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SCIENCE AND GOVERNMENT

By Dr. HAROLD G. MOULTON

PRESIDENT OF THE BROOKINGS INSTITUTION

THE term "science" is in some ways ambiguous and confusing: to some it merely connotes an area or field of study—science as distinguished from art or literature; to some it suggests a body of exact principles regarded as of fixed and unchanging character—called a science; to still others it means a particular method of analysis—the method of science. What we are really interested in should be the scientific spirit, which is an attitude of mind, rather than a field of inquiry, a body of principles or a particular method of analysis.

The objective, open-minded, scientific outlook is not restricted to natural phenomena or to any particular field of investigation, nor is there any single methodology or technique for scientific inquiry. There are as many different methods of observation, experimentation and analysis as there are divisions of science. Even a single research project may require the use of several methods. True scientists are alike only in their pursuit of the common purpose of deriving their conclusions from ascertained facts.

It is this scientific outlook, this scientific attitude, this scientific frame of mind with which we are concerned when considering the problems of modern government. If we are to conduct the greatest of all businesses, namely, that of government, with even a reasonable degree of proficiency, if we are to maintain a stable and efficient democratic, political system, it seems obvious that the effort must be increasingly animated by and permeated with the scientific spirit.

by having two normal individuals gargle with 20 cc of broth. A 10 per cent. mouse lung suspension of strain W. S. was diluted 1:50 with one of these specimens and the other was used as diluent for a mouse passage strain of type B virus (Lee). The mixtures were added to like volumes of Zephiran (1/10,000 in normal salt solution), thus reducing the virus dilution to 1 per cent. of the original 10 per cent. lung suspension and the Zephiran to a final concentration of 1/20,000.

After standing at room temperature for 20 minutes aliquots were removed from the specimens for inoculation into eggs. Three 0.1 ml amounts of each ten-fold dilution ranging from 10^{-3} to 10^{-8} were injected into the allantoic fluid of 10-day-old eggs. The eggs were incubated at 37.5° C. for 48 hours and the allantoic fluids were then harvested, pooling those from the three eggs of each dilution. Five mice were inoculated with the pooled egg material from each dilution, using 0.05 ml inocula administered intranasally.[3] As animals died they were promptly autopsied and lung lesions noted; those surviving 10 days were sacrificed and the lungs inspected for lesions.

The results of the animal experiments are summarized in Table 1. In the case of the W. S. strain the 10^{-4} dilution employed for egg inoculation contained active virus as did the 10^{-6} dilution of Lee strain material.

TABLE 1

RECOVERY OF INFLUENZA VIRUSES FROM ZEPHIRAN-TREATED THROAT WASHINGS*

Strain	Virus dilution of egg inoculum	Mouse reaction†				
WS (Type 'A')	1:1,000	3	3	3	3	4
	1:10,000	2	3	3	3	3
	1:100,000	K_0	K_0	K_0	K_0	K_0
	1:1,000,000	K_0	K_0	K_0	K_0	K_0
	1:10,000,000	K_0	K_0	K_0	K_0	K_0
	1:100,000,000	K_0	K_0	K_0	K_0	K_0
Lee (Type 'B')	1:1,000	2	3	4	4	4
	1:10,000	2	3	4	4	5
	1:100,000	3	3	3	4	4
	1:1,100,000	3	3	3	4	6
	1:10,000,000	K_0	K_0	K_0	K_0	K_0
	1:100,000,000	K_0	K_0	K_0	K_0	K_0

* Treatment with 1/20,000 Zephiran 20 minutes at 20° C. rendered throat washings free [illegible] were inoculated into eggs and after [illegible] were administered to mice (0.05 ml intranasally).

† Numbers indicate days elapsed between inoculation and death. Subscripts indicate lung lesions if mouse was sacrificed on 10th day. K_4 is complete consolidation, K_0 is none.

Aerobic and anaerobic cultures of the throat washings prior to treatment with Zephiran revealed heavy growths of those organisms commonly found in the mouth and pharynx. After exposure to 1/20,000 Zephiran for 20 minutes no bacteria could be isolated from 48-hour cultures of the throat washings or from 9-day subcultures.

[3] The Unit Personnel of Naval Laboratory Research Unit No. 1, *Jour. Lab. and Clin. Med.*, 27: 1197–1198, June, 1942.

Stock virus suspensions originally harvested from infected eggs and mice, and accidentally contaminated with bacteria during handling were readily freed from contaminants by Zephiran treatment as outlined for the throat washings. Cultures showed that the numbers of contaminating bacteria were smaller than in the case of throat washings, but in every instance the preparations maintained full virus potency and remained free from organisms after exposure to 1/20,000 Zephiran for 20 minutes. Of particular significance is the fact that the method functioned effectively with contaminated mouse-lung suspensions despite the quantities of tissue particles present. The dilution of Zephiran in broth did not lessen the disinfecting action.

Our findings indicate that it is possible to free influenza virus contained in throat washings, egg fluids or ground mouse lung menstrua from adventitious bacterial contaminants by treatment with 1/20,000 Zephiran for 20 minutes at 20° C. This agent does not inactive either type A or type B influenza virus under these conditions.

THE PERSONNEL OF U. S. NAVAL LABORATORY RESEARCH UNIT NO. 1[4]

[4] The Unit Personnel consists of the following members of the U. S. Naval Reserve: Albert P. Krueger, Commander, MC–V(S), officer-in-charge; J. W. Hope, Lieut. MC–V(G); L. E. Rosenberg, Lieut. H–V(S); N. S. West, Lieut. H–V(S); A. S. Browne, Lt. (jg) H–V(S); O. J. Golub, Lt. (jg) H–V(S); A. H. Jacobs, Lt. (jg) MC–V(S); J. R. Mathews, Lt. (jg) H–V(S); H. M. S. Watkins, Ensign, H–V(S); A. J. Glazko, CPhM; I. L. Shechmeister, CPhM; W. L. Axelrod, PhM, 1c; E. R. Chisholm, PhM, 1c; G. B. Saviers, PhM, 1c; H. R. Burkhead, PhM, 2c; C. R. Webb, Jr., PhM, 3c; J. A. Gray, Jr., PhM, 3c; and E. B. Mansfield, ChP (Ret.), and D. D. Mentz, HA, 2c both of the U. S. Navy.

BOOKS RECEIVED

BAITSELL, GEORGE A., Editor. *Science in Progress.* Third series. Illustrated. Pp. xiv + 322. Yale University Press. $3.00.

BRUNER, HENRY LANE. *Laboratory Directions in College Zoology.* Third edition. Pp. xvi + 173. Macmillan. $1.75.

KEYES, D. B. and A. G. DEEM. *Chemical Engineers' Manual.* Pp. vii + 221. John Wiley.

KLOEFFLER, ROYCE G. *Principles of Electronics.* Illustrated. Pp. ix + 175. John Wiley. Chapman Hall Ltd., London. $2.50.

LEITER, RUSSELL GRAYDON, Editor. *Living: The Basis for Learning.* Illustrated. Pp. xxvii + 232. Educational Factors, Ltd., Santa Barbara, Calif. $3.00.

LOWINGER, ARMAND. *The Methodology of Pierre Duhem.* Pp. 184. Columbia University Press. $2.25.

MILLER, CARL W. *Principles of Photographic Reproduction.* Illustrated. Pp. xiii + 353. Macmillan. $4.50

SPOERRI, PAUL E., HAROLD WEINBERGER and ROBERT GINELL. *Principles and Practice of Qualitative Analysis.* Pp. x + 282. McGraw-Hill. $2.75.

STOKLEY, JAMES. *Science Remakes Our World.* Illustrated. Pp. xii + 298. Ives Washburn, Inc. $3.50.

WILLIAMS, HOWEL. *The Geology of Crater Lake, National Park, Oregon.* Illustrated. Pp. vi + 162. Carnegie Institution of Washington.