between the energy of the stimulus and U_A. In the case of the axon membrane, the structural modifications are vibro-rotational transitions of the protein macromolecules[4]. In a system which reacts according to the 'all or none' law, a subthreshold stimulus will possibly reduce the forces X_k from X_k^0 to some lower values X_k^1. In this case, in response to a consecutive stimulation, the system will release the energy:

$$U_A^1 = \int_{t_1}^{\tau} \{\sum_k J_k(t) \cdot X_k(t)\}\, dt$$

$$[X_k(t_1) = X_k^1].$$

This last relation contains, in a 'implicit' manner, the adaptation phenomena.

The particularization of these general ideas could lead to a concrete energetical analysis of a given excitable system[5]. It is also an essential step in the calculation of the ratio between the information transmitted and the energy dissipated by an excitable system. This will be the subject of a further communication.

Résumé. On présente une brève caractérisation générale des systèmes excitables, considérés du point de vue énergétique.

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DISPUTANDUM

Non-Paramagnetism of Human Serum Proteins

Commencing with SMITHIE and POULIK's report[1] on paper starch gel two dimensional electrophoresis technique, both they and a number of others have contributed advances to the fundamental method which today has made possible exceedingly precise separation of human serum proteins. A good example of such work is the recent publication by MARGOLIS and KENRICK[2], in which they used a combination of polyacrylamide disc and polyacrylamide gradient electrophoresis for their two dimensional system. Separation of proteins by means other than electrophoresis to be followed by electrophoretic separation in the second dimension has also been reported[3,4]. The report that serum proteins could be separated by a magnetic force of 'about 25×10^6 Oersteds/cm²' acting over a period of 1 h[4] seemed to offer an interesting new approach.

In an attempt to repeat and improve on this work, we created an electromagnetic field measured at 30×10^6 Oersteds/cm². In a typical experiment, a small droplet of human serum was placed on a piece of cellulose acetate which had been submerged in a *tris*-barbital buffer, pH 8.8 (Gelman high resolution buffer), and blotted. The cellulose acetate strip was then sandwiched between 2 layers of polyacrylamide gel. This 'sandwich' was then inserted into a glass vial measuring 1×3 cm which was capped and placed in the electromagnetic field for 1 h. Evidence for the migration of proteins under the influence of this force was tested in 2 ways. In some experiments, the cellulose acetate strip was itself applied onto the surface of a gradient polyacrylamide gel measuring 3 mm × 10 cm at the point of application. A previously poured cap gel was placed against the strip and electrophoretic separation of the proteins was carried out using a pulsed constant power supply and a commercially available flat bed gel system[5]. The system was operated, except for the aforementioned method of applying the sample, as described by SCHIFF et al.[6]. A second test was simply to stain the cellulose acetate strip with Ponceau S to observe the protein spot which ranged in size from 1 to 3 mm in diameter. If magnetic force had moved all or an appreciable number of the serum proteins, it is to be expected that the spot would change from its typical round form to an oval or elongated shape. With both tests we were not able to discern any evidence to suggest that any protein had moved even 1 mm as a result of the magnetic force applied.

Since proteins would be expected to move more easily in cellulose acetate than in polyacrylamide gel, we conclude that the migration of protein through a distance of several centimeters as pictured in the previous publication[4] was due to a force other than magnetic. Under the conditions of our experiment, no effect of the movement of human serum proteins by magnetic force is observed[7].

Zusammenfassung. Normale Serumproteine wurden mittels Elektromagnetophorese in Zellulose-Azetatgel ausgeführt, wobei keine Trennung der einzelnen Proteine erfolgte. Es stellte sich heraus, dass Serumproteine keine paramagnetischen Eigenschaften aufweisen.

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