longs the period of viability to a greater degree than either Ringer's solution or distilled water.

4774

Electrophoretic Mobility Velocities of Rough and Smooth Avian and Bovine Tubercle Bacilli.*

MORTON C. KAHN AND HELEN SCHWARZKOPF.

From the Department of Public Health and Preventive Medicine, Cornell University Medical College, New York City.

Falk[1] showed that the electrophoretic mobility velocity (potential difference) of diphtheria bacilli varied according to their virulence, the more virulent organisms showing low mobility rate, while those of a less virulent nature gave a higher reading. For pneumococcus,[2] on the contrary, he found that the potential difference is higher the greater the virulence for white mice and *vice versa*. The sequence of decreasing potentials was shown to be Types III, I, II, IV, which follows the decreasing virulence for white mice. This work on the pneumococcus was carried out prior to the isolation of several new types from the erstwhile group IV.

Following the technique of Petroff[3] the writers undertook the dissociation of a stock strain of avian tubercle bacillus procured originally from Dr. Krumwiede of the Research Laboratories, New York City Department of Health. When the culture was planted on Proskauer and Beck medium after a suitable period of incubation at 37° C. the organism had dissociated into rough and smooth types of colonies. Representatives of each were selected and planted on glycerine agar and on Petroff's egg medium slants. After 5 generations the organisms are still truly representative of the original parent colonies from which they were taken. Other tests were performed on rough and smooth avian and bovine colonies dissociated by Dr. Petroff.

In view of the hypothesis that smoothness of colony may be an indication of virulence, while roughness may be taken as an indication of the reverse, the writers determined the mobility veloci-

* This experiment is part of a group investigation being carried on in conjunction with the Medical Research Board, National Tuberculosis Association.

[1] Falk, I. S., and Jensen, L. B., *J. Bact.*, 1928, xv, 367.

[2] Falk, I. S., *J. Infect. Dis.*, 1925, xxxvii, 481.

[3] Petroff, S. A., PROC. SOC. EXP. BIOL. AND MED., 1927, xxiv, 632.

ties for the two types of colonies, using the Falk slide cell technique. The growths were washed once in distilled water just prior to the experiment and the procedure was adhered to as outlined originally by Falk.

Certain sources of error must be taken into consideration when conducting experiments of this nature: 1. Difference in level of the water table in the cell makes a single standardization of the cell invalid. As it is impossible to get the identical amount of bacterial suspension in the cell, at all times, it is *absolutely essential* that the cell be standardized for the critical zones prior to each and every individual experiment; otherwise, highly variable and inconstant results will be obtained. 2. The lower zone of the slide cell was found to give less variable readings than the upper zone; therefore the results in these experiments were computed with readings taken only from the lower zone. 3. Age of culture examined is a third source of variability; therefore readings should be made on young cultures of identical age and from culture media of identical composition. When these factors are taken into consideration differences in mobility velocity are apparent for the rough and smooth types of colonies. Whether this difference is correlatable with virulence (in the pathogenic sense) as in the diphtheria group must perforce await the outcome of animal inoculations at present under way.

Under the conditions of this experiment the average mobility velocities for the rough avian colonies Krumwiede strain was 20.8 micra per second or 1.74 micra per second per volt per cm. For the smooth Krumwiede strain the average was 37.4 micra per second or 3.11 micra per second per volt per cm. For the Petroff avian strain the average for the rough colonies was 18.4 micra per second or 1.53 micra per second per volt per cm., while for the smooth the average was 35.4 micra per second or 2.95 micra per second per volt per cm. The Petroff bovine strain (B-1) revealed an average reading of 35.9 micra per second or 3.00 micra per second per volt per cm. for the rough colonies, while the smooth colonies revealed an average reading of 50.8 micra per second or 4.23 micra per second per volt per cm. In the case of colony No. 3 bovine smooth there was one reading of 39.0 micra per second. Twenty readings on suspensions from each of 3 other colonies, however, were well within the zone approximated by the average.

Whether these recorded differences in P. D. indicate a difference in virulence remains to be seen. The indications from Petroff's[4] work are that the smooth colony dissociates show a higher virulence

[4] Petroff, S. A., *Am. Rev. Tuberc.*, 1929, xix, 9.

than do the rough. It is interesting, therefore, to note these differences in the electrophoretic mobility velocities of avian and bovine tubercle bacilli from S. and R. colonies.

The E.M.F. used in all of these experiments was 42 volts.

The distance between the electrodes in the cell was 3.5 cm.

4775

Observations on the Pathogenesis of the Myeloid Leucemia of Fowls.*

J. FURTH.

From the Henry Phipps Institute of the University of Pennsylvania, Philadelphia Pa.

In a preceding communication[1] a new transmissible strain of leucemia has been briefly described. In the subsequent passages of this strain several of the inoculated birds died of intercurrent diseases chiefly of an acute or subacute inflammatory process of the upper respiratory tract. Birds dying of such infections but not inoculated with leucemic material did not show the pathological changes characteristic for the leucemias. The early death of several birds permitted a study of the pathogenesis of myeloid leucemia. A conspicuous result is obtained when the sequence of events in the development of the organ and blood changes is reconstructed from the following table which includes all the autopsies of 2 recent passages.

An extensive hyperplasia of the bone marrow unaccompanied by a rise in the number of the circulating white blood corpuscles appears to be the first marked pathological change which follows the inoculation of leucemic blood (Stage I). The hyperplasia of the bone marrow consists of an enormous extravascular proliferation of myelocytes and their precursors replacing the fatty tissue and narrowing the blood sinuses. Following this alteration of the bone marrow there is a rise in the number of white corpuscles in the peripheral circulation due to an invasion of cells similar to those found in the bone marrow, but extramedullary blood formation is absent (Stage II). There is a tendency for a further increase of the immature

* This investigation has been supported by a Fund for the Study of Leucemia and Related Diseases.

[1] Furth, J., PROC. SOC. EXP. BIOL. AND MED., 1929, xxvii, 155.