ever, appears more slowly than when ordinary glass is used. Containers other than glass will probably have to be employed before the whole problem of essential elements is solved.

A. L. SOMMER
UNIVERSITY OF MINNESOTA

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A CONTAINER FOR FIELD COLLECTION OF MOSQUITO LARVAE

IN the prosecution of malarial or mosquito studies larval collections play no small part. Containers used for captured larvae are subject to various disadvantages. For example, if the collecting jar is kept closed during field operations, the cover or cork must be removed whenever specimens are transferred to the container. If left open the contents are often lost because of jarring, especially if one is collecting in an area of irregular topography. Furthermore, most containers used for this purpose have either no mechanism for their attachment to the belt, or only an inadequate arrangement. The apparatus described below was devised to overcome the disadvantages just cited.

The container is a four-ounce jar with a mouth diameter of 40 mm. Two glass tubes with inner diameters of 4.5 mm. and 1.5 mm. run vertically through the rubber stopper as shown in the illustration. The outer termination of the former is flared

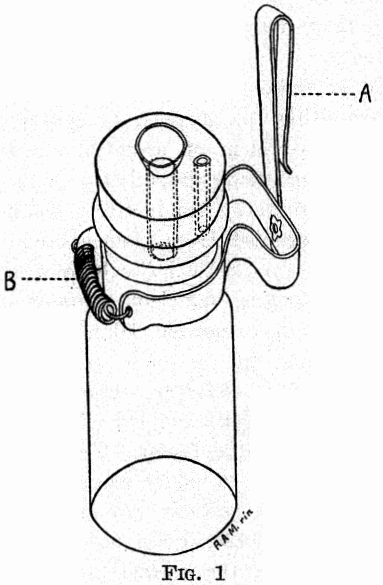

FIG. 1

into a funnel with a maximum diameter of 15 mm. and height not exceeding 10 mm. The inner end is flush with the surface of the stopper. The shorter the height of the protruding funnel the less will be the risk of breakage. The widened portion facilitates the transfer of larvae from the dipper in which they were captured, to the receptacle, by means of a pipette. The smaller tube practically prevents the formation of air bubbles in the larger. Its inner termination extends slightly beyond the stopper to prevent particles of the rubber cork from filling the tube and thus hindering air circulation.

The bent portion (A) made of nickel plated metal served to hold a key ring to a belt. It is now used for a similar purpose except that it is riveted to the collar, a piece of spring steel 13 mm. wide, so constructed that the jar is held tightly in place when its neck is enclosed within the collar. A hook similar to that shown in the illustration, except that it extended upward from the lower part of A, was cut off to better adapt the remainder for the design in view. The coiled spring (B), while not necessary, renders slipping of the jar impossible. All metallic parts should preferably consist of rust resisting material.

The apparatus after several months' trial in Porto Rico has proven fairly satisfactory. It is hoped that this descriptive note will stimulate others to improve the present model.

WM. A. HOFFMAN
SCHOOL OF TROPICAL MEDICINE
OF THE UNIVERSITY OF PORTO RICO,
UNDER THE AUSPICES OF
COLUMBIA UNIVERSITY,
SAN JUAN

DECALCIFICATION OF BONE IN ACID FREE SOLUTIONS

IN attempting to develop a method for the determination of an orthophosphate in bone, one of us observed that tertiary calcium phosphate is dissolved on addition of an excess of a magnesium citrate reagent even in the presence of a large excess of concentrated ammonia. White,[1] some four years ago, suggested the use of a solution of ammonium citrate for removing the lime salts from bone and the solvent action of the magnesium citrate reagent upon tertiary calcium phosphate suggested to us its possibilities as a decalcifying agent for histological purposes. The attempt to decalcify osseous tissue by means of this reagent proved successful.

The reagent is prepared as follows: Dissolve 80 gm of citric acid in 100 cc of hot water. Add 4 gm of magnesium oxide and stir until dissolved. Cool, and add 100 cc of ammonium hydroxide (density 0.90). Dilute to 300 cc, let stand 24 hours and filter. (If the magnesium oxide contains much carbonate, it

[1] White, C. P., *Jour. of Path. and Bact.*, Vol. 26, No. 3, 1923.

should be freshly ignited.[2]) The solution remains clear for some time and on standing, more rapidly after agitation, crystals of ammonium magnesium phosphate make their appearance.

Titrate with 5/N HCl to a reaction of approximately pH 7.0–7.6 and add an equal volume of distilled water.

Procedure and results.—This decalcifying fluid is apparently efficient in softening bone after it has undergone the action of any of the common fixing agents, but it is perhaps better to fix and harden the specimen in formalin. The latter must be well washed out from the tissue, first in running water for 12–24 hours according to the size of the specimen, and then in two or three changes of distilled water. It is then ready for decalcification. The citrate solution should be changed fairly frequently, since it will otherwise dissolve the calcium salts to saturation and the reaction will then retard. It has seemed best to replace the solution every other day. Decalcification proceeds relatively slowly as compared with solutions of the strong acids such as hydrochloric or nitric but it is much more rapid than Muller's fluid, picric or chromoacetoosmic acid, for example. The rib of a dog split through the center is freed of lime salts by this solution in about fifteen days. Swelling of the tissues is not induced by the fluid and there is no apparent shrinkage of such cells as those of the bone marrow. Stains are taken up without difficulty and sections stained with haematoxylin and Eosin colored in tints much more pleasing to the eye than those obtained when the application of the stain has been preceded by decalcification with strong acids. Magnesium citrate solutions are not so satisfactory as is Muller's fluid, however, if determination of the amount of uncalcified osteoid tissue present in the bone during the life is requisite. Unlike Muller's fluid, magnesium citrate allows decalcification to go on to completion and removes all possibility of distinguishing the osteoid tissue from bone which in life contained deposits of lime.

Conclusions. 1. Bone may be completely and rapidly decalcified by means of a reagent which is neutral or alkaline and is free of acids. 2. This process leaves the remaining tissues in a satisfactory degree of preservation.

B. KRAMER,
P. G. SHIPLEY

THE JOHNS HOPKINS HOSPITAL

[2] This reagent has been used by Mathison, G. C., *Biochem. Jour.*, 1909, IV, 237; Fiske, C. H., *Jour. Biol. Chem.*, 1921, XLVI, 289, and by others.

SPECIAL ARTICLES

E.M.F. INDUCED IN A STRAIGHT WIRE BY A CURRENT IN A PARALLEL STRAIGHT CONDUCTOR

IN Figure 1, let A be a cross-section of a tubular conductor of practically infinite length, and let a current, i, in this conductor flow "in," as shown by the crosses. Another long conductor, B, of small cross-section, is placed along the geometrical axis of A, and the ends of B are left open. It is required to compute the e.m.f. induced in B, per unit of its length, when the current in A varies with time at the rate di/dt.

Reasoning I. The magnetic lines of force outside the tube A are concentric circles, such as H. Within the wall of the tube they are also concentric circles. Inside the tube, the magnetic flux density is zero at any value of i. Consequently, no flux cuts B or collapses on it when the current i is varied, and no e.m.f. is induced in B.

Reasoning II. Consider two diametrically opposite filaments of current, such as f and f′, and determine the e.m.f. which a varying current in these filaments would induce in B. The three conductors are shown separately in Fig. 2. Let h be a line of force due to f, and h′ a line of force due to f′. Let the currents in f and f′ decrease; the motion of the two fluxes is then as shown by the horizontal arrowheads, each flux "collapsing" towards its own conductor. With

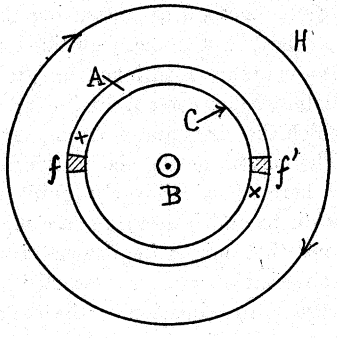

Fig. 1.

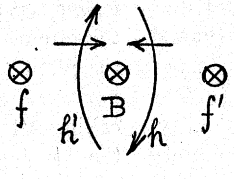

Fig. 2.

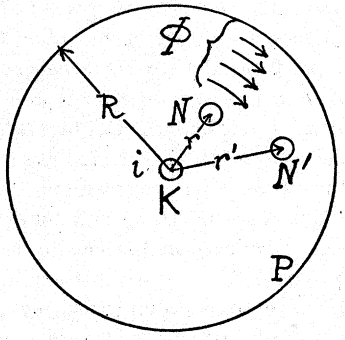

Fig. 3.