each reacting with different antibodies. One of these, with the high optical rotation and low degree of acidity, resembles the chief polysaccharide of the bovine and avian type cells (unpublished results) and is perhaps identical throughout the whole group. It yields *d*-arabinose and mannose on hydrolysis. The low-rotating, weak polysaccharide acid of greater solubility is present, if at all, in far smaller amount in the bovine and avian type cells. It readily yields *d*-arabinose in crystalline form on hydrolysis. Mannose does not appear to be present. In addition the bacilli contain at least one other polysaccharide acid. Whether or not this is independently specific, or reacts with antiserum on account of an admixture with the other polysaccharides is uncertain. The results reconcile in a certain measure the divergent findings of Laidlaw and Dudley[1] and Mueller,[2] the method used by the former workers evidently resulting in a relative concentration of the high rotating specific polysaccharide, while Mueller's process appears to have concentrated material rich in the low rotating specific fraction. Masucci, McAlpine and Glenn's product from tuberculin[3] is also a mixture, judging by the properties given.‡

6010

Chemotherapy of Experimental Spotted Fever.

L. C. FISHER. (Introduced by H. A. Reimann.)

From the Department of Medicine, University Hospital, University of Minnesota.

No specific treatment has yet been developed for diseases caused by rickettsia. Because of the nature of the vascular lesions, and because of the localization of the virus in the endothelium, it would appear that typhus and spotted fever were especially amenable to intravenous chemotherapy. Studies[1] have shown that injections of

[1] Laidlaw and Dudley, *Brit. J. Exp. Path.*, 1925, **6**, 197.

[2] Mueller, *J. Exp. Med.*, 1926, **46**, 9.

[3] Masucci, P., McAlpine, K., and Glenn, J., *Am. Rev. Tuberc.*, 1930, **22**, 669, 678.

‡ In initiating this investigation the senior author was aided by Dr. Marie Maxim. Since she has assumed responsibility, in an entirely unauthorized communication (*Biochem. Z.*, 1930, **223**, 404), for the results up to the time of her severance from the work. Since the method used had previously been developed in this laboratory and since both methods and findings are now altered, the writers feel further reference to Mrs. Maxim on their part to be unnecessary.

[1] Reimann, H. A., *J. Imm.*, 1930, **18**, 153.

various colloidal substances have a definite effect in prolonging the incubation time and of modifying the subsequent course of experimental typhus fever, if injected shortly after inoculation of the virus. Injection of the same substances after the onset of fever was ineffective. It was concluded that the injection of colloidal substances in the former case probably stimulated the endothelial cells to a defense activity sufficient to delay and modify the course of infection.

Numerous drugs administered intravenously and otherwise have been tested in the treatment of rickettsial disease clinically and experimentally. Salvarsan, chlorine solutions, colloidal silver preparations, novasural, antimony salts, quinine salts, mercurochrome and other substances have been tried. The results were uniformly disappointing. In view of these repeated failures it seemed of value to test some of the newer drugs which have been developed for chemotherapeutic purposes. Germanin (Bayer 205),* metaphen,* triphal (organic gold compound),* and tryparsamide were tested.

The strain of virus used in these experiments was derived from a patient in Minnesota, and was identified as an exceptionally mild type of Rocky Mountain spotted fever by Reimann, Fisher and Ulrich.[2] After the inoculation of 2 cc. of blood containing the virus intraperitoneally into guinea pigs, fever developed quite regularly on the 6th or 7th day and lasted from 2 to 6 days. None of the animals died from infection. A sample temperature curve in an untreated animal is shown in figure 1 B. In all experiments, the drugs were injected on the first day of fever, intravenously into the heel vein, intraperitoneally or subcutaneously. Attempts were made to give full therapeutic doses calculated on the basis of body

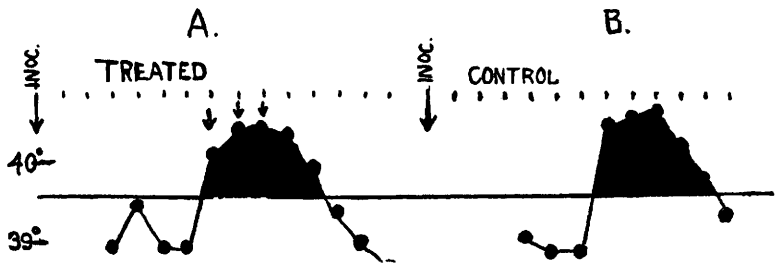

FIG. 1.

Temperature curve of spotted fever in (A) a guinea pig treated on 3 successive days with 0.02 gm. of tryparsamide intravenously, and (B) of an untreated control animal.

* We are indebted to the Winthrop Chemical Company of New York City for supplying these drugs.

[2] To be published.

weight. Injections were usually repeated on subsequent days and occasionally twice a day. Thirty-one animals were treated and 39 served as controls.

Tryparsamide was given in doses of 0.05 gm. per kilo intravenously to 3 guinea pigs, intraperitoneally in 2, and subcutaneously in 1. A record of a guinea pig treated intravenously is shown in figure 1 A. Triphal was given in doses of 0.125 gm. to 6 animals intravenously. Germanin was given intravenously to 11 guinea pigs in doses of 0.2 gm. and metaphen in 1 cc. doses to 6 animals intravenously and to 2 subcutaneously.

To date we have observed the febrile reaction in 140 guinea pigs.

Results. In none of the animals thus treated could any effect of therapy be detected in the temperature curve. In all cases the temperature curve differed in no material respect from that of the untreated control animals.

Conclusion. Germanin, metaphen, triphal, and tryparsamide had no effect on the course of spotted fever in guinea pigs, when administered therapeutically.

6011

Penetration of Antipneumococcic Horse Serum into the Consolidated Lung in Lobar Pneumonia.

T. HUNNICUTT AND W. SUTLIFF. (Introduced by Robert N. Nye.)

From the Thorndike Memorial Laboratory, Second and Fourth Medical Services (Harvard), Boston City Hospital, Boston, Massachusetts, and from the Department of Medicine, Harvard Medical School.

In analyzing the action of antipneumococcic serum in the treatment of lobar pneumonia, the question of its penetration of the pneumonic lung is often raised. The clinical observation that specific therapy is effective early in the disease and ineffective late in the disease has sometimes been explained on the basis of the accessibility of the pneumonic area to circulating antibodies in the initial stages of consolidation and a lack of penetration after complete consolidation has taken place. Studies of the circulation in the pneumonic lung have usually supported this view. Mallory[1] believed from the study of pathological histology, that in the stage of gray hepatization the air sacs became distended and the capillaries compressed so that they no longer appear engorged. Kline and