

of 9 injections extending over a period of 18 days. The amount of suspension introduced commenced with 0.25 cc. and the last 5 were each of 1 cc. amounts. There was no evidence of anaphylaxis during the period of this sequence of injections. Trial bleedings made during the latter part of this immunizing treatment showed the presence of agglutinins and the usual titre computed by 2 hours incubation at 37°C. followed by storage at ice box temperature was 1:320 with complete clearing of the tubes.

When immunization had progressed to the desired point, the animals were exsanguinated, the serum was separated by centrifugalization following defibrination and the resulting preparations were then stored without addition of preservative until used. Usual titrametric methods were followed in setting up the agglutination series and 2 controls were added. These checks consisted of the antigen suspended in physiological saline and of the antigen placed in contact with 1:25 normal rabbit serum.

These experiments dealing with agglutinin mobilization showed that each antigen was clumped by its own homologous antiserum. No cross agglutination whatever appeared. Thus each antigen was agglutinated by its homologous antiserum and by no other. It was thus demonstrated that the protein content of these unicellular algae is antigenic. There is much complexity in the antigenic structure of these forms however for there is no antigenic fraction which is common to the entire series of genera and species.

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### Quantitative Character of Coccidian Infection in Recipients of Blood from Immunized Animals.\*

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The writers have shown<sup>1</sup> that rats may be immunized to the coccidium *Eimeria miyairii* by feeding each day for 5 days or less standard doses of sporulated oocysts. Other workers have demon-

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<sup>1</sup> Becker, E. R., Hall, P. R., and Hager, A., *Iowa State College J. Science*, 1932, **6**, 299.

strated the development of a specific immunity in coccidiosis of certain other hosts. The nature of the immunity, however, still remains problematic. In the present experiment injections of blood from hyperimmunized animals were employed in the attempt to reduce the number of oocysts eliminated by the recipients to below the normal.

Nineteen Wistar A rats and 9 rats from a random strain were each given in all from 6 to 9 cc. of citrated or defibrinated blood (not including the citrate solution), some intravenously, some intraperitoneally. The blood injections for each rat were made on either 2 or 3 occasions, and in most cases were planned so that one injection would come from 1 to 9 days previous to the date of the first infective dose, and the others on the day of the first infective dose and several days later. Each rat was infected with 1500 oocysts daily for a period of 5 days, and all the oocysts passed during the period of elimination were conserved and counted by a dilution method. For each recipient of immune blood a litter mate of about the same weight was kept as a control. The controls received the same immunizing doses of parasites and other treatment as the rats receiving blood, except that they were not injected.

The mean number of oocysts eliminated by the Wistar A series receiving immune blood was  $176.2 \pm 14.73 \times 10^6$  oocysts, while the controls eliminated  $161.5 \pm 8.063 \times 10^6$  oocysts. The ratio of the difference of the means to the probable error of the difference is 0.8, an insignificant number. The random series receiving blood eliminated an average of  $61 \pm 5.4 \times 10^6$  oocysts, while the controls eliminated an average of  $50.4 \pm 3.7 \times 10^6$  oocysts. The ratio of the probable error to the difference of the means in this case is 1.6, an insignificant number.

The experiment, which involved 28 rats in the experimental series and 28 in the controls, showed that the blood from hyperimmunized rats contained no principle capable of inhibiting in the least the numerical increase of the parasite in the rat into which it was injected, and that the somewhat lower mean yields in the control series may be attributed to chance.