placing living nemas in a well slide and projecting on a daylight screen with a microprojector. Under suitable magnifications many of the anatomical features may be shown on the screen in this way.

Individual studies were carried out from living and preserved material. This last was prepared by the writer in the following way: With a pipette, the vinegar eels were collected into a graduate until 50 ml of solution was obtained. This was then poured into an Erlenmyer flask containing 10 ml formalin and quickly heated over a Bunsen burner. The heat promptly kills and straightens the nemas and after about a minute they are removed from the flame and allowed to stand in the formalin for one hour. Subsequently they were filtered through a piece of silk cloth, placed in 50 per cent. alcohol for one hour and in 70 per cent. alcohol, to which last some Delafield's hematoxylin stain was added (5 ml of the stain to 50 ml of the alcohol). In this they may be kept indefinitely. For use a drop of the solution was given to each student on a slide. In such material all the forms indicated in the above outline could be found by every student. The nemas show no distortion, and all of the structures stand out clearly. If desired, this material may be further dehydrated and mounted in balsam, although the optical effects in this last medium are not as satisfactory as when examined in alcohol.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

SOME LABORATORY USES FOR CROWN SEALED MILK BOTTLES[1]

THE Crown Seal used for milk bottles is a metal cap similar to those used for beverage bottles, except that the milk bottle cap is larger. The cap is crimped tightly over the neck of the bottle and, with a suitable lining, is air tight.

In most bacteriological laboratories the storage of media is a problem. It is customary to sterilize media in large flasks plugged with cotton and to store these in the refrigerator. The flasks are relatively expensive and easily broken. To avoid boiling over of the media during sterilization and wetting of the cotton plugs the flasks may be filled only about two thirds full. They require a great deal of refrigerator space. Through the cotton plugs the media evaporate and are exposed to oxidation by atmospheric oxygen. In time molds may grow down through the cotton plugs. The use of milk bottles with cork-lined Crown Seals (Fig. 1) eliminates these difficulties. The bottles may

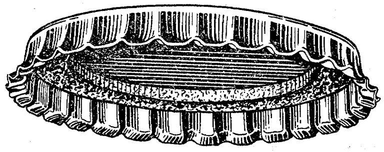


FIG. 1

be filled with media to within about two inches of the top. The caps are firmly crimped on by means of a suitable capping machine (Fig. 2) before the bottles are placed in the autoclave. During autoclaving the pressure outside should equalize that within the bottles and there is no leakage or boiling over if ordinary care is used in allowing the steam pressure to drop slowly at the end of the autoclaving period.

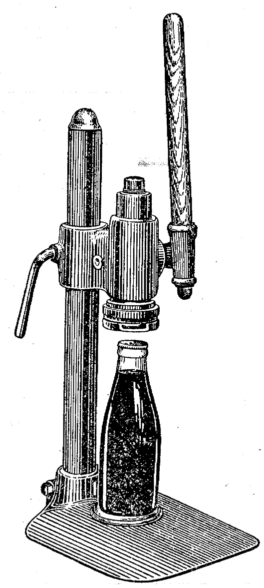


FIG. 2

The bottles of sterile media may be stored at room temperature in any convenient place. They require relatively little shelf room. There is no evaporation. There is little opportunity for oxidation since the air is excluded except for the small amount remaining over the media when the bottles are sealed. The bottles of media may be handled and shipped with no danger of leakage or contamination and little danger of breakage. The quality of glass obtainable in the milk bottles is fair. We have noted little chemical action on the glass. Occasionally a bottle may break under the influence of heat in the autoclave, especially if the bottles have been filled with cold media. Efforts are being made to procure Pyrex bottles for this purpose. The cost of the milk bottles is very low as compared with that of laboratory glassware.

[1] From the Department of Pathology and Bacteriology, Johns Hopkins University, Baltimore, Md.

The metal caps cost a fraction of a cent each. The cost of the sturdy capping machine shown in Fig. 2 is about $35.00 and a cheaper one is procurable. The quart bottle seems to be the best size. It fits into the autoclave, allows ready penetration of heat and stores conveniently on shelves. There is no disadvantage in having to distribute a large lot of medium into a number of bottles. The large mouth milk bottle is more convenient to fill and to pour from (especially for agar) than the small mouth beverage bottle.

In 1925 I reported on "The Preservation of Bacteria in Vacuo."[2] Dried on small bits of filter paper in a vacuum bottle most bacteria remain viable without transplanting for many years. The dried cultures were enclosed in pint milk bottles, the mouths of which were ground down flat against small glass plates and these were sealed with a wax mixture. The labor and difficulty of grinding down the bottles against the glass plates has doubtless discouraged the more general use of this method of preserving cultures. We now find that a smaller milk bottle (one half pint) with a metal Crown Seal which has a special rubber composition ring lining makes a much more convenient and readily available vacuum bottle at small cost. The cultures, smeared on small bits of sterile filter paper in small cotton-plugged vials, are placed over some dehydrating agent (calcium chloride has been used) in the bottle. The edge of the bottle is rimmed with vaseline to make a more perfect contact with the rubber ring in the cap. The cap is placed lightly over the bottle (not crimped) and the bottle is placed under the bell jar of a vacuum pump. When a vacuum has been established within the bell jar the air is admitted suddenly. The inrush of air into the bell jar closes the bottle immediately without entering the bottle. To insure a permanent seal the bottle is then placed under the capping machine and the cap securely fastened into place. After using these bottles for several months we have noted no leakage as indicated by small manometers placed within the bottles.

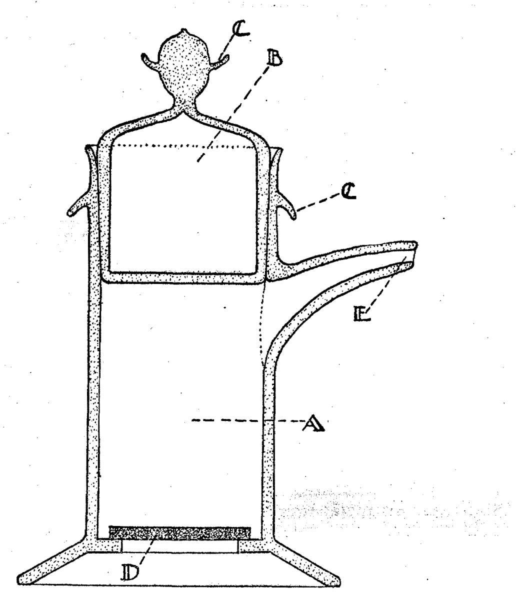
Quart milk bottles serve very well for the cultivation of anaerobic bacteria in test tubes. Pyrogallol and a strong solution of sodium carbonate are placed in the bottle along with the culture tubes and the bottle is promptly and securely sealed with one of the rubber composition lined caps.

J. Howard Brown

A DILATOMETER FOR MEASURING THE SWELLING OF SEEDS

The dilatometer here described—for measuring the rate and amount of swelling when immersed in an aqueous solution of seeds, dried fruits or other objects composed of or containing water-imbibing colloidal materials—is of the type in which the increase in volume of the test object is evidenced by the displacement of shot or sand surrounding it. The distinctive feature of the instrument is the avoidance of the use of metal in contact with the solution in which the test object is immersed, and is made possible by the utilization for the purpose in hand of two products of the glass industry which have recently appeared on the market:

(1) For the bottom wall of the dilatometer chamber, which is perforated to permit the flow of water through it, the perforations being too small to allow the escape of any of the enclosed shot or sand, use is made of a fritted glass filter disc manufactured by Schott and Gen., of Jena, Germany. In addition to avoiding the use of metal, this has the additional advantage of being more rigid than wire cloth.



(2) For the shot or sand surrounding the test object in the dilatometer chamber use is made of glass beads of very small sizes which are manufactured in Czechoslovakia and in Italy and which are employed in this country in the manufacture of decorative furniture novelties to produce a "crystal frosting" effect on fabric and paper surfaces. These glass beads are obtainable in sizes as small as 0.25 mm diameter, and in bright colors as well as in untinted glass. They are perfect spherules and roll and glide easily over one another when wet as well as when dry; they are greatly superior in this respect to the best grades of silica sand commercially obtainable. As compared with lead or steel shot these glass beads have the

[2] Abstracts of Bacteriology, ix: 1, p. 8, January, 1925.