying medium in orchard or truck-crop spraying. The presence of water should also decrease the danger of injury to foliage.

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MARKING ANOPHELES MOSQUITOES WITH FLUORESCENT COMPOUNDS[1]

MANY investigations concerned with activities and life cycles of *Anopheles* mosquitoes, as well as other insects, necessitates marking specimens in such a manner that individuals so marked can be recognized when subsequently collected and examined. Methods previously used employed dyes, either in solution or in the form of small particles, and metallic dusts.[2] When these methods are used, individual specimens have to be handled when search of collections is made for marked specimens. This procedure is very time-consuming.

The method herein presented involves the use of fluorescent compounds for marking adult specimens of *Anopheles quadrimaculatus* Say and later detecting those marked under an ultra-violet light. Anthracene, rhodamine B and fluorescein which produce blue, red and green fluorescent colors, respectively, have been successfully used as outlined below.

Anthracene can be applied as an aerosol or as a dust mixed with gum arabic. The aerosol is made by vaporizing anthracene with heat into a closed chamber. Particles with a mean diameter of 6.7 microns are produced. Exposure of caged specimens for five minutes to an aerosol concentration of 10.0 milligrams per liter of air produces an homogenous deposit of particles on the exoskeleton. This treatment apparently does not harm the specimens in any way.

When used as a dust, anthracene is mixed with gum arabic in water in the ratio of 1 part anthracene to 2 parts gum arabic. The mixture is evaporated to dryness and ground to a powder. Specimens are dusted with the powder and then placed in an atmosphere of saturated humidity for 15 minutes. This causes the particles to deliquesce and adhere to the insects. The use of gum arabic as a diluent provides a firm adhesion, thus contamination of unmarked specimens in the process of collection is avoided.

Rhodamine B and water-soluble fluorescein can be used to dye gum arabic at a concentration of 10.0 milligrams of dye to 3.0 grams of gum arabic. The resulting mixture is used as the anthracene dust for marking specimens, as indicated above.

By the use of this method large numbers of individuals can be readily marked and the examination of several hundred specimens can be made in a matter of a few minutes. Further details of this method will be given in a later publication.

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DISCUSSION

ANTIBACTERIAL ACTION OF QUINONES

WITH reference to the introductory statement by Colwell and McCall in their article in SCIENCE for June 8, page 592, that "the antibacterial activity of quinones has been recognized since 1911," I wish to remark that this property of quinones was made use of by me for preventing the bacterial decomposition of sugar-cane juice in 1906, in a study upon the action of the oxidases of cane juice on various polyphenols. I qoute as follows from my article on "The Fermentation of Sugar-Cane Products":[1]

> If certain polyphenols, such as hydroquinone, or pyrogallol, are added to fresh cane juice, a rapid oxidation of these compounds is produced with an intense darkening of the juice. The latter takes on at the same time a peculiar odor, due to the formation of a quinone body, and what is more remarkable acquires a germicidal property which, in the case of the juice treated with hydroquinone, insures its preservation for weeks. Sterilized juice shows no change in color and develops no germicidal properties with any of the phenol bodies named. In connection with this oxidation of hydroquinone there is a very marked absorption of oxygen.

Other experiments in my article tended to show that the familiar darkening in color of expressed

[1] From Emory University Field Station, Newton, Georgia.

[2] D. E. Eyles, *Public Health Bulletin*, No. 287, 39 pp., 1944.

[1] *Jour. Amer. Chem. Soc.*, April, 1906, pp. 455–6.