acids. It throws some doubt upon the hypothesis of *rapid* destruction or inactivation of estrogens by the liver in the intact animal. The liver appears to be capable of storing relatively large quantities of estrogen for at least 24 hours after administration of a single dose of estrone intravenously.

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Influence of Estrone upon Formation of Heterophil Antibodies.

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In a previous communication[1] we reported on the effect of the female sex hormone upon the formation of antibodies in rabbits immunized against Type I pneumococcus. Administration of estrone totaling 22 and 38 mg given before and during the process of immunization, produced a remarkable increase in specific agglutinating and protecting antibodies. The hormone alone did not elicit any specific antibody-response. Since it is known that Type I pneumococcus contains Forssman antigen (Powell and Jamieson[2]), it seemed of interest to investigate the effect of hormone-administration upon the production of heterophil antibodies, following the work of Levine, Bullowa, and Katzin.[3]

Material and Methods. Our above-mentioned sera were tested against 2% suspensions of washed human blood cells of groups AB, A, B, and O, and sheep erythrocytes. Serial dilutions of each serum were made in amounts of 0.15 cc beginning with a dilution of 1:2.5. To each diluted serum 0.1 cc of a 2% suspension of erythrocytes was added. The mixtures were shaken for 1 minute, incubated at 37°C for 2 hours and read macroscopically.

Results. Agglutinins for group A erythrocytes were demonstrable in the sera of the control animals up to a dilution of 1:2.5; for group AB, in 3 out of 6 animals up to a dilution of 1:5; for group B in the serum of only 1 rabbit to a dilution of 1:2.5. No agglutinins for group O and sheep erythrocytes could be demonstrated in any of the 6 ani-

[1] von Haam, E., and Rosenfeld, Irene, *J. Immunol.*, 1942, **43**, 109.

[2] Powell, G. H., and Jamieson, W. A., PROC. SOC. EXP. BIOL. AND MED., 1938, **39**, 248.

[3] Levine, P., Bullowa, J. G. M., and Katzin, E. M., PROC. SOC. EXP. BIOL. AND MED., 1939, **41**, 617.

mals. After immunization with Type I pneumococcal vaccine the agglutinins for group AB increased in all animals and could be demonstrated up to dilutions as high as 1:20 in 3 sera. Agglutinins for group A showed only a slight increase. Antibodies against group O cells were found in a single blood sample of 2 rabbits. No sheep-blood agglutinins were present in the sera after immunization.

During 2 weeks of hormone-administration the titer of agglutinins for group AB increased to 1:40 in the serum of 1 rabbit and to 1:20 in the sera of 4 others. The titer for group A rose to 1:40 in the serum of 1 rabbit and to 1:20 in the sera of 7 rabbits injected with estrone. Anti-O and antisheep agglutinins were demonstrated in the sera of all the rabbits that were tested. Following immunization with the vaccine an additional increase in the hemagglutinins was observed. The titers for AB cells were as high as 1:100, and those for group A cells as high as 1:80. Agglutinins for groups B and O and sheep erythrocytes were present in dilutions up to 1:20.

In Table I the average antibody-titers of animals which did and did not receive estrone before immunization with Type I pneumococcus have been compared. It appears quite evident that the process of immunization produced a marked increase in hemagglutinins in the rabbits which had received the female sex hormone as compared with the control animals. Moreover, it was shown that the administration of pure crystalline estrone alone increased the titer of nonspecific antibodies in the sera of the injected animals. Absorption-experiments are now under way to study the nature of these antibodies and to determine whether pure crystalline estrone resembles the Forssman antigen.

Summary. Administrations of estrone produced a moderate increase in the titer of nonspecific hemagglutinins in rabbits. This was followed by a more striking increase in the antibodies after immunization with pneumococcal vaccine.

TABLE I.
Average Titer of Heterophil Antibodies.

Type of agglutinin	Experimental animals			Control animals		
	Before exper.	After estrone injec.	After immun.	Before exper.	After sesame oil	After immun.
AB	2.8	13.8	59.2	2.5	3.2	8.1
A	2.5	13.6	29.9	2.5	2.2	3.6
B	0	2.8	5.0	0.4	0.4	0.4
O	0	4.4	8.3	0	0	0.1
Sheep	0	6.9	11.7	0	0	0