The conclusion, therefore, seems reasonable that tartaric acid and oxalic acid exert their influence on the kidney tubules by precipitating the calcium salts in the cells, during the process of their excretion.

22 (1200)

Do lecithin and glucose combine to form a true chemical compound?

By ERNEST L. SCOTT.

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About a year ago I[1] reported a substance found after the evaporation of an emulsion of lecithin and glucose. This material seemed to be identical with the one previously reported by Bing[2] and others, the only point of difference being that previously it had been prepared by the evaporation of an alcoholic solution of lecithin and glucose upon the water bath while I evaporated a watery emulsion either on the water bath or in a vacuum desiccator at room temperature.

In attempting to study by the freezing-point method any changes in molecular weight which might occur, I found that some reaction took place between the benzene, which was used as a solvent, and the solute, lecithin, so that the results were entirely irregular and of no value for my purpose.

A further search for a solvent which could be used for the determination of either the freezing or the boiling point has revealed the same difficulty for a number of other solvents. In their turn ether, chloroform, carbon tetrachloride, bromoform, ethylene dibromide, acetic acid, formic acid and phenol were tried and discarded.

However, when the boiling point of a solution of "lecithin" in alcohol was determined the molecular weight of the sample of "lecithin" which I was using was consistently found to be 1,300. The high figure found would indicate an association of two mole-

[1] Scott, E. L., *Am. Journ. of Physiol.*, XL, p. 145, 1916.

[2] Bing, H. J., *Skand. Arch. f. Physiol.*, XI, pp. 166–175, 1901.

cules in the alcoholic solution. Since this "lecithin" was prepared by precipitation with acetone it probably contained considerable kephalin and consequently had for a single molecule a lower average weight than the 800 usually given (see Maclean[1]).

There was, as perhaps might be expected, a rise in the boiling point when small amounts of glucose were added to a solution of lecithin in alcohol. The present point of interest is that this rise was only one half as much as it would have been had no lecithin been present, provided that the sugar was added in such quantities that there was considerable excess of lecithin molecules over the sugar molecules present.

The simplest interpretation that can be placed upon this is that a portion of the lecithin disassociates and one molecule of lecithin combines with one molecule of glucose. If the number of moles of sugar added approach the number of moles of lecithin present less than half of the sugar moles disappear. This may mean either that there must be an excess of lecithin for the maintenance of equilibrium or that the sugar unites with only one of the components of the "lecithin" which as indicated above is confessedly a mixture. Again, when a comparatively large excess of sugar is added there is apparently another compound found in which more sugar is combined. This compound might be represented by L_nG_m in which m is greater than n. In the course of this work a paper by Kornfeld[2] has come to my notice in which the author has made use of the same method for the study of the hydrates of pyridine.

Again in two experiments in which a solution of the lecithin-glucose preparation was dialyzed for several days through a rubber membrane against chloroform, a reducing substance was found outside the membrane. This passage of a reducing substance did not take place when either ether or benzene was used as solvent.

Although I feel that the results already obtained throw considerable doubt upon the theory that this substance is an adsorption compound, work is being continued in which the samples of lipins used are separated and purified by the best methods available.

[1] Maclean, H., *Biochem. Journ.*, IX, pp. 351–378, 1915.

[2] Kornfeld, G., *Monatshefte f. Chemie*, pp. 865–897, 1915.

I wish to take this opportunity to express my appreciation of the kindness of Professor J. L. R. Morgan of the department of chemistry, Columbia University, who has given me the facilities of his laboratory and has freely helped me with advice and criticism.

23 (1201)

The postural activity of the rectus abdominis muscle of the cat.

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If we accept Sherrington's[1] view that a muscle may undergo changes in length without concomitant changes in tension as a means of preserving a certain posture or attitude of the body, we find that the rectus abdominis of the cat manifests this property in a high degree.

The animals used for experiment were etherized and a tracheal cannula inserted. The skin was incised in the median line of the thorax. The pectoral muscles of one side were then severed close to their attachments to the sternum and sternal portions of the ribs and reflected outward. The tendinous insertions of the rectus abdominis on the ribs were divided and the free upper end lifted out. A thread was tied about the tendinous end of the muscle and led through a system of small pulleys to a muscle lever. The abdominal wall was kept intact. A rise of the writing point of the lever indicated a shortening of the muscle, while the writing point fell when the muscle relaxed. The thoracic and abdominal respiratory movements were recorded by Verdin tambours connected to Crile stethographs. Small changes in the length of the rectus abdominis occurred during ordinary respiration. But if fluid, usually an *M*/8 solution of sodium chloride, was introduced into the stomach through a stomach tube passed down the esophagus, or directly into the peritoneal cavity through a hypodermic needle, the muscle promptly relaxed, the amount of relaxation being proportional to the amount of fluid introduced, and continuing until the limit of distension of the abdominal cavity was reached. This limit of distension is determined by

[1] Sherrington, *Brain*, 1915, Vol. 38, pp. 191–223.