forms. Adjoining these large forms one observes frequently a growth of very fine curved filaments into the agar medium and the presence of very small, lose L type of colony. This type of colony develops only on blood agar plates and has never been observed on plain, dextrose, ascitic or boiled blood agar. Compared with the L type colonies of *Streptobacillus monilliformis* or those of the yellow bacillus, these L colonies remained very small and only rarely was a compact colony observed. In agar cultures stained *in situ* with the methods used in this study, groups of stain granules are seen occasionally under leucocytes or other cells. If methylene blue or azure is used the color of the precipitate is reddish while the young L type colonies are stained bright blue. Attention is called to this stain precipitate to avoid confusion in those cases in which the L type colonies remain small.

It would appear therefore that the formation of L type colonies is not an exclusive property of the *Streptobacillus monilliformis*. It might be suggested that with the use of appropriate technic such variant forms might be observed more frequently.

Summary: Cultures of various bacteria on blood agar plates were stained *in situ* by methods previously described. Examination of cultures of a Gram negative bacillus (of the genus *Flavobacterium*) so stained revealed tiny secondary colonies similar in appearance and morphology to the L1 variant of the *Streptobacillus monilliformis*. The same phenomenon was observed, in a less pronounced degree, in cultures of *Bacillus influenzae*, *Bacillus fundulliformis* and in cultures of certain strains of colon bacilli.

11003

Heterophile Antibodies Developed During Prophylactic Rabies Immunization.

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(Introduced by Lloyd Arnold)

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Aside from producing resistance to rabic infection, the injection of relatively large amounts of rabbit-brain suspension may be expected to induce the formation of various antibodies. A type of generalized reaction clinically resembling infectious mononucleosis is occasionally

encountered in patients undergoing antirabic immunization. In such patients, a simple test for heterophilic antibodies, using only sheep-erythrocytes, is difficult to interpret unless one knows what effect the injections of rabbit-brain suspensions have upon heterophilic agglutinin-titers.

Davidsohn[1-2] reported hemolysins and agglutinins for sheep's red blood cells in the blood of patients treated with normal or with immune horse serum. Paul and Bunnell[3] demonstrated an increase of heterophilic antibodies in the blood of patients suffering from infectious mononucleosis. Davidsohn and Walker[4] differentiated the antibodies present in serum disease from those present in infectious mononucleosis by absorption of the specimen of serum with guinea pig's kidney and of another sample of the same serum with rabbit's kidney. They consider the antibodies in infectious mononucleosis to be heterophilic in nature, but not of the Forssman heterophilic type. They defined heterophilic antibodies as "antibodies that have the ability to react with antigens which are apparently entirely unrelated to those that stimulated their production." Bailey and Raffel[5] concluded that the heterophilic antibodies in infectious mononucleosis are not the Forssman type because they were not absorbed by a known carrier of Forssman antigen, namely, guinea pig's kidney; though horse kidney, another carrier of Forssman antigen, had some ability to absorb the heterophilic antibodies. Stuart, Tallman, and Brintzenhoff[6] reported an increase in rabbit-cell agglutinins in the majority of patients with horse-serum-sickness.

The purpose of our present investigation was to study the antibody-responses in prophylactic rabies-immunization and to compare the nature of antibodies in serum-sickness, infectious mononucleosis, and normals with those found in the serum of patients who received rabies-vaccine. Fifty-nine patients were treated with Semple rabies-vaccine. Blood was obtained* before treatment and 10 to 15 days after treatment. The specimens were tested for the presence of agglutinins for the red cells of sheep, rabbit, and guinea pig. The technic of absorption and the titrations were carried out according to the methods described by Davidsohn[7].

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1 Davidsohn, I., *J. Immunol.*, 1929, **16**, 259.

2 Davidsohn, I., *J. Immunol.*, 1930, **18**, 31.

3 Paul, J. R., and Bunnell, W. W., *Am. J. Med. Sci.*, 1932, **183**, 90.

4 Davidsohn, I., and Walker, P., *J. Clinical Path.*, 1935, **5**, 455.

5 Bailey, J. H., and Raffel, S., *J. Clin. Invest.*, 1935, **14**, 228.

6 Stuart, C. A., Tallman, J., and Brintzenhoff, E., *J. Immunol.*, 1935, **28**, 85.

* We are indebted to the Chicago Board of Health for collection of the blood specimens and other excellent cooperation.

7 Davidsohn, I., *J. Am. Med. Assn.*, 1937, **108**, 289.

TABLE I.
Erythrocyte-Agglutinins Before and After Rabies-Immunization. Average Titers in 59 Patients.

Sheep		Rabbit		Guinea pig	
before	after	before	after	before	after
1:4	1:24	1:62	1:258	1:12	1:44

The injections of rabies-vaccine stimulated the formation of antibodies against the erythrocytes of sheep, rabbit, and guinea pig. There is a more definite and consistent increase in the agglutinative titer for the red cells of guinea pig and rabbit than for those of sheep. In this respect the antibodies formed during rabies-immunization differ from those present in infectious mononucleosis and serum-sickness. In these diseases there is a consistent increase in the sheep-cell agglutinins, regardless of the increase for rabbit and guinea pig cells.

Absorptions were carried whenever the titer for sheep cells was 1:28 or higher. In all cases the following agents were used: guinea pig and rabbit kidney, beef-erythrocytes, and kaolin. Titers of the sheep-cell agglutinins were determined before and after absorptions. The effect of absorption was expressed in percentages of antibodies removed. If the antibodies were left the same, the percentage of absorption equals zero; if they were removed completely, the absorption equals 100%. Table II gives the absorbing effect of these agents upon sera with titers of 1:28 or higher.

The readiness with which all antigens removed the agglutinins for sheep red cells suggests that the antibodies developed during rabies-immunization are of the heterophilic type. The kidney of the guinea pig and the erythrocytes of the sheep, both carriers of the Forssman antigen, removed completely the agglutinins for red cells of the sheep. However, erythrocytes of beef and kidney of the rabbit, known to lack Forssman antigen, also completely removed the agglutinins for the sheep cells. Therefore, the results of absorption indicate that

TABLE II.
Effect of Absorption.

No. of cases	Titer before absorption	Percentages of absorption of agglutinins for the red blood cells of sheep with				
		Kidney of		Erythrocytes of		
		Guinea pig	Rabbit	Beef	Sheep	Kaolin
16	1:28	100	100	100	100	63
4	1:56	100	100	100	100	50
2	1:112	100	100	100	100	50

the antibodies developed during rabies-immunization are heterophilic in nature but do not belong to the special Forssman group.

Summary. Heterophilic antibodies developed during rabies-immunization differ from the heterophilic antibody developed in true serum sickness and from the heterophilic antibodies present in cases of infectious mononucleosis.

11004

Correlation between Movements of Gravid Uterus and Formation of Histamine.

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Harding and Fort[1] first noted the presence of a considerable amount of histamine in the placenta. This has been confirmed several times since. As an accumulation of histamine could be dangerous for normal pregnancy it seemed consistent to investigate whether histaminase is present in the placenta. Danforth and Corham[2] found histaminase to be present in the human placenta though in extremely variable amounts. Danforth[3] demonstrated that the amount of histaminase to be found in the placenta "shows some correlation with the efficiency of uterus contractions of women during labor."

During researches—Daels and Donatelli[4–6]—on the motility of the cat's uterus (about 150 animals) we had the opportunity to examine the motility of the uterus of 7 pregnant cats. These observations seem to us to be in correlation with the problem mentioned above and this is why we want to publish them. The cats in our experiments were narcotized with chloralosane; the distal end of one uterus horn was fixed by a thread which was connected by a Jackson tube to a level which registrated the movements. The abdomen was closed, the animal warmed.

Table 1 shows the results of these 7 experiments.

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1 Harding, V. J., and Fort, C. A., *J. Biol. Chem.*, 1918, **35**, 29.

2 Danforth, D. N., and Corham, F., *Am. J. Physiol.*, 1937, **119**, 394.

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