than at pH 9.3. The difference in the rate caused by the variation in the external pH value is less marked with exit than with penetration.

As brucine comes out of the vacuole the pH value of the sap is decreased.

The same result is obtained with penetration of brucine into the "vacuole" of an artificial system consisting of a layer of chloroform placed between the brucine sulphate solution and the sap in a U-tube.

The results indicate that brucine goes in and out of the vacuole of a living cell primarily in form of free base, but the mechanism of penetration is somewhat different from that of the exit, just as was shown previously with cresyl blue.[1] The accumulation of brucine is chiefly caused by the transformation of free base into the salt by the sap, but in some cases is due partly to the formation of a very slightly soluble compound of brucine with some constituent of the sap. The results support the multiple partition coefficient theory[2] which states that the cell controls the rate of penetration and exit of a substance as it would if it were made up of a non-aqueous layer lying between the external solution and the vacuolar sap, the rate of diffusion of a substance being partly dependent on its partition coefficient at each phase boundary.

The same results were obtained with codeine hydrochloride.

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Adrenalin and Fatiguability of Muscle of Adrenalectomized Rats.

L. B. NICE, D. S. GREENBERG AND S. L. GREENBERG.

From the Physiological Laboratories, Ohio State University.

A series of adrenalectomized rats was given subcutaneously 1 cc. of 1:50,000 adrenalin chloride (Parke Davis & Company) daily for periods of 7 days to 14 weeks. The animals were then urethanized and a fatigue curve of a gastrocnemius muscle obtained by a modification of the Gans and Miley method.[1]

The results are shown in Table I.

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[1] Irwin, M., *J. Gen. Physiol.*, 1926-27, x, 75.

[2] Irwin, M., PROC. SOC. EXP. BIOL. AND MED., 1927, xxv, 127.

[1] Gans, H. M., and Miley, H. H., *Am. J. Physiol.*, 1927, lxxxii, 1.

TABLE I.

Absolute muscle force and total work done by gastrocnemius muscle.

Animal number	Absolute muscle force per gm. of muscle	Absolute muscle force	Total work	Wgt. of muscle	Work per gm. of muscle	Age of rat	Wgt. of rat	Time given adrenalin
	gm.	gm.	gm. cm.	gm.	gm. cm.	days	gm.	days
303 ♀	753.3	678	12,800	0.9	1,422	277	190	84
307 ♀	226.3	430	330,387	1.9	173,888	271	190	97
84 ♀	836.3	920	288,618	1.1	262,380	218	120	11
338 ♂	964.3	1350	62,244	1.4	44,460	256	172	7
82 ♀	740.0	1110	112,320	1.5	74,880	255	181	7
91 ♂	607.7	790	10,080	1.3	7,754	266	220	7
A ♂	758.3	910	4,077	1.2	3,398	75	98	8
B ♂	780.8	937	32,273	1.2	26,894	75	150	9
E ♂	1160	1160	3,182	1.0	3,182	75	150	9
D ♂	400	400	151	1.0	151	75	100	9
C ♂	761	784	70,606	1.0	69,222	75	100	9
Average for 11 animals	726.2	860.8	84,249	1.2	60,694		152.7	

The amount of work per gm. of muscle done in our series varied between 151 and 262,380 gm. cm., while with the adrenalectomized rats of Gans and Miley it varied between 1200 and 206,400 gm. cm. The average work per gm. of muscle of our rats amounted to 60,694 gm. cm., which is slightly less than that of their adrenalectomized rats—64,200 and only one-sixteenth of the average of their controls—1,015,300 gm. cm.

There is no evidence of increased work done by the muscles of our rats after the daily administration of adrenalin.