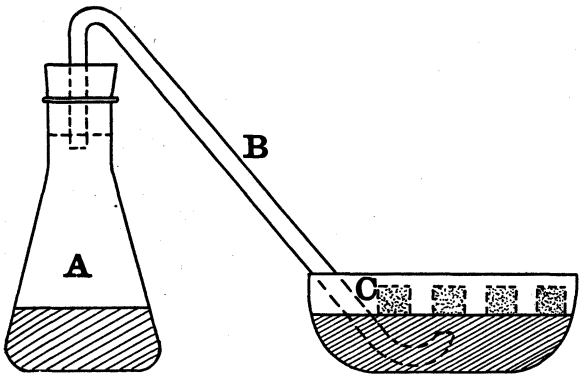

FIG. 1. Carbon tetrachloride recovery apparatus.

volatilized, it escapes through the tube. The distal end of tube (B) dips into and down to the bottom of a kidney-shaped enamel pan, which is filled to the depth of 1 or 2 inches with metallic mercury. On the surface of the mercury ice cubes (C) are placed in order to keep the mercury cool. The kidney-shaped pans are used so that they may encircle the electric heater when several extracts are volatilizing at the same time. Any suitable container for the mercury may be used.

When the electric heater is started, the volatilized carbon tetrachloride escapes through the distal end of tube (B) under the mercury. In its passage to the surface of the mercury it condenses and emerges as liquid carbon tetrachloride. The liquid carbon tetrachloride then can be readily poured off from the mercury and easily separated by use of a separatory funnel from the water which has resulted from the melting ice.

The advantages of this method are important from both the economic and health angle. Practically all the carbon tetrachloride can be recovered and the method is extremely simple. It does away with all escape of fumes into the room. Nine flasks have been used at one time, with no odor of carbon tetrachloride in the room. The distress complained of by laboratory assistants disappeared. Various other methods of recovery were tried, including removal by suction. None of them was capable of completely excluding the fumes. The method here reported has been used very successfully, is efficient and inexpensive.

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A SIMPLE AGITATION DEVICE[1]

A SIMPLE device for the moderate agitation of solutions is shown in the accompanying diagrams. All one side, except a strip B about one inch wide and running lengthwise, is cut out of a gallon oil-can A.

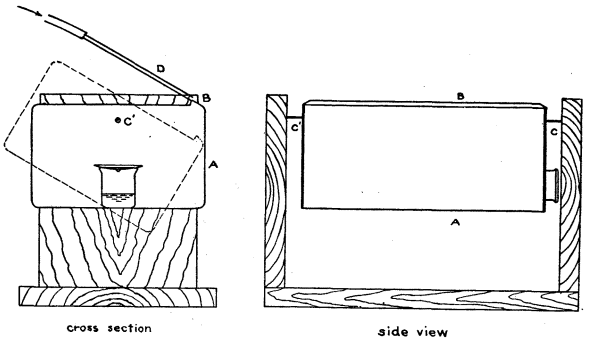

FIG. 1.

This strip is bent slightly upwards as indicated. The can is then mounted by means of nails between two upright boards. The holes in the can must be of such diameter that oscillation can occur freely. C and C′ indicate the positions of support.

When a stream of compressed air is passed through the glass tube D, striking the edge B, the can rocks back and forth on the nail supports. The amplitude may be controlled by regulating the air supply and the distance of the end of the glass tube from the edge of the can.

Vessels containing solutions to be shaken may be held in position by wires which are properly spaced and run lengthwise through the can. If beakers are used, watch glasses may be fastened on with rubber bands.

GRAHAM W. MARKS

A METHOD OF INCREASING THE YIELD OF DROSOPHILA

DURING the course of experimentation with different types of food media for raising *Drosophila melanogaster* at the University of Texas, the author discovered that the yield could be greatly increased by the addition of dried brewers' yeast to the culture media. Accurate counts were made under controlled conditions, and the yield was found to be about ten times greater after the addition of the yeast than in plain banana food and almost twice as great as in banana food with autoclaved fresh bakers' yeast added. When added to corn-meal food the brewers' yeast increased the yield in the ratio of 5:2. Since the yeast is very reasonable in price and convenient to handle, it should prove a source of great saving in the study of Drosophila.

The amount of yeast to be added depends on the richness of the food desired, but for general use about two grams per 100 cc of media will be satisfactory. It may be added as soon as the agar has dissolved and

[1] Contribution from the Scripps Institution of Oceanography of the University of California, La Jolla, California.

boiled with the food. Although the yeast is dehydrated, it may contain some spores which might cause a slight fermentation. This difficulty, however, may easily be overcome by autoclaving the yeast for a short while before using. The plain dried brewers' yeast (procured from The Vitamin Food Company, New York) was found to be the most satisfactory.

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SPECIAL ARTICLES

HUMAN IMMUNIZATION WITH A DERMAL VACCINE CULTIVATED ON THE MEMBRANES OF CHICK EMBRYOS[1]

IN previous papers with A. M. Woodruff[2,3] we have reported the successful cultivation of vaccine virus on the chorio-allantoic membrane of chick embryos, following the method of Woodruff and Goodpasture in their study of fowl-pox[4]; and we have suggested that this method be applied to the preparation of anti-smallpox vaccine on a large scale. Recently these experiments have been successfully repeated with dermal strains of vaccine by Nauck and Paschen[5] and by Stevenson and Butler.[6]

With the purpose of determining the practicability of preparing and using vaccine cultivated on the chick membranes for human vaccination, we began 15 months ago culturing a dermal strain of vaccine derived from the laboratories of the New York City Board of Health. It was found that an infection free of bacteria could frequently be obtained on primary inoculation, but to insure bacterial sterility the infected membranes were ground and filtered through a Berkefeld N candle. The filtrate, having shown no growth on bacterial media, was centrifuged and a pure strain of vaccine was obtained by inoculating the sediment upon the exposed chorio-allantoic membranes of 10 and 12 day chick embryos. This strain has been propagated during the past fifteen months through eighty-five successive generations without mammalian passage, and apparently it has become stabilized.

The results of the work of the past year have convinced us of the practicability of preparing by this method a vaccine, free of bacteria, with a potency and durability that will insure a stable product over a sufficiently long period to be safe and reliable under field conditions. The vaccine may be preserved dry or glycerinated, and except for its cultivation it is prepared and utilized in the manner now employed for calf vaccine.

After determining that the chick vaccine shows no essential differences from calf vaccine in its pathogenicity for rabbits and monkeys, and that it induces, so far as we can determine by serological and crossed vaccination experiments, an equally substantial immunity in these animals, we made observations upon its effects in man.

Seventeen persons, ranging in age from 3 to 40 years, were chosen. They were judged to be non-immune from the fact that vaccination scars were absent. They were vaccinated over the deltoid muscle of the left arm by the scratch method in the following groups.

Seven persons were inoculated with a dermal strain of vaccine virus which had been carried on the chick membrane through six successive passages. This virus had been stored in the refrigerator at 0° C. over a period of five months, and was finally prepared by adding four parts of 50 per cent. glycerol to one part of ground material. Bacteriological tests proved this vaccine to be entirely free from contaminating micro-organisms. Tests on the rabbit proved it to be of reliable potency.

Seven persons were inoculated with a regular calf strain of vaccine virus prepared by E. Squibb and Sons. This was contained in capillary pipettes in the usual manner of vaccine virus prepared for routine vaccinations. These vaccinations were performed to serve as a control and for comparison with the reactions produced by the chick strain of vaccine.

Four persons were vaccinated with a dermal strain of vaccine virus which had been cultivated on the chick membrane through seventy-five successive passages. This vaccine had been stored in the refrigerator for a period of three months and was prepared in the same manner as mentioned above.

Of the seven persons vaccinated with the regular calf strain of virus, one failed to develop any reaction. One developed a typical vaccinoid reaction which reached its height on the sixth day and then rapidly subsided. The remaining five developed a typical vaccinia which reached the height of its reaction on the tenth to the twelfth day. These reactions were typical in every respect as to the appearance of the successive stages of the lesions and the

[1] Aided by grants from the Divisions of International Health and Medical Sciences of the Rockefeller Foundation.

[2] SCIENCE, 74: 1919, 371, 1931.

[3] *Amer. Jour. Path.*, 8: 271, 1932.

[4] *Amer. Jour. Path.*, 7: 209, 1931.

[5] *Zentrbl. f. Bakt., Parasitkd., u. Infkr.*, I Abt. Orig. 128, 171, 1933.

[6] *Lancet*, ccxxv, 228, 1933.