

Golgi region accumulates silver granules after treatment with acid silver nitrate, and why in those of other tissues it does not; and why the Golgi material in the cells of the one tissue will accumulate silver granules at one time and not at another; while they do not refer at all to Hirsch's<sup>6</sup> comments on the relation of the staining of the Golgi material of cells with the acetic acid silver nitrate reagent and the production of secretory droplets.

If the results of Barnett and Fisher<sup>1</sup> are significant, one would expect that in organs such as the adrenal cortex and the corpus luteum, where there are large numbers of small fatty and lipoidal droplets in the cells, thus paralleling the oil droplets in their preparations, the application of the acid silver nitrate would cause these droplets to become surrounded with black granules, but in fact it does not. In this organ and in other organs containing fatty droplets, Giroud<sup>5</sup> has stated that he has never seen black granules deposited on the surface of the droplets.

One is forced to conclude that Barnett and Fisher's results quoted above need further support than they have given.

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<sup>1</sup> Barnett, S. A., and Fisher, R. B., *J. Exp. Biol.*, **20**, 14 (1943).

<sup>2</sup> Bourne, G. H., *NATURE*, **132**, 850 (1933).

<sup>3</sup> Bourne, G. H., *Aust. J. Exp. Biol.*, **13**, 239 (1935).

<sup>4</sup> Leblond, C. P., "Recherches histochimiques sur la localisation et le cycle de la vitamine C dans l'organisme", Thèse n° 41. (Paris, 1934).

<sup>5</sup> Giroud, A., "L'acide ascorbique dans la cellule et les tissus" (Protosplasma Monographien, Berlin, 1938).

<sup>6</sup> Bourne, G. H., "Cytology and Cell Physiology" (Oxford, 1942).

<sup>7</sup> Silver, *Anat. Rec.*, **82**, 507 (1942).

<sup>8</sup> Hirsch, G. C., "Form- und Stoffwechsel der Golgi-Körper" (Protosplasma Monographien, Berlin).

## Role of Phosphate in the Methylene Blue Reduction by Dehydroascorbic Acid

WITH reference to the recent publication, by Penney and Zilva<sup>1</sup>, on "The Chemical Behaviour of Dehydroascorbic Acid *in vitro* and *in vivo*", I wish to direct attention to my paper "On the Methylene Blue Reducing System of Palestine Orange Peels"<sup>2</sup>, the conclusions of which, arrived at by a different method, are supported by the results of the above authors.

While investigating the methylene blue reducing system of orange peels, which was afterwards identified with dehydroascorbic acid (or its irreversible product, diketogulonic acid), it was found that this substance reduced methylene blue, the rate of reduction increasing with increasing pH as from 6.5 to 8.5. But this reaction (which seems to involve the disappearance of diketogulonic acid<sup>3</sup>) proved to be dependent upon the presence of phosphate (which could not be replaced by acetate). I suggested that this explained the discrepancies between Borsook *et al.*<sup>4</sup>, who worked with McIlvaine buffer, and Ball<sup>5</sup>, who used acetate buffer.

It is interesting to note that Penney and Zilva likewise observed that when they used phosphate buffers (McIlvaine or phosphate-NaOH) "above pH 6, it was found that diketogulonic acid began to decompose, the rate of disappearance increasing with increasing pH", and when they worked with borate buffer, pH 7.4, "the resulting diketogulonic acid was relatively stable and no indophenol-reducing substance was formed from the mutarotating solution".

It is therefore surprising that Penney and Zilva did not note the part played by phosphate, as pointed out in my paper, which is supported by their own experiments, and, as mentioned above, suggests a likely explanation of the discrepancies between Borsook *et al.* and Ball.

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<sup>1</sup> Penney, J. R., and Zilva, S. S., *Biochem. J.*, **37**, 403 (1943).

<sup>2</sup> Frankenthal, L., *Enzymologia*, **6**, 287 (1939).

<sup>3</sup> Borsook, H., Davenport, H., Jeffreys, C., and Warner, R., *J. Biol. Chem.*, **117**, 237 (1937).

<sup>4</sup> Ball, E. G., *J. Biol. Chem.*, **118**, 219 (1937).

## Number of Configurations of Molecules Occupying Several Sites

THE number of possible configurations of a mixture of molecules some occupying two sites, the remainder one site, was obtained by Chang<sup>1</sup>. The corresponding number for a mixture of molecules some occupying  $p$  sites, the remainder one site, was correctly stated by Miller<sup>2</sup> by analogy, but without proof. By using a technique considerably simpler than that used by these authors, I have been able to generalize these results to a mixture of any number of distinct types of molecules each with its own geometric properties.

Let the molecules of type  $i$  be  $N_i$  in number; let each such molecule occupy  $p_i$  sites; let the number of sites which are neighbours of one site be  $z$ ; let the number of sites which are neighbours of a molecule of type  $i$  be  $q_i z$ ; and let  $C_i$  denote the number of distinct configurations of a molecule of type  $i$  when one of its elements is fixed on a given site. The  $p_i$ 's and  $q_i$ 's are related by  $z(p_i - q_i) = 2(p_i - 1)$ .

The number of distinguishable arrangements  $g(N_i)$  of this system is found to be given by

$$\log g(N_i) = \frac{1}{2} z \log (\sum_i q_i N_i)! - \sum_i \log N_i! - (\frac{1}{2} z - 1) \log (\sum_i p_i N_i)! - \sum_i N_i \log C_i.$$

Details of the derivation of this formula and its use to derive thermodynamic properties will be published shortly.

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<sup>1</sup> Chang, *Proc. Camb. Phil. Soc.*, **35**, 265 (1939).

<sup>2</sup> Miller, *Proc. Camb. Phil. Soc.*, **39**, 54 (1943).

## Origin of the Solar System

THE criticisms of Alfvén's theory<sup>1</sup> of the origin of the solar system contained in Lieut.-Colonel Edgeworth's letter<sup>2</sup> seem to be based on a summary of the theory given by its author in an earlier letter<sup>3</sup>. This summary was clearly designed to illustrate the application of the theory to the newly discovered non-solar planetary systems, and it did not bring out what is perhaps the most attractive feature of the theory, namely, that it explains why a large part of the angular momentum of the solar system resides in the outer planets.

In a recent paper<sup>4</sup> Alfvén has shown that a cloud of ionized matter in the neighbourhood of a rotating magnetized conducting sphere is acted upon by electromagnetic forces which tend to make it take