prepatellar bursa, the synovial sheath of one of the dorsal carpal tendons, and the pleura were thus investigated. The results are presented in Table II. In the instance in which there was a possibility of infection, in the case of prepatellar bursitis, the fluid was sterile bacteriologically. The 5 membranes were extraordinarily variable in their permeability. In the case of the tendon sheath the process of absorption was rapid; the P.S.P. appeared in the urine within 15 minutes and 60% was excreted in 2 hours. In the case of the *tunica vaginalis testis*, however, the process was very slow. In fact, little if any of the dye was excreted by the kidney in 12 hours, and nearly all the P.S.P. injected was recovered from the hydrocele sac at the end of 16 hours. This latter observation is being thoroughly studied by Huggins and Entz.[4]

In traumatic arthritis with effusion the synovial membrane of the knee is freely permeable to phenolsulphonephthalein. There is great variability in the permeability of diseased serous and synovial membranes.

4762

Creatine in Medullated Nerve.

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The finding in frog and rabbit sciatic nerves of a soluble phosphorus compound behaving like the phosphocreatine of muscle[1] suggested the desirability of a similar study of nerve creatine.

Total creatine was determined, after digestion of the whole tissue for 3 hours in N H_2SO_4 on a water bath, by the usual picric acid method. For estimating "free" and "bound" creatine, the cold tissue was extracted with iced trichloracetic, alcohol added to an aliquot portion to a concentration of 66% and the bound creatine precipitated with crystalline $Ba(OH)_2$ (Eggleston,[2] for separating phosphocreatine). The 2 fractions were then heated with acid and determined as above. Controls showed full recovery of creatine in the "free" fraction and phosphocreatine (kindly supplied by Dr. Fiske) largely in the "bound" fraction.

[4] Huggins, C. B., and Entz, F. H., personal communication.

[1] Gerard, R. W., and Wallen, J., *Am. J. Physiol.*, 1929, lxxxix, 108.

[2] Eggleston, P., personal communication.

The total creatine content of green frog sciatics varies markedly with the season or condition of the animals, although values for nerves from one frog agree within 6%. From June 4th to July 27th the values rose entirely regularly in 11 successive experiments a few days apart, from 104 mgm. % to 234 mgm. %. The muscles showed a similar but less regular rise from 440 mgm. % to 570 mgm. % (average 500 mgm. % for 13 experiments). The average total creatine in the nerves, in 30 experiments extending from May to January, was 164 mgm. %. A similar average for the bull frog sciatic, based on 20 experiments, was 135 mgm. %, but in this series fewer of the analyses were made during the periods of high concentration than in the case of the green frogs. Two determinations of total creatine in dog's sciatic yielded 139 and 140 mgm. %.

The sum of the free and bound creatine in a trichloracetic acid extract of nerve or muscle was always less than the total determined directly. The tissue residue from the extraction, when digested with acid, yielded a test for creatine and when this amount was added to that in the extract, the sum equalled the total as directly estimated. In 13 experiments on nerve the direct measurement gave 133 mgm. % total creatine and the sum of the fractions also 133 mgm. %. For muscle, 8 experiments gave: total direct, 498 mgm. %; sum, 490 mgm. %. This affords a further check on the methods. The creatine not extracted from the tissue averaged 35 mgm. % for nerve (36 experiments) and the same for muscle (39 experiments). This could not be removed by repeated extraction with trichloracetic acid, water, mineral acid, alkali, or ether-alcohol, and was not lessened when the tissue was powdered in liquid air before extraction.

The preformed creatinine in nerve was hardly more than in a blank test.

In fresh nerve the free creatine averaged 57 mgm. %, the bound 44 mgm. % (6 experiments). A somewhat larger fraction was bound when the nerves had been allowed to rest in air or oxygen. It is striking that in both nerve and muscle, despite marked differences in the total, about half the creatine is bound. After 8 to 24 hours in nitrogen at 20° C. the values for nerve were 80 mgm. % free, 25 mgm. % bound (7 experiments); about half the bound creatine having been freed. For muscle, the bound creatine fell from 260 mgm. % to 65, over three-fourths being broken down. In CO_2, two experiments have shown a similar though lesser decomposition. The effect of activity is being studied.

Fresh frog nerve contains about 9.5 mgm. % of phosphorus in a

labile combination, of which 4 mgm. % is broken down during asphyxia. If phosphocreatine is the substance there should be 40 mgm. % of bound creatine in fresh nerve, 23 mgm. % after asphyxiation. The observed values are 44 and 25, which leaves little doubt that the labile phosphorus and bound creatine are present in nerve as phosphocreatine. Similar agreement is obtained for muscle.

4763

Effects of Ligating the Bile Duct in the Rat.

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The experiment to be described was suggested by a finding reported by Buchbinder and Kern,[1] namely, that ligation of the common bile duct in the pup is followed by a decline in the blood calcium and by the development of an osteoporotic condition. Since the incisors of the rat are teeth of continuous eruption and relatively convenient for microscopic study, this animal could be expected to show the effects of an icteric calcium metabolism upon growing teeth.

In a series of rats, all of them males, white, weighed every day, and kept on a standard diet, ligation of the bile duct was done with asepsis and ether-magnesium sulphate anesthesia. The duct was found in the hepatoduodenal ligament and was divided between liga-

TABLE I.
Survival-times of Male Rats, Untreated, After Ligation of Bile Ducts.

			Weight	Survival	Remarks
			gm.	days	
1	RH	1	169	2.5	
2	RF	4	147	2.8	
3	LH	2	158	4	
4	LH	45	145	7	
5	RH	3	161	10	
6	LH	4	173	10	
7	LH	1	155	12	Smallest cyst.
8	LH	3B	185	14	Small cyst.
9	LH	34	172	23	Large cyst.
10	LH	5	132	30	Large cyst; ascites.
11	LH	3A	151	38	Large cyst; bleeding from nose, etc.

[1] Buchbinder, W. C., and Kern, R., PROC. SOC. EXP. BIOL. AND MED., 1927-8, XXV, 104.