6. Diethylaminoethyl-*p-n*-butylaminobenzate hydrochloride and *p-n*-butylaminobenzamide were not antagonized by the presence of *p*-aminobenzoic acid when tested in trypticase soy broth against *Streptococcus pyogenes* (C203).

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Action of Certain Carbohydrates on the Reaction of *Eberthella typhosa* with Antibody O.

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In a previous publication, Olitzki, Shelubsky and Hestrin[1] reported that certain carbohydrates promote the pathogenicity of *E. typhosa*. Since Gram-negative microorganisms are normally eliminated from the peritoneal cavity in the mouse mainly by bacteriolysis a short time after the onset of infection,[2] the possibility that the carbohydrates, which alter pathogenicity might also interfere with a bacteria-antibody reaction seemed to deserve consideration. The influence of the carbohydrates previously employed in tests of pathogenicity on the agglutination of typhoid strain 0901 by its O-antibody, the presence of which in antisera parallel the bactericidal activity,[3] has accordingly been examined. The results of the agglutination tests are shown in Table I.

Table I shows that the carbohydrates used for testing, *viz.* dextran, levan, mucin and pectin, markedly inhibit agglutination. The results were the same whether bacteria were added to the serum-carbohydrate mixture immediately after its preparation or after it had been incubated for 4 hours at 37°C.

The mechanism of the inhibition could be a serological reaction between the test carbohydrates and the typhoid antibody. We have not, however, been able to detect a visible precipitation reaction when the carbohydrates were mixed with anti-typhoid serum. In order to ascertain whether the inhibition is produced by interference on the part of the carbohydrates with fixation of antibodies by the bacterium, or by an intervention in the second stage of the agglutination reaction, we measured the effect of the more active of the inhibitors (dextran 2%, levan 2%, pectin 2%, and mucin 5%) on antibody-nitrogen uptake.

The carbohydrate solutions were sharply centrifuged to remove all insoluble particles. Heat-killed and washed bacteria sediment containing 0.419 mg nitrogen was then suspended in 2.0 cc of the solutions. After the selected carbohydrates and bacteria had been in contact for 2 hours at 37°C, the immune serum was added and the mixture allowed to stay for 24 hours in the ice box. The bacteria were then removed and washed and the N-uptake determined by a Micro-Kjeldahl method. In another series of experiments the serum was left in contact with an inhibitor for 2 hours at 37°C. Examination of this mixture failed to reveal any visible precipitation. Bacterial sediment containing 0.260 mg nitrogen was then suspended in the mixture. The suspension was left for 24 hours in the ice box. The bacteria were then removed and examined as in the previous series. Both series of experiments gave similar results. The control test without the addition of inhibitor showed that the bacteria are normally able to remove in 24 hours 0.033 mg N from 0.1 ml serum and 0.061 mg N from 0.2 ml serum. In the pres-

[1] Olitzki, L., Shelubsky, M., and Hestrin, S., in press.

[2] Olitzki, L., and Koch, P. K., *J. Immunol.*, 1945, **50**, 229.

[3] Felix, A., and Olitzki, L., *J. Immunol.*, 1926, **11**, 31.

TABLE I.
Influence of Pathogenizing Substances on Agglutination of the 0901 Strain by Anti-O Serum (Titer 1:10,000).

Substance tested	Concentration, %	End of the agglutination titer
Dextran (*L. mesenteroides*)	0.1-0.25	1:10,000
	0.5-1.0	1: 1,000
	2.0	negative at 1:100
Levan (*A. levanicum*)	0.1-0.5	1:10,000
	1.0	1: 5,000
	2.0	negative at 1:100
Mucin	1.0	1:10,000
	2.0	1: 2,000
	5.0	negative at 1:100
Pectin	0.1-0.2	1:10,000
	0.5	1: 1,000
	1.0	1: 100
	2.0	negative at 1:100
Glycogen	0.5	1:10,000
	1.0	1: 2,000
	2.0	1: 1,000
Starch	1.0-2.0	1:10,000
	5.0	1: 200
Inulin, gum acacia, cellulose (cotton)	0.1-5.0	1:10,000

ence of any of the inhibiting substances (dextran, levan, mucin, pectin), however, no measurable quantities of antibody N were taken up by the cells. These observations accord with the findings of Keefer and Spink[4] concerning the effect of mucin on the bacteriolysis of gonococci by whole blood and immune serum.

[4] Keefer, C. S., and Spink, W. W., *J. Clin. Invest.*, 1938, **17**, 23.

Summary. The union of O-antibody by *E. typhosa* is completely inhibited by dextran, levan, and pectin at 2% concentration and by mucin at 5% concentration. Reduction of agglutination titer occurs in the presence of starch (5%) and glycogen (1-2%). Inulin, gum acacia, and acid-degraded cotton cellulose in 5% concentration are without this effect.

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Influence of Nitrogen Mustards on the Antibody Response.*

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The absence of infection in the leucopenic phase following nitrogen mustard therapy of lymphomas suggests that some specific protective mechanism persisted despite the demonstrable widespread damage to the hemopoietic system. The role of lymphocyte in the antibody response[1,2] suggests the lym-

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[1] Ehrich, W. E., and Harris, T. N., *J. Exp. Med.*, 1942, **76**, 335.