

SPOOROZOITE TRANSMISSION AND SERIAL BLOOD PASSAGE OF *PLASMODIUM VIVAX* IN SQUIRREL MONKEYS (*SAIMIRI SCIUREUS*)

SIR,—DEANE et al. (1966) described an infection of *Plasmodium vivax*, induced from human blood, in a splenectomized squirrel monkey (*Saimiri sciureus*). Although a significant parasitaemia of long duration was reported, there has been no additional exploration of this host-parasite system.

Studies at Gorgas Memorial Laboratory show that vivax infections can be maintained in unaltered squirrel monkeys by serial trophozoite passage. Adult and juvenile malaria-free animals, of both sexes, were used in these investigations. Initially, 10^7 parasites of the monkey-adapted Achiote vivax strain (PORTER and YOUNG, 1969), from a night monkey (*Aotus trivirgatus*) bearing the 78th passage of this malaria, were inoculated intraperitoneally into each of 2 normal squirrel monkeys. Patent infections developed in the recipients after 4 and 18 days, with parasitaemia maxima of 910 and 2,360 per c.mm. respectively. This parasite line since has been transferred serially 17 times in normal squirrel monkeys, producing peak infections ranging from 1,720 to 111,070 per c.mm. These monkeys sustained parasitaemias for periods of 17 to 72 days; 11 subjects survived the untreated primary attack.

Having established that this monkey species can serve as a reliable host for the blood forms of *P. vivax*, experiments were initiated to determine the susceptibility of the squirrel monkey to infection by mosquito transmission. Applying methods developed in preceding investigations (BAERG, et al., 1969) *Anopheles albimanus* were infected from night monkey donors bearing the Achiote strain. Sporozoites from these mosquitoes were introduced into 6 unaltered squirrel monkeys by bite or intravascular inoculation; 4 developed infections. The results are shown in the Table.

Sporozoite transmission of *Plasmodium vivax* to squirrel monkeys (*Saimiri sciureus*).

Monkey No.	Method of inoculation	Parasite periods—days		Maximum parasitaemia per mm ³
		Prepatent	Patent	
5514	i.v.	39	15,26*	<10,90
5515	bite	62	29	720
5519	i.v.	52	10*	<10
5520	i.v.	42	23*	27,480†

i.v. intravenous inoculation

* died during patency

† after splenectomy

P. vivax parasites were seen in one recipient (5520) on day 13 after intravenous inoculation of sporozoites. On subsequent days, no additional parasites were observed. However, a subpatent parasitaemia in the monkey was confirmed on day 17 by subinoculation of 3 ml. of blood into a normal night monkey, which developed an infection. Monkey 5520 was splenectomized on day 32 and after 10 days parasites again were detected in blood films.

The infection then followed an ascending course, reaching a parasite density of 27,480 per c.mm. before death of the animal on the 23rd day of parasite patency.

Patent infections were recorded in 3 of the 5 remaining subjects, after prepatent periods ranging from 39 to 62 days. Parasitaemias in 2 monkeys, 5514 and 5515 (intravenous inoculation and bite, respectively), persisted at relatively low levels (< 10 to 700 parasites per c.mm.) for 15 and 29 days, respectively. A relapse with similar low parasite concentrations appeared in monkey 5514 following a subpatent period of 18 days (72 days after inoculation). The infection continued until the host died 26 days later. The third monkey, 5519 (inoculated intravenously), showed only a low level parasitaemia, < 10 per c.mm., and succumbed on the 10th day of patency.

Significant gametocytaemias were produced, and infectivity for *A. albimanus* and *A. aztecus* was demonstrated. No attempts were made to transmit the infections by mosquitoes to other squirrel monkeys.

These findings, coupled with the ability of *S. sciureus* to support the development of a monkey-adapted strain of *P. falciparum* (YOUNG and ROSSAN, 1969) demonstrate the utility of this small New World primate as a laboratory host for human malaria.

We are, etc.,

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REFERENCES

BAERG, D. C., PORTER, J. A., JR. & YOUNG, M. D. (1969). *Am. J. trop. Med. Hyg.*, **18**, 346.
 DEANE, L. M., FERREIRA NETO, J. & SILVEIRA, I. P. S. (1966). *Trans. R. Soc. trop. Med. Hyg.*, **60**, 811.

PORTER, J. A., JR. & YOUNG, M. D. (1966). *Milit. Med.*, **131** (suppl.), 952.

YOUNG, M. D. & ROSSAN, R. N. (1969). *Trans. R. Soc. trop. Med. Hyg.*, **63**, 686.

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