Parallelverschiebung des inneren Plasmas (Rotationsströmung). Lösen sich Teile aus der fibrillär aufgebauten peripheren Plasmaschichte los, z.B. einzelne Chloroplasten, so vermögen sie sich im inneren Protoplasma wie aktiv zu bewegen, weil an ihnen noch Fibrillen haften[6].

Bei der Gleitbewegung vieler niederer Organismen (Diatomeen, *Euglena*, *Gregarina*, *Oscillatoria*, *Spirulina*, *Beggiatoa*) wirken anscheinend die parallel verschiebenden Kräfte nach aussen, auf an der Zelloberfläche ausgeschiedene Plasmaelemente, die dann einen abgeschiedenen Schleim parallel zur Zelloberfläche bewegen können. Das bedingt einen viel rationelleren Bewegungseffekt als etwa durch blosse Stemmwirkung infolge Gallertausscheidung (Desmidiaceen) erzielt werden kann[8].

So lassen sich also offenbar vier sehr verschiedenartige Lebensbewegungen auf dasselbe qualitative Prinzip, nämlich die Fähigkeit der Fibrillen zur Parallel-Längsverschiebung zurückführen. Die Unterschiede dürften nur in quantitativer Hinsicht, vor allem in der Dauer der Verschiebungszeit, bzw. in der Art des Richtungswechsels zu suchen sein. Damit scheint die alte schon von VERWORN[9] u.a. vertretene Auffassung, alle Bewegungserscheinungen des Protoplasmas seien die Folge eines einzigen Prinzipes, Bestätigung zu finden.

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Optical rotation and anion binding in acid solutions of serum albumin*

Almost all the physico-chemical properties of serum albumin in aqueous solution undergo marked changes[1] as the pH is lowered into the range of 4 to 2. Specific rotation, for example, changes[2,3] from about $-62°$ at pH 4 to $-87°$ at pH 2. In contrast to some other characteristics, the change in levorotation is reduced substantially by added salt[3]. With 0.1 *M* NaCl[3], $[\alpha]_D$ at pH 2 is only about $-67°$; with 0.2 *M* NaCl, $-62°$.

The changes in characteristics of serum albumin in the acid range have generally been attributed to swelling of the macromolecule due to the strong internal electrostatic repulsions developed in the protein as it becomes increasingly cationic with drop in pH. On this basis the effect of salt in reducing the change in levorotation has been ascribed[3] to an ionic strength effect which decreases the electrostatic repulsions.

Since Cl^- is bound to serum albumin, and increasingly so in more acid solutions[4], it seemed possible that the effect of salt on levorotation might not be due to a general ionic strength effect but rather might be a consequence of the formation of specific complexes with cationic residues of the protein. A choice between these two explanations can be made by examining the effect on $[\alpha]_D$ of a much more strongly bound anion which can combine with the protein at concentrations much lower than 0.1 *M*. For this purpose we have measured the optical rotation of 1% bovine serum albumin in the presence of sodium dodecyl sulfate at concentrations below 0.005 *M*. As the data in Fig. 1 illustrate, dodecyl sulfate reduces substantially the upward rise in levorotation as the pH is lowered from 4 to 2.

In the two detergent-albumin solutions, the ratio of anion to protein is 15:1 and 30:1, respectively. In view of the binding results of KARUSH AND SONENBERG[5] at higher pH's, it seems very likely that substantially all of the anion is bound to the protein in the acid range. Consequently the net positive charge on serum albumin must be reduced by 15 and 30 in the respective detergent solutions, as compared to solutions without dodecyl sulfate. In water alone, bovine albumin reaches an $[\alpha]_D$ of $-77°$ at pH 3, where the protein carries a net charge of about $+50$ ($+60$ due to added protons, -10 due to[4] bound chloride from added acid). In the presence of 0.005 *M* dodecyl sulfate, a strongly-bound competing anion, little or no chloride is likely to be bound by the protein. In this detergent solution, a net charge of $+50$ ought to be acquired by

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albumin when the pH drops to slightly below 3, and the charge certainly should exceed +50 at pH 2 where the protein has acquired its full complement of 96 protons[6]. Nevertheless, $[\alpha]_D$ in 0.005 M detergent solution never reaches even $-77°$, the rotation for albumin in water at pH 3, let alone approach $-87°$ as observed for the protein in water at pH 2. If the magnitude of $[\alpha]_D$ were merely a reflection of the net cationic charge (and any consequent expansion) of the albumin molecule, one would expect substantially more negative values at pH's near 2 in dodecyl sulfate solutions than are actually observed (Fig. 1). It seems possible, therefore, that levorotation in acid solutions of this protein is sensitive to the presence of some cationic residues in the charged state and that their influence may be removed when they are complexed with anions.

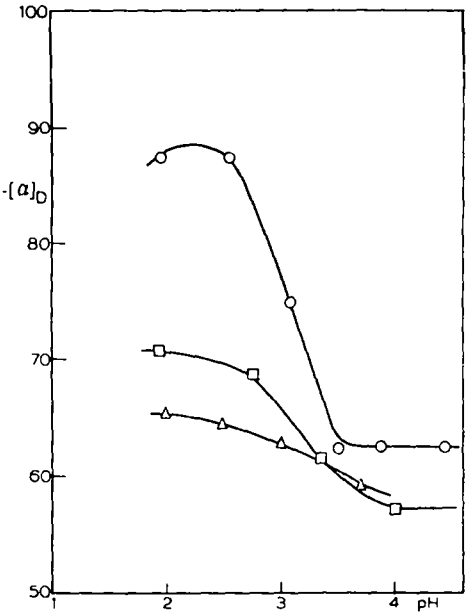

Fig. 1. Optical rotations of bovine serum albumin ($1.45 \cdot 10^{-4} M$) in aqueous solutions at various pH's: ○, only added HCl; △, in presence of $2.2 \cdot 10^{-3} M$ sodium dodecyl sulfate plus added acid; □, in presence of $4.5 \cdot 10^{-3} M$ sodium dodecyl sulfate plus added acid.

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The site of galactoside-permease activity in *Escherichia coli*

It has been shown that the bacterium *Escherichia coli* can accumulate galactosides intracellularly[1,2,3]. Under certain conditions the cellular concentration of a galactoside may be several hundred times that in the medium. In the case of thiomethyl-β-D-galactoside (TMG), a substance not metabolized by *E. coli*, the intracellular accumulation may attain 3–5% of the bacterial dry weight. The system responsible for this intracellular accumulation of galactosides has all the characteristics of an inducible enzyme and has been termed galactoside-permease.

The location of the galactoside-permease in *E. coli* is not known. However, the very nature of its function, that of transport, suggests that it may be associated with either the cell wall or the plasma membrane of the organism, although an intra-cytoplasmic site cannot be excluded.

Techniques have been developed for the production of viable protoplasts by removal of the bacterial cell wall under conditions that conserve the osmotic integrity of the cell (*e.g.*[4,5,6]). It is possible then to determine whether the galactoside-permease is associated with the cell wall or the protoplast. In this communication, it is demonstrated that the permease is associated with the protoplast.

E. coli, strain W-2244, the Lac_i^- mutant of K-12[7], was employed in these experiments. This strain cannot form the enzyme β-galactosidase and consequently does not metabolize lactose. However, cultivation of W-2244 in the presence of a galactoside will induce formation of the galactoside-permease. It is therefore possible to measure lactose accumulation in this organism.

Cultures were grown on the mineral medium "56" as previously described[3] with 0.4% glycerol as carbon source. TMG at a concentration of $5 \cdot 10^{-4} M$ served as permease inducer. Protoplasts were prepared by the method of REPASKE[6], modified as follows: bacteria in the exponential phase of growth were harvested by sedimentation and washed twice with distilled water. They were