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SOME BLOOD VALUES OF THE WESTERN DIAMOND-BACK RATTLESNAKE *(Crotalus atrox)* FROM SOUTH TEXAS

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Abstract: Hematologic values of the western diamond-back rattlesnake (*Crotalus atrox*) from south Texas were determined by standard techniques. The means of the principal blood measurements were 0.68 ± 0.20 million erythrocytes/mm^3, 31.9 ± 4.6% hematocrit and 10.0 ± 1.8 gm% hemoglobin. A comparison of hematologic values of snakes is given.

INTRODUCTION

Numerous researchers maintain colonies of venomous snakes as sources of enzymes.[11] Personnel involved in the care of snakes may encounter situations where disease compromises the health of specimens. Although present methods in reptile care incorporate quantitative hematology in the diagnosis of disease,[7,11] few reports are available on the blood values of poisonous species. These data are presented to help establish the range of normal values for rattlesnake blood.

MATERIALS AND METHODS

Western diamond-back rattlesnakes (*Crotalus atrox*) were collected in the south Texas area around Duval County by participants in the Freer Jaycee Rattlesnake Roundup, 2-4 April 1976. Snakes 0.9 to 1.8 m long were decapitated and bled into sterile tubes. Sequester-Sol[1] (1 drop/5 ml blood) was added as the anticoagulant. Hemoglobin was measured as cyanmethemoglobin using Drabkin's diluent.[3] Samples in Drabkin's diluent were stored at 4 C until analyzed with a Beckman Model 25 spectrophotometer[2] set at 540 nm. Cyanmethemoglobin Certified Standard[3] was used to prepare the standard curve. Non-heparinized capillary tubes were filled with blood, sealed on one end with clay, and centrifuged for 5 min at 11,500 rpm in an Adams Microhematocrit centrifuge.[4] A modified diluent of Natt and Herrick[6] was used for erythrocyte counts. Gentian violet (0.1 gm/1) was substituted for methyl violet 2B in the diluent. Techniques for erythrocyte counts given by Seiverd[9] were followed.

Blood was added to Drabkin's diluent within 10 min post-collection. Erythrocyte counts and hematocrits were performed within 4 hr post-collection.

Standard methods[3] were used to calculate the mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC). Statistical analyses followed Mendenhall.[5]

[1] Cambridge Chemical Products, Inc., Fort Lauderdale, Fla. 33309.

[2] Beckman Instruments, Inc., Anaheim, Cal. 92806.

[3] Hycel Inc., Houston, Tex. 77001.

[4] Clay-Adams, Inc., New York, N.Y. 10519.

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RESULTS

The number of samples, range, mean, and standard deviation for erythrocyte (RBC) count, hematocrit (PCV), hemoglobin (Hb), MCV, MCH, and MCHC are listed in Table 1. The means of the measurements were: 0.68 ± 0.20 million erythrocytes/mm^3; 31.9 ± 4.6% hematocrit; 10.0 ± 1.8 gm% hemoglobin; 480 ± 152 μm^3, MCV; 146 ± 46 pg, MCH; and 31.9 ± 5.4%, MCHC. A comparison of the values reported for other snakes is found in Table 2.

TABLE 1. Number of samples (n), range, mean ($\bar{X}$), and standard deviation (S.D.) of blood values of the western diamond-back rattlesnake.

	n	range	$\bar{X}$	S.D.
RBC/mm^3 (X10^6)	14	0.39-1.01	0.68	0.20
PCV %	71	20.0-43.0	31.9	4.6
Hb gm%	69	6.0-13.6	10.0	1.8
MCV μm^3	14	311-652	480	152
MCH pg	13	95-258	146	46
MCHC %	68	18.8-58.5	31.9	5.4

DISCUSSION

The mean hemoglobin concentration of rattlesnake blood is at the upper range of values reported for other snakes (Table 2). This could be due to species differences, environmental factors, or methods of measurement. Hemoglobin can be measured in several forms: oxyhemoglobin, carboxyhemoglobin, methemoglobin, and cyanmethemoglobin.[3] The most accurate assay of total hemoglobin involves cyanmethemoglobin.[4]

Avian blood diluents have been used to count erythrocytes of reptiles.[1] Natt and Herrick[6] used methyl violet 2B in an avian blood diluent that was stable for long periods and simple to prepare. Methyl violet 2B was unavailable so gentian violet was substituted. This diluent was satisfactory for diluting rattlesnake blood as it prevented clumping and lysis, and allowed the differentiation of erythrocytes from leukocytes and thrombocytes.

Possible injury due to capture, stress induced by captivity and crowding, sex, and age of specimens were not considered in this study. Parasitic infestation as well as seasonal and dietary changes have been reported to produce wide fluctuations in hematological parameters of reptiles.[7]

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TABLE 2. Comparison of mean hematologic values of snakes. Names in parentheses are those used in the reference. Values in parentheses are ranges.

species	RBC/mm³ (X10⁶)	PCV %	Hb gm%	MCV μm^3	MCH pg	MCHC %	reference
Crotalus atrox	0.68 (0.39-1.01)	31.9 (20-43)	10.0 (6.0-13.6)	480 (311-652)	146 (95-258)	31.9 (18.8-58.5)	
Constrictor c. imperator	—	29.3 (22-37)	—	—	—	—	10
Pituophis catenifer annectans	—	29.5 (27-33)	—	—	—	—	10
Pituophis melanoleucus sayi (*P. sayi*)	1.095	—	8.8	—	80.5*	—	8
Thamnophis sirtalis (*Eutania sirtalis*)	1.05 (0.71-1.39)	28.0 (19-37)	8.5 (5.8-11.3)	267 (266-268)	82.0	30.4*	2
Heterodon platyrhinos (*H. contortrix*)	0.57 (0.50-0.63)	18.7 (13-24)	5.6 (3.7-7.5)	325 (266-383)	95.5 (74-119)	29.9*	2
Natrix sipedon	0.77	35.5	10.0	465	131.0	28.2*	2
Natrix natrix	0.85	—	—	—	—	—	7

*Calculated from available data.

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