

TABLE II.
Blood of Streptococcal Convalescents Possesses a Property Absent from Normal Blood.

Streptococcal Convalescent Plasma (by Routine Test)	=	Resistant Clot
" " " + Normal Serum	=	" "
" " Serum + Plasma	=	" "

Note: Resistant clot denotes no lysis of clot in 24 hours. Susceptible clot denotes complete lysis within 1 hour.

The results which are summarized in Tables I and II indicate that the resistant clots of newborns depend on a different mechanism than those observed in patients recovering from a hemolytic streptococcal infection. In newborns resistance is apparently due to the *absence* of a substance since their clots are rapidly dissolved when normal serum has been added, and resistance cannot be passively transferred to a normal plasma by the addition of newborn serum. The converse is true of the blood of patients recovering from a hemolytic streptococcal infection, that is, their resistance is due to the *presence* of a substance which is transferable.

Studies in progress indicate that the positive antifibrinolysin tests (resistant plasma-clots) encountered in patients with severe non-streptococcal diseases are frequently like those of newborns in that they are due to absence of a substance—presumably "lytic factor" of Milstone—and not to the presence of streptococcal antifibrinolysin. In other instances both absence of a lytic factor and presence of antifibrinolysin have been demonstrated.

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Ultraviolet Sterilizer for Celluloid Tubes.

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In the course of describing a high speed, air-driven centrifuge for the study of viruses, Bauer and Pickels¹ reported the use of celluloid tubes as satisfactory containers capable of withstanding high centrifugal forces. The tubes are transparent, light, flexible, and practically nonbreakable. More recently Horsfall² pointed out their ad-

¹ Bauer, J. H., and Pickels, E. G., *J. Bact.*, 1936, **31**, 53.

² Horsfall, F. L., Jr., *J. Bact.*, 1940, **40**, 559.

vantage over glass containers for the storage of certain labile biological material at the temperature of solid CO_2 . They now also are used frequently for shipping labile material packed in dry ice.

The extensive use of celluloid tubes has been handicapped by the difficulty of sterilizing them. Any form of heating deforms them or renders them brittle, and chemical agents such as alcohol are also unsatisfactory. Thus there has existed an urgent need of a practical method of dry sterilization, and the purpose of this paper is to describe a simple apparatus for the sterilization of celluloid tubes by means of ultraviolet light.

The sterilizer consists essentially of a cabinet and 3 enclosed ultraviolet lamps, which, with the aid of a suitable reflector, direct their illumination downward into the openings of the tubes. As celluloid absorbs ultraviolet light, the certainty in sterilization of a tube depends on every element of its internal surface being supplied with an uninterrupted beam of the radiation, either directly from a lamp or by reflection from a good mirror surface. The present apparatus is designed to accomplish this with tubes* which are $\frac{1}{2}$ inch in diameter and $3\frac{1}{2}$ inches in length, and which are provided at the top with impressed threads for metal screw caps. Although such tubes were used in testing the efficacy of the sterilizer, it was found to function equally well, as might be expected, with tubes of other dimensions, provided, however, that the ratio of length to diameter was not greater than 7.

The cabinet is made of wood with an inside width of about 17 inches. Double lapping doors hinged flush with the front side of the cabinet at its ends close into rabbeted recesses which prevent the escape of ultraviolet radiation. It was found to be an advantage to provide the doors with small windows through which the proper operation of the lamps can safely be observed.

The sterilizing radiation is furnished by 3 straight, 30-inch Westinghouse Sterilamp tubes, type 782-30, arranged parallel to each other in a horizontal plane and spaced 2 inches apart, center to center. According to specifications of the manufacturers,[†] 80% of the radiation generated by these lamps is in the ultraviolet region of 2537 Ångström units. The tubes are made of a special glass which permits a high degree of ultraviolet transmission and consequently they can be furnished at considerably less cost than the more familiar quartz burners. It has been recommended that the

* Supplied by the Lusteroid Container Co., Inc., 10 Parker Avenue West, South Orange, New Jersey.

† Westinghouse Electric and Manufacturing Co., 150 Broadway, New York City.

tubes be replaced after 4500 hours of intermittent duty since their efficiency decreases slowly after this period. The comparatively high voltage required to operate the lamps can be obtained from either a single transformer or from 3 smaller, individually connected transformers. Supplied by the same manufacturer, these transformers operate on 110 volt, 60 cycle alternating current and consume less than 30 watts for each burner. Very little heat and relatively small amounts of visible light are produced. Heavily insulated wires should be used for electrical conductors between the tubes and the transformers, which can be placed either inside or outside the cabinet. Plain metal clips mounted on strips of insulating material at either end of the cabinet furnish a simple method of holding the lamps and making electrical contact. An ordinary snap or toggle switch outside the cabinet controls the current to the primary side of the transformers.

Near the top of the cabinet and centered above the 3 lamps is a metallic reflector made from a 1/16-inch sheet of polished aluminum, commercial grade, measuring 12 inches by 30 inches. It is bent downward along the center line to form an angle of about 140° between the two 6-inch surfaces. The ridge of the reflector is parallel to the central lamp and is situated 4 inches above its center. The reflector may be made of any flat material such as tin-plated iron sheeting which has a high reflectivity in the ultraviolet.

During sterilization the open celluloid tubes are held in test tube racks placed on a shelf whose height is so adjusted that the tops of the tubes are approximately 9 inches below the lamps. It is important that the tubes, especially narrow ones, fit the rack spaces closely enough to be held in an upright position. The limited effective zone for complete sterilization is demarcated on the surface of the shelf by wooden strips 1 inch high which form a fixed rectangular enclosure 5 inches wide and 24 inches long. This enclosure is centered directly beneath the lamps and will accommodate 2 ordinary test tube racks, together holding at least 180 1/2-inch tubes.

The efficiency of the sterilizer was determined with several lots of contaminated tubes distributed throughout the effective zone and subjected to the radiation for various lengths of time. The internal wall of each tube, including the threaded section, was contaminated by smearing with a concentrated aqueous suspension of fresh monkey feces which was known to contain large numbers of highly resistant spores. Tests for sterility were performed by filling the tubes with sterile broth, which was allowed to flow from the pipette across the threaded section of the tube. Each tube was incubated at 37°C

for 3 days before final reading for sterility or contamination was made. About half of the tubes were usually found to be slightly contaminated after an exposure of 6 hours' duration. Complete sterilization was consistently obtained after an irradiation time of 20 hours. While considerably less time may be sufficient for tubes not purposely and so highly contaminated, the safe practice has been adopted of exposing tubes of any size to the ultraviolet light for 24 hours. The metal screw caps are placed in petri dishes and sterilized separately by any heat. They are then attached with the aid of sterile forceps to the threaded tops of the sterilized tubes, preferably before removing the tubes from the cabinet.

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Lymphocytic Choriomeningitis: Two Human Fatalities Following an Unusual Febrile Illness.

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Human infections with the virus of lymphocytic choriomeningitis may assume a number of different clinical forms, *viz.*, aseptic meningitis,¹ meningo-encephalomyelitis,² anterior poliomyelitis³ and grippe.^{4, 5} Furthermore, unrecognized infection with this virus appears to be common since many individuals have in their serum neutralizing antibodies for the agent.⁵ Nevertheless, acute illness proved to be caused by the virus of choriomeningitis has been reported in less than a hundred individuals and none of these died.⁵ Fatalities have been reported among patients assumed to have been infected with this virus;⁶ however attempts to isolate the agent from

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¹ Scott, T. F. McN., and Rivers, T. M., *J. Exp. Med.*, 1936, **63**, 397; Rivers, T. M., and Scott, T. F. McN., *J. Exp. Med.*, 1936, **63**, 415.

² Findlay, G. M., Alcock, N. S., and Stern, R. O., *Lancet*, 1936, **1**, 650.

³ MacCallum, F. O., and Findlay, G. M., *Lancet*, 1939, **1**, 1370.

⁴ Lépine, P., Mollaret, P., and Kreis, B., *Compt. rend. Acad. Sci.*, 1937, **204**, 1846.

⁵ Armstrong, C., *The Harvey Lectures*, 1940-41, **36**, 39.

⁶ Viets, H. R., and Warren, S., *J. A. M. A.*, 1937, **108**, 357; Silcott, W. L., and Neuburger, K., *Am. J. Med. Sci.*, 1940, **200**, 253; Howard, M. E., *Yale J. Biol. and Med.*, 1940-41, **13**, 161; Machella, T. E., Weinberger, L. M., and Lippincott, S. W., *Am. J. Med. Sci.*, 1939, **197**, 617.