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CONTRIBUTIONS OF THE MEDICAL CORPS OF THE ARMY TO THE PUBLIC HEALTH LABORATORY[1]

By COLONEL EDGAR ERSKINE HUME

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DR. WILLIAM HENRY WELCH was a long-time friend and constant user of the Army Medical Library. Billings, its great librarian, had selected Welch for his professorship at Johns Hopkins. Not long before his last illness Dr. Welch was in the library and, in the course of one of his delightful conversations, said: "I have been asked on more than one occasion what have been the really great contributions of this country to medical knowledge. I have given the subject some thought and believe that four should be named: (1) The discovery of anesthesia; (2) the discovery of insect transmission of disease; (3) the development of the modern public health laboratory, in all that the term implies; and (4) the Army Medical Library and its Index Catalogue."

"Popsy," as he was affectionately called, was more apt to utter words of wisdom than to write them. The Librarian was so struck by this pronouncement that he reduced it to writing immediately after Dr. Welch had left. I bear witness, for I was the Librarian.

What is "the modern public health laboratory"? I assume that Dr. Welch meant not a mere building with a miscellaneous collection of apparatus, but the concept of the sum of the knowledge of chemical, physical and biological procedures which have added to our scientific knowledge or which aid in the maintenance of health of individuals and communities. In

[1] Presented at the first session of the Laboratory Section of the seventy-first annual meeting of the American Public Health Association, St. Louis, Mo., October 27, 1942.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN APPARATUS FOR CONCENTRATING SERUM

WITH the current large-scale use of human serum, in both military and civilian medicine, the desirability of concentrating the serum has been manifest, both in order to economize storage space and to facilitate treatment. With the apparatus to be described we have found it practicable to store the equivalent of 250 cc of serum in a 100 cc bottle rather than in the 500 cc bottle previously used.

Concentration may be effected by evaporation through a Cellophane tube supported by a special glass bell (Fig. 1). Seamless tubes of Cellophane,

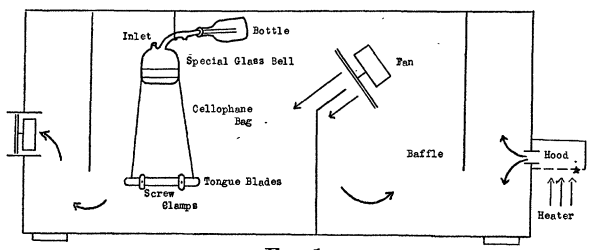

FIG. 1.

known commercially as sausage casings, are used as containers for evaporation. These tubes are cut into 12-inch lengths and the bell is inserted in one end. It is made secure with a one-half inch strip of tape drawn tightly over the adjoining surfaces. The bottom of the tube is closed by folding the bag over a strip of wood. (Tongue blades are excellent strips for this purpose.) This in turn is folded once more and additional tongue blades are securely fastened on each side with screw clamps. To maintain a closed system, the inlet is sealed with a "mushroom" vaccine stopper. The side arm of the bell is wrapped with cotton and inserted into the neck of a 100 cc storage bottle (Kimble vaccine bottle). The cotton forms a bacteria-proof seal between the side arm and the bottle. Paper is then wrapped around the joint to further insure sterility. This entire closed system, consisting of Cellophane bag, glass bell and storage bottle, is autoclaved as a single unit.[1] Serum is introduced into the Cellophane bag through the inlet and the unit is suspended in a vertical position in the cabinet.

The concentrating cabinet is 4 feet long, 1 foot wide and 2 feet high. The individual units are suspended from hooks situated as shown in the diagram. A cabinet of these dimensions will accommodate twelve units.

The cabinet is so constructed that a constant volume of warm air is blown over the Cellophane surfaces. The incoming air is warmed by a "Fletcher Radial" gas burner. The heating unit is covered with a metal hood that is equipped on the under surface with a screen. The flames from the burner pass through the screen (A), but do not go beyond the hood. With this arrangement, air is adequately heated before it enters the cabinet. A constant current of air is maintained by an exhaust fan situated at the opposite end of the cabinet.

It is important that the air brought in at the intake shall be thoroughly mixed with the air in the cabinet in order to insure an even temperature on all the drying surfaces. This has been accomplished by installing three baffles and an electric fan within the cabinet. The fan is so situated that part of the air is blown directly on the bags and the remainder mixes with the incoming air from the first compartment.

We have tried numerous types and arrangements of the baffles and have found the one shown in the accompanying diagram to be the most satisfactory in producing a uniform temperature.

The Cellophane tube as described will handle a volume of 250 cc of serum. By experimenting it has been found that a cabinet temperature of 60° C. will give a fluid temperature in the Cellophane tubes of approximately 30° C. At this temperature, water is removed at a rate of 25–30 cc per hour and concentration to one fourth the original volume is effected in six to eight hours.

After the desired amount of water has been removed, the bag is inverted and the concentrate allowed to flow into the bottle. The bottle is then aseptically sealed with a vaccine stopper and stored in a frozen state.

The apparatus also lends itself readily to the concentration of other biological products.

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[1] When sausage casings are autoclaved and allowed to dry they become brittle. In order to prevent this, we wrap the entire unit in a towel before autoclaving. This retains enough moisture to prevent cracking.

BOOKS RECEIVED

ADOLPH, EDWARD F. *Physiological Regulations.* Illustrated. Pp. xvi + 502. The Jaques Cattell Press. $7.50.

BLACKWELDER, RICHARD E. *Monograph of the West Indian Beetles of the Family Staphylinidae.* Pp. 658. U. S. Government Printing Office. $1.00.

BRENKE, WILLIAM C. *Plane and Spherical Trigonometry.* Illustrated. Pp. x + 269. The Dryden Press. $1.90.

GABRIELSON, IRA N. *Wildlife Refuges.* Illustrated. Pp. xiii + 257. Macmillan. $4.00.

GALDSTON, IAGO. *Behind the Sulfa Drugs.* Pp. xviii + 174. Appleton-Century. $2.00.

HIRST, H. *X-Rays in Research and Industry.* Illustrated. Pp. 127. Chemical Publishing Co. $2.50.

LEMON, HARVEY BRACE and MICHAEL FERENCE, JR. *Analytical Experimental Physics.* Pp. xvi + 584. The University of Chicago Press. $7.00.