

## DEVELOPMENT OF FALCIPARUM MALARIA IN A PANAMANIAN SUBSPECIES OF HOWLER MONKEY\*

RICHARD N. ROSSAN AND DAVID C. BAERG

Gorgas Memorial Laboratory, P. O. Box 2016, Balboa Heights, Canal Zone

**Abstract.** After adaptation to Colombian and then Panamanian *Aotus trivirgatus*, the Panama II strain of *Plasmodium falciparum* was infective for *Alouatta villosa trabeata* Lawrence. Five serial trophozoite passages were demonstrated, with parasitemias reaching 35,000 per mm<sup>3</sup>; four animals experienced multiple recrudescences, terminating as long as 175 days after inoculation.

Previous attempts to induce infections of *Plasmodium falciparum* in howler (*Alouatta*) monkeys met with little success.<sup>1-3</sup> We now report infectivity of the *Aotus trivirgatus*-adapted Panama II strain<sup>4</sup> to a coindigenous subspecies of *A. villosa*, yielding parasite growth at significant levels and establishment of serial passage in normal hosts.

### MATERIALS AND METHODS

The Panama II strain was acquired in July 1972 through the kindness of Dr. W. E. Collins, USPHS, Chamblee, Georgia after the second transfer in Colombian *A. trivirgatus*. Since that time we have carried a line in intact or splenectomized night monkeys of local origin. The laboratory procedures have been published elsewhere.<sup>5</sup>

The species designation for the howler monkey, *Alouatta villosa* (= *A. palliata*), follows Hall and Kelson<sup>6</sup> and other authors.<sup>7,8</sup> All of these subjects originated from Barqueta, Chiriqui Province in southwestern Panama, and the subspecies was identified as *A. v. trabeata* Lawrence (Mendez, Gorgas Memorial Laboratory, pers. commun.) consistent with descriptions given for this group of middle American primates.<sup>9</sup>

### RESULTS

At our 18th *A. trivirgatus* passage of the parasite, a combined intraperitoneal/intravenous

subinoculation was made to each of two *A. v. trabeata*. One, 8008, experienced an infection (Table 1), while the corecipient remained negative throughout 54 days of observation. Four subsequent serial passages were made intraperitoneally.

Monkey 8008 showed a 1-day prepatent period, having received  $738 \times 10^6$  parasites. The onset of patency among the remaining subjects, requiring 5 to 20 days, did not relate to the inoculum size ( $0.8 \times 10^6$  to  $70 \times 10^6$ ). Peak counts oc-

TABLE I  
*Infections of Plasmodium falciparum in Alouatta villosa trabeata*

Host no.*	Prepat. and (submat.) pds. days	Patent pds. days	Maximum parasitemia per mm <sup>3</sup>	Total period examined days
8008	1	5	<10	238
	(54)	16	10,680	
	(21)	45	6,420	
	(13)	20	7,220	
8009	5	18	14,910	166
	(31)	15	1,060	
	(37)	25	5,490	
8011	11	16	35,060	85
	(19)	21	14,180	
	(6)	12†	33,060	
8013	17	20	5,820	203
	(11)	47	4,600	
	(30)	3	120	
	(25)	21	3,370	
8014	19	22†	6,520	41

\* Listed in sequence of serial passage.

† At death.

Accepted 9 July 1975.

\* Supported in part by the U.S. Army Medical Research and Development Command under Grant No. DADA 17-72C-2031. This is contribution no. 1364 to the Army Research Program on Malaria.

