

A Study of Simian Malaria in Animals Treated with Serum from Chronic
Plasmodium coatneyi and Plasmodium inui Infections

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OBJECTIVE: The objective of this study was to determine the effect of serum from monkeys chronically infected with Plasmodium coatneyi or Plasmodium inui on homologous and heterologous infections.

DESCRIPTION: A total of 18 cynomolgus monkeys were divided into six groups so that animals of differing weights were distributed approximately equally among the groups. Three groups were infected with P. coatneyi (6×10^5 parasitized erythrocytes per kg. body weight intravenously) and at the same time given either pooled normal monkey serum (group I) or pooled serum from monkeys with chronic coatneyi (group II) or inui (group III) malaria (10 ml per kg, subcutaneously). Similarly, nine animals were infected with P. inui (6×10^5 parasitized erythrocytes per kg.) and simultaneously treated with one of the three serum preparations.

Parasitemia was monitored by thick and thin blood films. The number of parasitized erythrocytes per 50 oil immersion fields of the thin films was determined and an estimate of the percentage of cells parasitized calculated assuming 10,000 erythrocytes per 50 fields. When parasitemia was detected on the thick but not the thin film, the observation was arbitrarily assigned a value of 0.001% parasitized cells for purposes of data reduction and analysis.

In some other host-malaria systems (1, 2), serum mediated passive immunity is effective primarily prior to peak parasitemia. Therefore, this portion of the course of the infection was isolated for analysis. The parasite burden (area under the plot of per cent erythrocytes parasitized vs. time) prior to peak parasitemia was measured by planimetry of data plots sufficiently large to allow duplicate measurements which differed by less than 2%. Since the P. coatneyi infections showed a marked tertian periodicity for the first 42 post infection day, only the values obtained on alternate (high) days were included in the analysis during this period for these animals.

PROGRESS: The prepatent periods and parasite burdens during early parasitemia for each animal are presented in Tables I and II. Parasitemias were quite low and variation within groups was great. In each case, animals given homologous serum had lower parasite burdens and longer prepatent periods than the normal serum controls, but the differences in the case of the P. inui infections were very small. With heterologous serum, the results are even more difficult to interpret; however, the mean parasite burdens were again lower than in the normal serum controls, and in the case of P. inui infected animals lower than in the homologous serum treatment group.

The course of parasitemia in each animal for the entire observation period is depicted in Fig. 1 and Fig. 2. There are no obvious differences between groups during the post-peak period of parasitemia.

Although clearly inadequate for a firm conclusion, we view these data as suggestive of an inhibitory effect of serum on parasitemia. The wide variation between groups observed would dictate much larger group sizes in further experiments; at present no serum is available for such studies.

This is the final report on this study.

SUMMARY: The effect of serum from monkeys with chronic P. coatneyi and P. inui malaria on homologous and heterologous infections was studied. Individual variation in the response of the animals precluded clear evaluation. However, group mean parasite burdens were lower in all chronic malaria serum treated groups than in the appropriate normal serum treated groups. In the case of the P. inui infections, the mean parasite burden in the P. coatneyi serum treated group was lower than in the P. inui serum treated group.

REFERENCE:

- (1) Briggs, N.T., Wellde, B.T., and Sadun, E.H., *Military med.*, 131 (Suppl.): 1237, 1966.
- (2) Diggs, C.L. and Osler, A.G., *J. Immunol.* 102: 298, 1969.

Table 1. Summary of P. coatneyi infections prior to peak parasitemia in serum treated monkeys.

Serum Source	Monkey No.	Weight (Kg)	Prepatent period (days)	Parasite burden* (% days)
Normal monkeys	81	2.8	10	4.2
	68	2.8	14	0.3
	82	3.3	20	0.4
	Mean	3.0	14.7	1.6
Monkeys infected with <u>P. inui</u>	74	2.4	8	3.1
	72	2.8	10	0.2
	73	3.2	10	0.5
	Mean	2.8	9.3	1.3
Monkeys infected with <u>P. coatneyi</u>	77	2.0	16	0.2
	78	2.8	16	0.02
	76	3.2	14	0.2
	Mean	2.7	15.3	0.1

* Area under the curve of per cent erythrocytes parasitized vs. time (days).

Table II. Summary of P. inui infections prior to peak parasitemia in serum treated monkeys.

Serum Source	Monkey No.	Weight (Kg)	Prepatent period (days)	Parasite burden* (% days)
Normal monkeys	86	2.9	1	2.5
	85	2.7	2	1.7
	79	2.3	5	1.1
	Mean	2.6	2.7	1.8
Monkeys infected with <u>P. coatneyi</u>	84	2.8	7	1.5
	90	2.7	7	0.3
	89	2.3	2	0.4
	Mean	2.6	5.3	0.7
Monkeys infected with <u>P. inui</u>	83	2.8	2	2.8
	69	2.3	6	1.1
	80	1.5	7	0.5
	Mean	2.2	5.0	1.7

* Area under the curve of per cent erythrocytes parasitized vs. time (days).

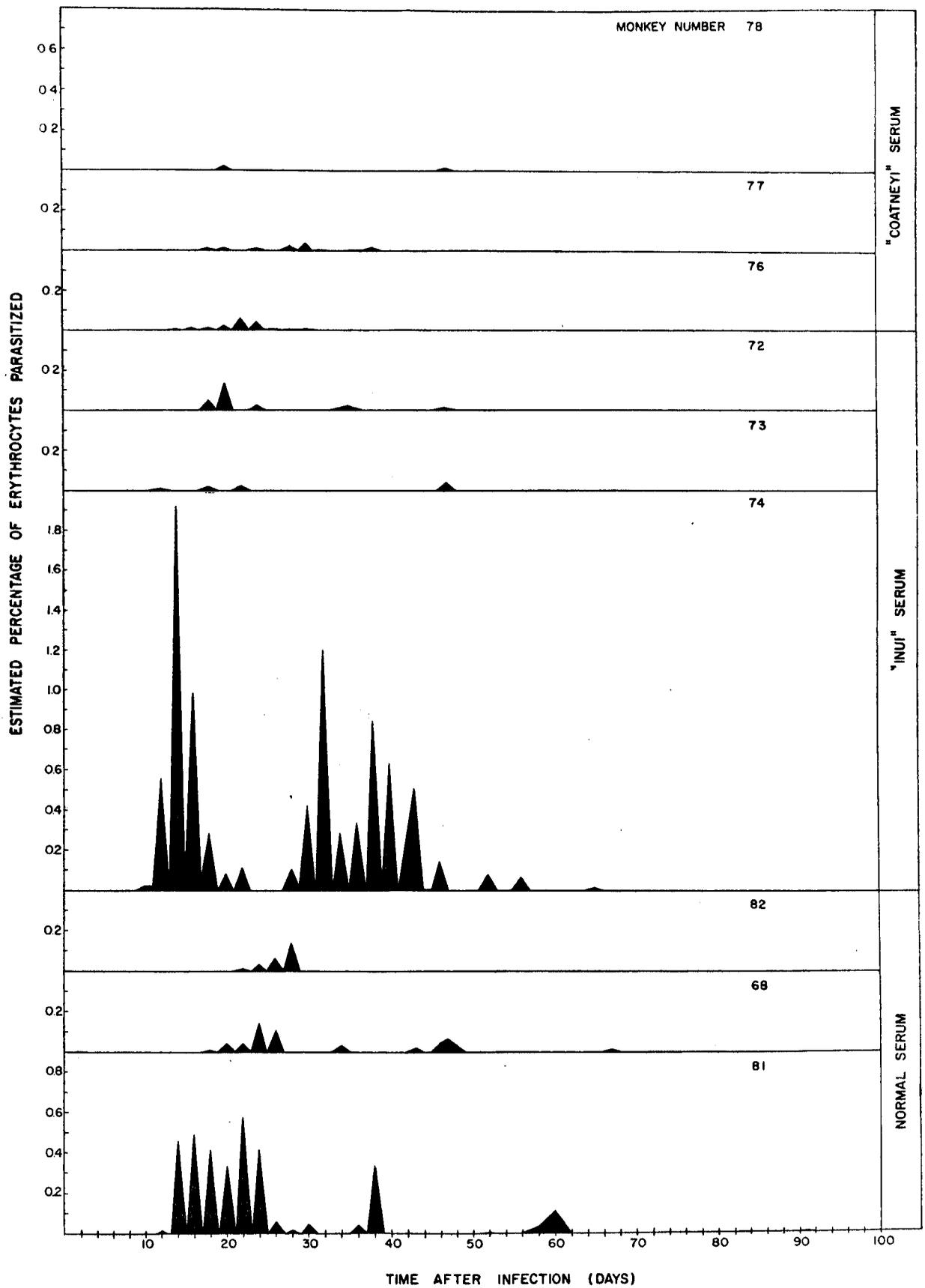


Fig 1—Parasitemia in serum treated monkeys with Plasmodium coatneyi infections.

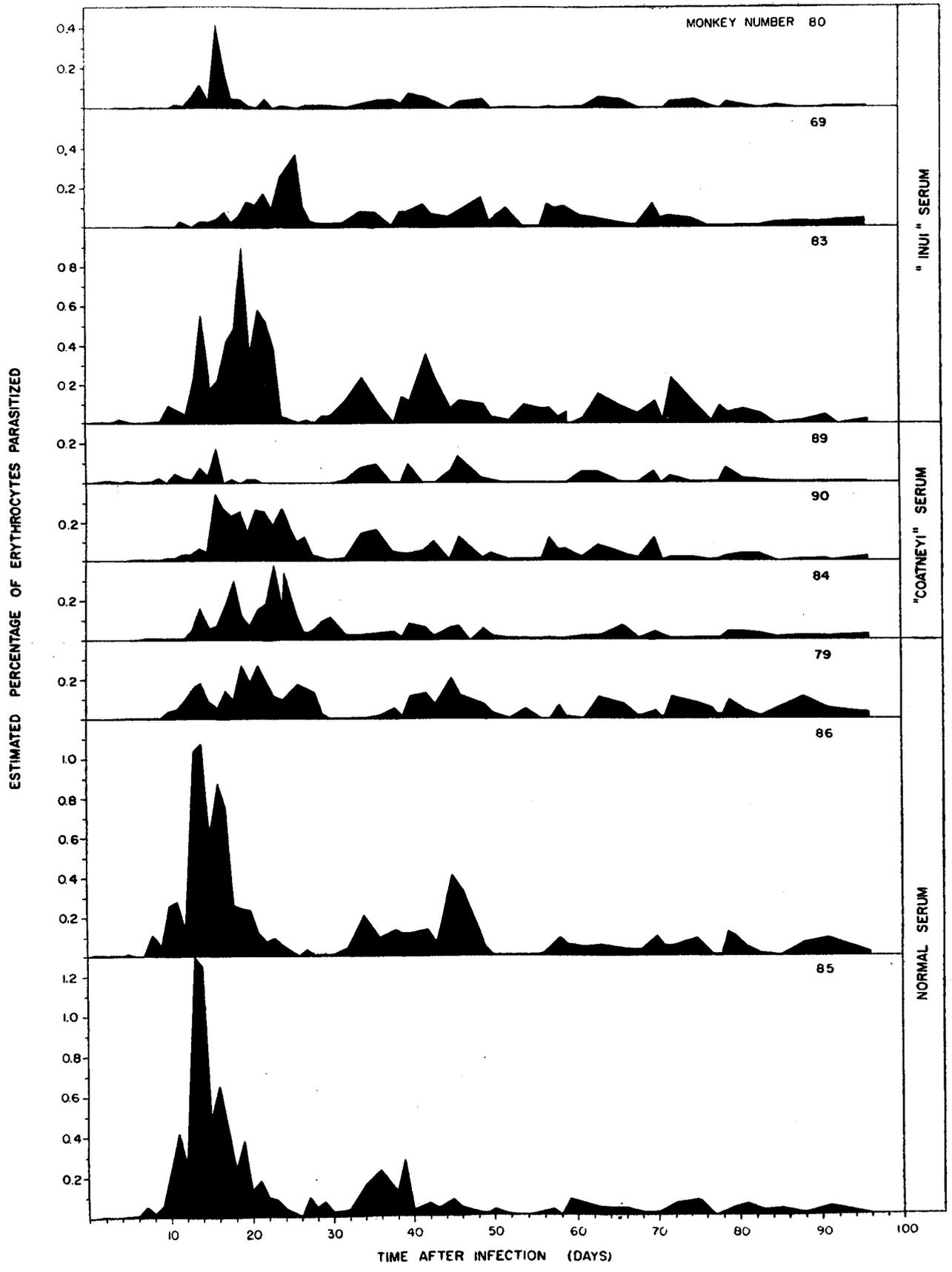


Fig 2—Parasitemia in serum treated monkeys with Plasmodium inui infections.