

BACTERIOLOGY

Chairman: EDWARD W. SHRIGLEY, Indiana University
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ABSTRACTS

The Effect of Formaldehyde on the Agglutination of Red Cells by Antiserum Against Artificially Attached Antigens. J. S. INGRAHAM, Indiana University Medical Center.—It has been observed that treatment with formaldehyde renders human red blood cells nonagglutinable by specific blood group antisera (Cole, L. R. and Farrell, V. R. J. Exp. Med. 102:631, 1955). Moskowitz and Carb (Fed. Proc. 16:426, 1957) reported that cells made nonagglutinable by formaldehyde still adsorbed blood group antibodies as specifically and avidly as fresh cells and concluded that the effect of formaldehyde is not directly on the blood group antigens.

Red blood cells coupled with sulfanilazo groups are agglutinated specifically by antiserum against the attached groups. In the work reported here it was observed that treatment of these cells with formaldehyde either before or after attaching the hapten groups abolished agglutination by antiserum when observed by the customary slide test or by a tube test using centrifugation and resuspension. This is in agreement with the work cited above and strongly supports the conclusion of Moskowitz and Carb. However, as judged by a rate-of-settling technique or by settling pattern the formaldehyde treatment had little effect on the agglutination. These observations emphasize the importance of accounting for nonspecific factors in any theoretical treatment of immune agglutination.

Formalin treated cells bearing attached hapten groups are a convenient and very sensitive antigen for the detection and measurement of antibodies homologous to the attached groups. We are presently using these antigens to investigate the formation in rabbits of antibodies homologous to simple chemically defined hapten groups.

Sensitivity of *Streptomyces* Species to Ultra-violet Radiation. THOMAS C. NELSON and ROBERT E. NICHOLS, Eli Lilly and Company, Indianapolis.—Ungerminated spores of various *Streptomyces* species: *griseus*, *hygroscopicus*, *erythreus*, and *orientalis*, gave different survival curves when irradiated with short-wave ultra-violet from germicidal lamps. Spore suspensions suspended in nutrient broth were irradiated in shallow layers at an intensity of 40 microwatts per square centimeter. Surviving spores were determined as colonies formed after incubation on various nutrient media.

The kinetics of the *S. hygroscopicus*, *S. erythreus*, and *S. orientalis* curves are of the one-hit type. The kinetics of the *S. griseus* curves are multi-hit, with the number of hits varying between 2 and 60.

The inactivation energy required to reduce the survival of spores to 37% of the initial number, corresponding to an average of one effective hit per spore, is 32×10^3 ergs/cm² for *S. hygrosopicus*, 76×10^3 ergs/cm² for *S. orientalis*, and 48×10^3 ergs/cm² for *S. erythreus*. The inactivation energy for *S. griseus* varies inversely with the multiplicity of the curve, from 12×10^3 ergs/cm² at 50 to 60 hits to 29×10^2 ergs/cm² at 2 hits. Spores germinated in agitated medium gave a one-hit curve with a sensitivity slightly less than that of the 2 hit ungerminated spores.

A fraction of the spores is resistant to killing by ultra-violet, the fraction varying considerably between experiments. The resistance is physiological rather than genetic and may be due to clumping of spores and mycelial fragments.

Treatment following irradiation affects the survival. Exposure to visible light, or pre-incubation at low temperature, results in reactivation.

A correlation of radiation kinetics with the amount of sensitive material, presumably desoxyribose nucleic acid, and its distribution by chemical and cytological analysis, may be used to determine the growth cycle.

Bacteriological Problems in Food. GLEN C. WEBER, Indiana State Board of Health, Indianapolis.—Recent developments in Food Technology coupled with a changed sociological pattern have brought about a revolution in food preparation and distribution methods, and in eating habits. More meals are being taken away from home and more pre-packaged foods, particularly the frozen and refrigerated types, are being consumed. This implies a potential threat to Public Health, inasmuch as many of these items have been handled after heat treatment, and have not received final post-packaging sterilization.

Survey work has shown that some foods have high counts of bacteria; some are contaminated with fecal organisms; and some are carrying definite pathogens. The problem is complex because of the diversity of formulae, processing techniques, and dispensing methods employed by different processors and retailers.

There is shown to be a need for an intense study of the situation, in order to determine the extent and degree of the danger, and to find ways for keeping it under control.

An Improved Combination of Optical Instruments Useful in the Bacteriological and Biological Laboratory. P. S. PRICKETT, E. F. HARRISON, H. R. WILLIAMS, JR. and H. L. MURRAY, Research Laboratories Mead-Johnson and Company, Evansville.—The combination consists of a monocular compound microscope and a Euscope.¹ The latter projects the microscopic image onto an opaque vertical screen for viewing by one person, or by turning a lever to move the opaque screen out of the optical path, onto a vertical ground glass screen for viewing by several persons.

¹ Euscope is the name trademarked by Bausch and Lomb for this instrument.

The improvements consist of equipping the microscope with a variable focus substage condenser and a hyperplane ocular, plus an adequate light source. The first enables the operator to obtain critical illumination rapidly and easily with a fully and uniformly illuminated field at any magnification, particularly important with projected images. The second gives a clearer, flatter projected image, thus almost entirely correcting the usual highly curved image ordinarily obtained with a short projection distance and the commonly used huygenian ocular.

In the teaching laboratory, probably the ground glass viewing screen, by means of which the microscopic image can be seen by a group of students, would be more useful. Since the image is magnified about two times when thus projected, frequently the specimen can be satisfactorily demonstrated under high dry magnification without having to resort to the oil immersion objective. The specimen can also be demonstrated rapidly and satisfactorily at lower and higher magnifications.

In the industrial laboratory, the opaque screen viewed by a single person, has proven the most practical. It is quite useful for the rapid microscopic examination, without fatigue or eyestrain, of large numbers of preparations, particularly under low and high dry magnifications. The image thus seen is magnified 1.5 times by the viewing glass of the Euscope.