Reprinted from the AMERICAN JOURNAL OF VETERINARY RESEARCH,
Vol. 31, No. 2, Pages: 379–381

Hematologic Values of the Panamanian Marmoset (*Saguinus geoffroyi*)

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SUMMARY

Hematologic values were determined for Panamanian marmosets (*Saguinus geoffroyi*) according to sex and by time of collection of blood samples. According to collection times, data were put into 3 groups: at time of arrival of marmosets at laboratory (shortly after capture); during maintenance in the laboratory in 1967 (marmosets were fed mainly a noncommercial ration); and during maintenance in the laboratory in 1968 (marmosets were fed a commercially supplemented ration).

Mean erythrocyte count, packed cell volume, and hemoglobin concentration in female marmosets maintained during 1967 were significantly less ($P < 0.01$) than the respective values in female marmosets just arriving at the laboratory. In male marmosets, only mean erythrocyte count and packed cell volume were similarly decreased during the given times.

Received for publication April 16, 1969.

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Contribution No. 496 from the Army Research Program on Malaria.

Supported in part by the U.S. Army Medical Research and Development Command under research contract DA-MD-49-193-67-G9234.

The author acknowledges the assistance of Alberto Kant for laboratory determinations and of Belasario Polo, Jr., for data analysis.

Panamanian marmosets (*S. geoffroyi*) were used in malarial studies initiated at Gorgas Memorial Laboratory (GML) in 1965. Except for the report by Taliaferro and Kluver[4] on the "normal" erythrocyte and leukocyte counts for two of this species, published hematologic data could not be found. Work was initiated, therefore, to determine certain values. Subsequently, Anderson *et al.*[1] reported on the hematologic values of acclimatized, wild-caught marmosets. Since the marmosets studied at GML were of a different species, and since most data from GML were for nonacclimatized marmosets, the results are reported here.

Materials and Methods

Methods used for collection of blood and analysis were the same as those described elsewhere for the night monkey (*Aotus*

TABLE 1—Hematologic Values of Female Marmosets (*Sanguinus geoffroyi*)

Determination	Arrival at laboratory (1966–1968) No. of determinations	Mean ± S.D.	Maintained in laboratory: 1967 No. of determinations	Mean ± S.D.	Maintained in laboratory: 1968 No. of animals	Mean ± S.D.
Erythrocytes/cmm. (×10⁶)	73	4.39 ± 0.78	21	3.84* ± 0.53	7	4.04 ± 0.76
Leukocytes/cmm. (×10³)	73	10.9 ± 3.8	21	12.9 ± 5.5	7	13.0 ± 3.8
Packed cell volume (%)	106	41.7 ± 6.9	15	35.3* ± 6.0	7	36.1 ± 5.1
Hemoglobin (Gm./100 ml.)	58	12.9 ± 2.0	18	11.4* ± 1.5	7	11.7 ± 1.8
Neutrophils (%)	50	69.5 ± 11.1	4	77.8 ± 10.1	6	75.5 ± 6.9
Lymphocytes (%)	50	28.8 ± 10.1	4	19.3 ± 9.2	6	22.0 ± 7.2
Monocytes (%)	50	1.3 ± 1.3	4	1.8 ± 1.3	6	1.5 ± 0.5
Eosinophils (%)	50	0.8 ± 1.1	4	1.3 ± 0.5	6	1.0 ± 0.9
Basophils (%)	50	0.4 ± 0.8	4	0	6	0
Mean corpuscular volume (cμ)	62	95.6 ± 5.2	15	92.2 ± 11.5	7	91.6 ± 10.5
Mean corpuscular hemoglobin (μμg)	58	29.0 ± 1.6	18	29.5 ± 0.4	7	29.9 ± 1.4
Mean corpuscular hemoglobin concentration (%)	50	30.5 ± 2.2	14	32.9 ± 7.1	7	32.7 ± 4.4

* Differs from corresponding value for arrival time ($P < 0.01$).

trivirgatus).[2] Only apparently healthy, mature (or nearly mature) marmosets were used. Pregnant or nursing female marmosets were excluded. Data from marmosets in use in research studies were not included. Samples were collected only as time permitted over the 1966 to 1968 period. Data were reported according to sex of the marmosets and time of collection of blood samples. Data were grouped according to time of collecting blood samples from the marmosets: (1) at time of arrival at laboratory (shortly after capture); (2) during maintenance in the laboratory in 1967 (fed mainly a noncommercial ration); and (3) during maintenance in the laboratory in 1968 (fed a commercial ration supplemented by fruits). Demands of the research program and scarcity of marmosets were factors which limited the sample population available for maintenance studies. Blood samples were collected more than once from some marmosets in the group maintained in 1967; blood samples were collected only once from marmosets in the group maintained in 1968.

Methods of handling and of feeding marmosets were similar to those detailed elsewhere for the night monkey.[2,3] In 1967, the ration consisted of fruits supplemented by baby cereals, milk, eggs, suckling mice, and mealworms. In 1968, the ration was altered by substituting a commercially available primate feed[a] as the protein

[a] Purina Monkey Chow 25, Ralston Purina Company, St. Louis, Mo.

TABLE 2—Hematologic Values of Male Marmosets (*Sanguinus geoffroyi*)

Determination	Arrival at laboratory (1966–1968) No. of determinations	Mean ± S.D.	Maintained in laboratory: 1967 No. of determinations	Mean ± S.D.	Maintained in laboratory: 1968 No. of animals	Mean ± S.D.
Erythrocytes/cmm. (×10⁶)	74	4.41 ± 0.90	36	3.89* ± 0.88	6	4.12 ± 0.69
Leukocytes/cmm. (×10³)	74	10.1 ± 4.3	36	12.7 ± 6.3	6	11.8 ± 4.9
Packed cell volume (%)	123	43.7 ± 7.6	32	38.2 * ± 8.4	6	39.5 ± 7.0
Hemoglobin (Gm./100 ml.)	51	12.9 ± 2.5	26	11.8 ± 2.7	6	12.2 ± 1.9
Neutrophils (%)	39	70.0 ± 7.9	4	72.0 ± 16.2	6	68.1 ± 13.5
Lymphocytes (%)	39	27.7 ± 7.4	4	24.5 ± 15.2	6	29.5 ± 13.7
Monocytes (%)	39	1.6 ± 1.3	4	2.8 ± 1.3	6	1.8 ± 1.0
Eosinophils (%)	39	0.8 ± 0.8	4	0.8 ± 1.0	6	0.5 ± 0.8
Basophils (%)	39	0.7 ± 1.6	4	0	6	0
Mean corpuscular volume (cμ)	67	95.8 ± 12.9	32	97.2 ± 5.3	6	95.8 ± 1.0
Mean corpuscular hemoglobin (μμg)	51	29.1 ± 1.9	26	29.5 ± 0.7	6	29.7 ± 0.4
Mean corpuscular hemoglobin concentration (%)	45	31.5 ± 6.2	21	31.6 ± 1.7	6	31.0 ± 0.8

* Differs from corresponding value for arrival time ($P < 0.01$).

source. Since the commercial feed was refused by the marmosets, even when fasted, the feed was softened and mixed with fruits.

Results

Results of the hematologic determinations for female marmosets and for male marmosets are shown (Tables 1 and 2). There was no significant difference ($P < 0.01$) in the hematologic values between the sexes. Mean erythrocyte count, packed cell volume percentage, and hemoglobin concentration from female marmosets maintained in the laboratory in 1967 were significantly decreased from the respective values determined at time of arrival (Table 1). Mean erythrocyte count and packed cell volume percentage from male marmosets had a similar significant decrease (Table 2).

For both female and male marmosets, the mean erythrocyte count, packed cell volume percentage, and hemoglobin concentration were greater during 1968 than during 1967, but were less than the mean hematologic values in newly arrived marmosets.

Mean leukocyte counts in the 1967 and 1968 groups in both sexes were larger, but not significantly, than the mean values of newly arrived marmosets. Mean differential counts differed little among the newly arrived and the 1967 and 1968 groups in both sexes.

Discussion

Samples of blood were obtained from many marmosets on arrival at the laboratory. The data collected represents, as closely as is possible for us to determine, the hematologic values of Panamanian marmosets in their natural state. These data comprise a measure against which hematologic values of acclimatized marmosets could be compared. We used the data for this purpose, against the hematologic values of a limited number of acclimatized marmosets. We observed that maintenance conditions and rations for marmosets maintained at GML in 1967 and possibly in 1968 did not compare favorably with the nonacclimatized condition of the marmosets, as reflected by changes in erythrocyte count, packed cell volume, and hemoglobin concentration. The marmosets may not have eaten an adequate amount of the commercial supplement, even when it was mixed with fruits in 1968. Since maintenance conditions and rations are so greatly variable from laboratory to laboratory, a given laboratory should determine hematologic values for marmosets which it maintains or otherwise handles.

References

1. Anderson, E. T., Lewis, J. P., Passovoy, M., and Trobaugh, F. E., Jr.: Marmosets as Laboratory Animals. II. The Hematology of Laboratory Kept Marmosets. Lab. Anim. Care, 17, (1967): 30–40.

2. Porter, J. A., Jr.: Hematology of the Night Monkey (*Aotus trivirgatus*). Lab. Anim. Care, 19, (1969): 470–472.

3. Porter, J. A., Jr., and Young, M. D.: Susceptibility of Panamanian Primates to *Plasmodium vivax*. Milit. Med., 131, (1966): 952–958.

4. Taliaferro, W. H., and Kluver, C.: The Hematology of Malaria (*Plasmodium brasilianum*) in Panamanian Monkeys. I. Numerical Changes in Leucocytes. J. Infect. Dis., 67, (1940): 121–161.

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