new investigations, since many an investigation is not entered into because of the difficulty of learning fully what has been done. One fears to devote time and energy to something which may have been already tried out in another place or another country. The time saved by this proposed system of abstracting will permit many a good investigator to take up problems for which he does not have time under the present system. What a boon it would be to industrial chemistry!

It will take time and money to carry out this proposed plan, but it will be a mine when it is in shape—a mine furnishing real precious products. After the chemical literature of the past has been once abstracted it will not require so much expense to keep the material up to date.

The great universities of the country might combine in their efforts and carry out such a project. Many sets of the cards could be printed without great additional expense, and thus the complete work would be given to each of the institutions. In this way the expense would not be so great for each institution. Large industrial organizations might join with the institutions or they might get together and carry out the plan themselves. It would grow into a very large card system and would require space for installation and care. As the years go by, it would continue to grow and occupy more space.

Another method of carrying out such a project would be the formation of an independent organization for the purpose which would be endowed and completely fitted for carrying on the work. This organization could print numerous copies of all cards made and furnish them to educational institutions or industrial organizations wanting them—either a complete set or those on given subjects as desired. This would call for a liberal endowment.

Other methods of carrying out the plan are possible, of course, and even better ones might be found. There is no question but that the idea is a great one and the carrying out of such a plan would involve excellent planning and a considerable outlay of money. It would be one of the greatest scientific achievements of the century.

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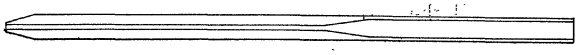
SCIENTIFIC APPARATUS AND LABORATORY METHODS

A PIPETTE FOR THE DILUTION COUNTING OF HOOKWORM EGGS[1]

THE pipette shown in the accompanying figure has, in this laboratory, proved more satisfactory than any



other suggested for use in the dilution counting of hookworm and other parasite eggs in human feces, by Stoll's method.[2] It consists of a 12 cm length of capillary glass tubing, with inside diameter between 1.0 and 1.1 mm and outside diameter approximately 7 mm, fused at one end to a piece of ordinary glass tubing, with outside diameter of 7 to 8 mm, to make a total length of 20 cm. The taper inside the junction should be perfectly smooth and even and approximately 1.5 cm in length. The end of the capillary tubing is ground on a carborundum stone or wheel and finished on a fine stone to produce a smooth, strong tip.

When one is calibrated, all others from the same stock can be estimated quite closely, thus shortening the labor of calibration. In this laboratory it has been found that technicians are most accurate in calibrating if they are instructed to vary the marking of the pipette until 20 times will fill, level full, a serum tube which has been cut off to hold exactly 1.5 ml. Final checking is then done by the person in charge, and recorded on the pipette with a diamond pencil. The resulting column of fluid will contain the required .075 ml and will vary in length from 65 to 95 mm, within which limits reading is quite accurate.

This pipette eliminates the difficulty of contamination of successive specimens by the accidental filling of the rubber bulb, a frequent occurrence in similar capillary pipettes which do not have the larger tubing attached. Furthermore, this pipette has not the fragility of those drawn from larger tubing, nor the tendency to clog found when the latter are drawn to a taper.

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[1] The studies and observations on which this paper is based were conducted under the auspices of the Department of Public Health of the Egyptian Government and the International Health Division of the Rockefeller Foundation.

[2] N. R. Stoll and W. C. Hausheer, "Two Options in Dilution Egg Counting: Small Drop and Displacement," *Amer. Jour. Hygiene*, 6: 134–145, March Supplement, 1926.

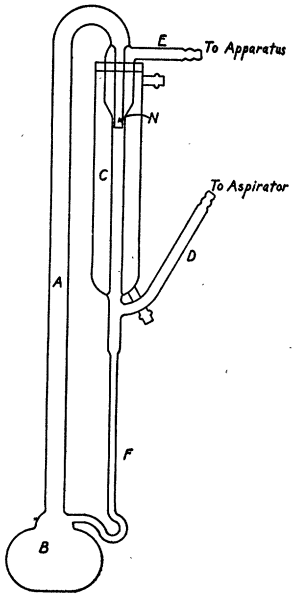
MERCURY VAPOR PUMPS FOR VACUUM DISTILLATIONS[1]

THE vacuum pumps used in organic laboratories to evacuate distilling apparatus are ordinarily of the

[1] Contributed from the Chemical Laboratory of the University of North Carolina.

Cenco Hyvac type. Vapors from organic distilling apparatus frequently and soon ruin their efficiency either by corroding the insides of the pump or by dissolving in the pump oil and making the limiting pressure of the pump equal to the vapor pressure of the oil. In the case of corrosion, the pump is ruined, and in the case of vapors dissolved in the oil, the pump must be taken apart, cleaned and have new oil put in—a very messy job. Moreover, pumps of this kind will not pump condensable vapors, because they operate as piston pumps. Another disadvantage is that they are rather expensive.

A Pyrex glass mercury vapor pump of the type shown in the diagram, designed to work against an



aspirator as a force pump has none of these disadvantages, although it has a few drawbacks of its own. It is made of glass and so is not subject to corrosion except for the mercury that it contains. It contains no oil to absorb vapors and spoil its efficiency. When it becomes dirty, it is much easier and less messy to clean, for this can be quickly done with nitric acid. Since it works by diffusion, it will pump condensable vapors. In addition, it is a much less expensive piece of apparatus than an oil pump and occupies a smaller table space.

A type of pump suitable for doing vacuum distillations is shown in the figure. The boiler B should be a flattened bulb about 6.5 cm in diameter and 4.5 cm in thickness. It is not absolutely necessary to use a flattened bulb, but this shape gives rise to less bumping of the mercury during operation of the pump than a spherical boiler. Tube A, which leads from the boiler to the nozzle N, can be made from 1.5 cm tubing. The nozzle should be 7 mm in outside diameter and project a distance of one centimeter into the narrow part of the condenser. The condenser should be 8 mm inside diameter. A 15 cm condenser will be found long enough to condense all the mercury. The return tube F should be 14 cm long. Although most of these dimensions may vary, the dimensions of the nozzle and the length of the return tube should not be changed, since they are vital to the operation of the pump.

The operation of a pump of this type is quite simple. The main requirements for its satisfactory operation are that the apparatus to be evacuated be as free as possible from leaks and that the aspirator to be used as a force pump be one capable of producing a vacuum of 30 mm of mercury or better. In use, the pump is clamped to a ringstand by means of asbestos padded clamps at a height such that a good burner can be used to heat the boiler which has about one centimeter of mercury in it. The outlet tube D is connected by means of suction tubing through a safety trap to the aspirator which is to serve as a fore pump. The inlet tube E is connected to the vacuum distilling apparatus and the condenser is connected to the water supply and to the sink. After the apparatus is connected, the aspirator is turned on. When the pressure in the apparatus gets down to 30 mm of mercury, the mercury vapor pump is started. This is done by starting the water through the condenser and lighting the burner under the boiler. The burner should be regulated so that the mercury stands about 7 cm high in the return tube F. If the condenser used with the distilling apparatus is not efficient enough to condense all the vapors of the substance being distilled, it is a good idea to insert a trap cooled with ice between the distilling apparatus and the pump.

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SPECIAL ARTICLES

THE VALIDITY OF MEASURING EYE MOVEMENTS BY DIRECT OBSERVATION

IN clinical and experimental studies of eye movements during reading one method of measurement has been to count the number of fixations through direct observation. (A mirror is sometimes used to obtain a better view of the eyes.) However, during a recent experiment this method gave results which were inconsistent with those obtained from photographing eye movements with the Iowa Eye Movement