motic pressure theoretically obtainable with the 2 reagents in solution together, the narcotic being osmotically inactive due to its rapid penetration and the immediate attainment of its equilibrium.

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Relation of Plasma Volume to Plasma Protein Concentration.

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It was the purpose of this study to determine the relationship of plasma protein concentration to the plasma volume of non-edematous dogs. The value of plasma albumin determinations in studying fluid exchange has been amply demonstrated. It was consequently determined to perform simultaneous analyses of plasma albumin and globulin concentrations and of plasma volume in dogs that were undergoing certain experimental procedures. The method of Koch and McMeekin[1] was used for determining the plasma protein levels of the first 2 dogs and a micro-kjeldahl procedure involving distillation into N/70 H_2SO_4 and subsequent titration with N/20 alkali was used for the other 2 dogs. The circulating plasma volumes of the first 2 dogs were kindly determined for me by Mr. John Morcan, who used the brilliant vital red technique as described by Whipple and coworkers.[2] Those of the other 2 dogs were performed by the author, utilizing the spectrophotometric procedure for analyzing brilliant vital red described by Clarke and Graff.[3]

Changes in the plasma albumin concentration proved to be the most significant ones and consequently they alone will be mentioned in this report.

Two dogs in the anemia colony in this laboratory were studied weekly over a period of 2-3 months. In one of them, both the plasma volume and the plasma albumin concentration remained fairly constant. In the other, as the plasma albumin concentration decreased, the plasma volume decreased. As the plasma albumin concentration increased the plasma volume increased.

[1] Koch, F. C., and McMeekin, T. L., *J. Am. Chem. Soc.*, 1924, **46**, 2066.

[2] Hooper, C. W., Smith, H. P., Belt, A. E., and Whipple, G. H., *Am. J. Physiol.*, 1920, **51**, 205.

[3] Graff, S., and Clarke, H. T., *Arch. Int. Med.*, 1931, **48**, 808.

Two other dogs (not anemic*) were placed upon a low protein diet developed by Weech and Goettsch[4] and studied weekly for about 2 months. This diet consisted mainly of carrots and contained essential salts and apparently all of the recognized vitamins. One of these dogs showed small changes in plasma volume that were paralleled as above by changes in the plasma albumin concentration. The other dog showed large changes in plasma volume which paralleled changes in the plasma albumin concentration.

It was found that whole blood volume also varied directly with the plasma albumin concentration. The following table is a protocol of the results obtained with one of the dogs in the anemia colony.

TABLE I.

Day	Plasma Albumin gm./100 cc.	Plasma Volume cc.	Blood Volume cc.
1	3.82	1155	1414
10	4.92	1178	1435
17		1141	1498
24	4.30	1115	1450
31		1003	1358
38	3.42	822	1136
44	2.14	691	1073
56	3.42	961	1260
63	3.63	1018	1260
71	4.17	1074	1301

From these experiments it appears that there is a rather constant and direct relationship between the plasma albumin concentration and the plasma volume, which can be explained adequately on the basis of the Starling conception of fluid exchange, for according to this theory a rise in plasma colloid osmotic pressure (other factors remaining constant) will attract fluid into the blood and a fall in the plasma colloid osmotic pressure will permit filtration of fluid out of the blood. It is therefore concluded that the concentration of plasma albumin may be one factor concerned in the regulation of plasma volume.

* This experiment was conducted at the Babies' Hospital in New York, N. Y. It is a pleasure to acknowledge my indebtedness to Dr. A. A. Weech and his associates for encouragement and cooperation; to Dr. S. Graff of the College of Physicians and Surgeons for teaching me the spectrophotometric technique for determining plasma volume.

[4] Weech, A. A., Snelling, C. E., and Goettsch, E., *Am. J. Dis. Child.*, 1932, **44**, 657.