

Title: Transmission of Plasmodia to Heterologous Host. Heterologous red cell survival as a possible factor affecting transmission.

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Objective The purpose of this study is to determine factor (s) which may influence the acceptance of malarial parasites in rats from infected donors of other species, in this case, gibbons and monkeys. The ultimate aim of the investigation would be the adaption of human malarias to a common laboratory animal such as the white rat or mouse.

In the previous Annual Report (pages 380-82) an account was given of initial attempts to infect the white rat with primate malarias. Adult rats failed to become infected with either P. inui or P. coatneyi, but newborn rats exhibited a low grade infection of the gibbon malaria, P. jefferyi. It was suggested in that report that the relative success with P. jefferyi might have been due either to the use of newborn animals or to the greater compatibility of gibbon and rat bloods as compared to rhesus and rat bloods. This present report gives the results of experiments designed to test these two hypotheses.

#### Description and Progress

1. Attempts to infect newborn rats with P. coatneyi: P. coatneyi-infected blood from a rhesus monkey was injected into six different groups of newborn rats (24-28 hours). In one group of infected rats, smears were made from heart, liver and spleen of animals killed at hourly intervals during the first day and at 4 hours intervals on the following days. For the other groups, peripheral blood smears were made daily. Crush smears from different tissues were obtained from animals that died during the experimental period.

Subpassage was attempted when the normal intact parasites were seen in peripheral smears of infected rats.

All animals receiving blood from a P. coatneyi infected monkey showed hematuria during the following 24 hours. Although malarial pigment was seen in the spleen smears of animals killed 1 hour after inoculation no parasites were observed in their peripheral blood. Two hours after inoculation parasites were seen in heart and liver crushes but again not in the peripheral blood smears. At 24 hours the peripheral blood smears showed young ring forms. The parasitaemia was scanty and the parasites did not stain well and showed some degree of degeneration.

2. Primate and rodent blood compatibility Since there were no specific antisera available for typing animal blood groups the Eldoncards for human blood typing were used.

Crossmatch was performed according to the tube technique used in human crossmatching. Coomb's test was not done. Rats were considered as recipients while gibbons as donors.

All of infected gibbons used were typed as O, Rh<sub>0</sub> negative, the recipient rats were of type B, Rh<sub>0</sub> negative.

In crossmatching, it was found that compatibility reaction was macroscopically discernible after centrifugation both of major tubes (Gibbon r.b.c. + rat serum) and high protein tubes (Gibbon r.b.c. + rat

serum + bovine albumin). On the other hand, the minor tubes (rat r.b.c. + gibbon serum) were strongly incompatible. After all tubes were incubated at 37°C for 30 min. and examined for compatibility, both macroscopically and microscopically, the same result was obtained.

Results in rhesus monkeys indicated that they were all of type O Rh<sub>0</sub> positive. Major and minor tubes revealed a high degree of incompatibility between rat and rhesus bloods.

Study on the survival time of gibbon erythrocytes in rats was performed in a group of 340 rats. The procedure for tagging of red blood cells and radioactivity determination as described previously by Miller *et al.*, was followed (Miller, Chongsuphaisiddhi and Kanakakorn, SEATO Ann. Report 1968, Ann. Trop. Med. Parasit. in press). Approximately 0.2 gm. of a Cr<sup>51</sup> labelled gibbon red blood cell suspension was injected intravenously into young rats (body weight 25–40 gm). The rats were divided into groups, each of 20 animals. Heart blood was drawn from each group of rats at various intervals of after injection, the percent for the determination of survival rate of red blood cells. The results indicated (Fig. 1) that survival dropped rapidly to 0.3 at 19 hours after the injection.

SHOWING THE PERCENT SURVIVAL OF GIBBON RED BLOOD CELLS AFTER INTRAVENOUS INJECTION INTO RATS

