suspended in 0.88 M sucrose and resedimented at 24,000 × gravity. Resuspension of this final sediment in 0.88 M sucrose yielded a distinctly yellowish preparation that showed pronounced birefringence of flow and was made up of mitochondria that had retained their original rod-like shape. The washed mitochondria were readily stained with Janus green at a dye concentration of 1/20,000, perceptibly stained at a dye concentration of 1/40,000, and remained morphologically stable in 0.88 M sucrose over a period of several days when kept at 4°C. No extraneous elements could be seen either in preparations stained with Janus green or in preparations fixed with osmium tetroxide and examined at high magnification in the electron microscope. In several experiments, the suspensions of washed mitochondria isolated by this procedure were found to contain 70 to 80% of the succinoxidase activity of the original liver homogenate, the remainder of the enzyme activity being present in the mixture of nuclei and unbroken cells sedimented by the preliminary low-speed centrifugations.

Of some interest is the fact that results obtained with rat kidney homogenates in sucrose solutions paralleled those described above for liver. Furthermore, the morphological alteration of mitochondria within unbroken liver or kidney cells present in homogenates, a phenomenon that occurred very rapidly in isotonic saline or 0.25 M sucrose, was progressively delayed as the concentration of sucrose was increased. In 0.88 M sucrose homogenates, the unbroken cells retained a normal appearance for hours. A possible explanation for the latter finding and for the preservation by concentrated sucrose solutions of mitochondria freed by cell rupture is that the intracellular osmotic pressure at the mitochondrial membrane may be considerably higher than the blood osmotic pressure.

15949

Blood Picture of Adult Gold Hamster (*Cricetus auratus*) After Castration.*

WALTER O. CRUZ AND FERNANDO UBATUBA.

From Instituto Oswaldo Cruz, Rio de Janeiro, Brazil.

It has been shown that gonadal hormones influence the blood picture in different species of vertebrates, the males having a higher number of corpuscles and greater hemoglobin values than the females. Steinglass *et al.*[1] showed a decrease in red blood count and hemoglobin value in castrated male rats; after testosterone administration the values return to normal. Vollmer *et al.*[2] claim that androgen raises the red blood count not only in castrated rats but in hypophysectomized and in normal animals.

Stein and Carrier[3] reported an appreciable drop (25 to 30% of the normal value) in the red blood cells of the "gold hamster" after castration, a decrease of red cell volume and an increase of mean corpuscular hemoglobin content, all of which disappeared after administration of iron, liver extract and testosterone propionate in periods as short as 3 days.

These results interested both the Hematology and Endocrinology Departments of our Institute and an investigation was planned to repeat this study.

Methods. Thirty-three adult male ham-

* We are indebted to Mr. Guilherme Guinle for a grant for this investigation.

1 Steinglass, P., Gordon, A. S., and Charipper, H. A., PROC. SOC. EXP. BIOL. AND MED., 1941, **48**, 169.

2 Vollmer, E. P., Gordon, A. S., Levenstein, I., and Charipper, H. A., PROC. SOC. EXP. BIOL. AND MED., 1941, **46**, 409.

3 Stein, K. F., and Carrier, E., PROC. SOC. EXP. BIOL. AND MED., 1945, **60**, 313.

TABLE I.
Blood Picture of Normal Adult Gold Hamster. Average Values for 33 Male Animals.

R.B.C. 10^6 per cmm	Hb g per 100 cc	Vol. packed R.B.C. cc per 100 cc	M.C.V. (c.μ.)	M.C.H. ($\gamma\gamma$)	M.C.H.C. (%)
8.1±0.22*	13.9±0.25	46±0.78	57±1.61	17.3±1.24	30±0.36

* Standard deviation of the mean.

TABLE II.
Blood Picture of Male Adult Gold Hamster.

Animal No.	Weight, g	Before castration: R.B.C., 10^6 per cmm	Before castration: Hb, g/100 cc	Before castration: Vol. packed R.B.C., cc/100 cc	41 days after: R.B.C., 10^6 per cmm	41 days after: Hb, g/100 cc	41 days after: Vol. packed R.B.C., cc/100 cc
2	90	8.3	15.2	48	8.4	14.4	49
3	95	8.3	15.3	49	7.3	13.8	48
6	115	7.9	13.8	51	8.3	14.0	42
7	134	7.4	15.2	53	8.7	15.2	43
8	140	6.7	15.4	53	9.0	14.0	49
	Avg	7.7±0.32	14.9±0.29	50±1.03	8.3±0.28	14.3±0.17	46±1.53

sters, weighing 76 to 145 g were used. Before and after castration red blood cell counts, hemoglobin and hematocrit determinations were made by technic previously described.[4] We emphasized that the hematocrit tube should be centrifugated for one whole hour at 3000 r.p.m. in order completely to settle the red blood cells of the hamster. 0.1 ml samples of blood from the heart were drawn each time and rendered incoagulable by the proper amount of a mixture of ammonium and potassium oxalate. We previously observed that this amount of blood could be drawn every 2 weeks without change in the blood picture of this mammal. In most cases cardiac puncture was done without anesthesia, in others after light ether anesthesia. Castration was performed by trans-scrotal route under avertina. Animals 15 to 19 were anesthetized by thionembutal (Abbott). Good results were obtained with intraperitoneal doses of avertina and thionembutal as used in the routine of our laboratories for rats.

Results. The normal hematological data for the male adult healthy hamster are shown in Table I. Our results are in reasonable agreement with those of Stein and Carrier.[3]

The first group of 5 castrated animals showed no alteration in blood picture after 41 days (Table II). The second group of 6 castrated showed no significant decrease 13 and 70 days after castration (Table III). The third group consisting of 12 castrated animals still showed normal blood picture 24 and 62 days after operation (Table IV); 5 normal controls were bled simultaneously with the castrated animals of this group, to check the maintenance conditions during the whole experimental period. As far as the blood picture is concerned the range of variation in both castrated and normal adult hamsters was not significantly different, according to the "t test" of Fisher.

We did not find the conspicuous alterations in the adult gold hamster after castration reported by Stein and Carrier;[3] we were interested only in observing the blood picture of the adult animals after castration. These authors emphasized that the blood picture is stabilized when the hamsters are 65-70 days old—"adult level"—so the effect of castration was observed only in 3 adult animals.

Summary. Thirty-three adult, healthy, male gold hamsters *(Cricetus auratus)* were used. Hematological data were obtained

[4] Cruz, W. O., Martins da Silva, E., and Pimenta de Mello, R., *Mem. Inst. Oswaldo Cruz*, 1946, **42**, 609.

TABLE III.

Blood Picture of Male Adult Gold Hamster.

Animal No.	Weight, g	Before castration			13 days after			70 days after		
		R.B.C. 10^6 per cmm	Hb, g/100 cc	Vol. packed R.B.C. cc/100 cc	R.B.C., 10^6 per cmm	Hb, g/100 cc	Vol. packed R.B.C., cc/100 cc	R.B.C., 10^6 per cmm	Hb, g/100 cc	Vol. packed R.B.C., cc/100 cc
9	102	7.9	13.2	49	6.2	12.8	—*	—	—	—
10	115	9.4	14.6	47	7.5	11.0	—	8.6	16.6	51
11	145	9.6	17.4	54	7.7	13.0	—	6.3	14.0	45
12	100	8.8	14.8	47	6.7	11.2	—	6.2	13.0	44
13	110	9.2	15.4	48	5.8	9.0	—	5.7	11.4	41
14	95	8.7	14.6	44	6.2	11.6	—	5.4	11.2	40
	Avg	8.9±0.25	15.0±0.56	48±0.37	6.7±0.31	11.4±0.59		6.4±0.56	13.2±0.98	44±1.93

* Data accidentally lost.

TABLE IV.

Blood Picture of Male Adult Gold Hamster.

Animal No.	Weight, g	Before castration			18-24 days after			60-62 days after		
		R.B.C. 10^6 per cmm	Hb, g/100 cc	Vol. packed R.B.C. cc/100 cc	R.B.C., 10^6 per cmm	Hb, g/100 cc	Vol. packed R.B.C., cc/100 cc	R.B.C., 10^6 per cmm	Hb, g/100 cc	Vol. packed R.B.C., cc/100 cc
15	84	8.4	14.0	45	6.3	12.7	42	7.0	12.8	45
16	125	8.9	14.6	50	7.5	13.8	46	7.5	14.6	48
17	100	8.9	13.8	45	5.7	13.0	47	7.3	14.2	40
18	117	7.2	13.4	42	6.2	12.9	48	—	—	—
19	87	8.3	12.8	39	5.2	9.4	34	—	—	—
20	113	8.3	14.2	50	6.6	14.3	48	8.4	15.2	51
21	85	6.1	13.0	46	7.7	14.8	47	8.7	16.6	51
22	102	7.4	13.6	45	6.3	13.3	48	7.3	16.0	49
23	123	7.5	12.6	44	5.7	13.0	48	7.1	15.8	49
24	98	7.4	11.0	36	6.2	11.6	40	7.0	15.4	47
25	125	7.2	11.8	44	7.2	12.8	47	7.4	16.0	48
26	76	9.9	14.6	41	6.4	11.8	45	—	—	—
	Avg	7.9±0.29	13.3±1.00	44±1.17	6.4±0.67	12.8±1.27	45±1.24	7.5±0.20	15.0±0.38	47±1.12
					Values for 5 Normal Parallel Controls.					
		First sample			18 days after			60 days after		
35	92	6.2	13.2	46	8.1	13.0	37	7.0	13.2	48
36	139	8.9	11.6	41	6.0	12.7	45	8.2	14.0	50
37	101	7.1	12.0	38	4.7	9.5	42	7.0	12.6	47
38	118	7.1	13.4	43	7.3	12.4	46	—	—	—
39	105	10.6	14.8	46	8.0	14.0	54	8.6	15.8	51
	Avg	7.9±0.78	13.0±0.66	43±1.53	6.8±0.64	12.3±0.75	45±2.78	7.7±0.41	13.9±0.69	49±0.91

from the blood drawn by heart puncture before castration, and in 2 instances after castration. Castration failed to induce significant changes in the blood picture of 23 adult male hamsters.

15950

Hemoglobin and Glycemia Levels of the Adult White Mouse, Effect of Starvation and Central Depressants.

WILLIAM A. HIESTAND, MARY F. HADLEY, SHIRLEY E. MERCER, AND BETTY K. SANDOCK.

From the Laboratory of Animal Physiology, Purdue University, Lafayette, Indiana.

A survey of the literature available has disclosed a dearth of published material on glycemia levels in mice. One group of workers[1] lists the blood sugar levels of hereditary dwarf mice as averaging 135 mg % (26 mice) and 139 mg % (16 mice). Others[2] give normal values between 76 and 86 mg %. Favour[3] has found values between 80 and 100 mg. Blood sugar levels of the commonly used albino rat seem to be no better known. One report[4] states that the blood sugar of (starved) rats is affected by age, season, and sex. These investigators determined blood sugar levels in 85 male albino rats averaging 114 g body weight, all of which were starved 17 hours previous to bleeding. The range of blood sugar levels extended from 100 to 148 mg %, the average being 113 mg. Myers and Bailey modification[5] of the Lewis and Benedict method was used for which 1 ml of blood was obtained by decapitation. Others[6] using the Folin-Wu method found an average of 122.2 mg % in 17 normal rats, the average of males being 4.7 mg higher than that of females.

Hemoglobin determinations in mice are likewise rare. In the chapter on histology[7] Fekete quotes from Hamm in Jaffé[8] stating that the hemoglobin content of mouse blood (based on the average of observations of 9 investigators) is 97% Sahli. Allowing 13 g hemoglobin per 100 ml of blood as 100% Sahli[9] this would be an average hemoglobin content of mouse blood of 12.6 g %.

Experimental. Adult albino mice of the Purdue Swiss strain were used. These were fed Purina Laboratory Chow in abundance such that extra pellets always remained in the cages. In this manner the mice were unstarved up to the time of bleeding. However, a more uniform level of glycemia can be obtained by starving the animals for a given period of time. Therefore our results of blood sugar determination in the non-starved mouse appear higher than those reported elsewhere. Unless a standard procedure is followed by all, the results are not comparable.

Blood was obtained by sudden decapitation with a razor blade. We tried also bleeding from the tail with the mice wrapped in towelling to minimize struggling but with no apparent advantage. Blood hemoglobin was

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