approximately 24%. A change in conformation would imply that the electric field in the vicinity of the dipole would be altered, leading to a change in the interaction of diffusing anion and cation with the choline phosphate group. Such a conformational change would alter the relative diffusion coefficients of Na^+ and Cl^-. A long range order transformation, which could explain the changes in the absolute values of the diffusion coefficients of water, Na^+ and Cl^-, could be a second order result of such a conformational change.

The possibility of different configurations of the lecithin polar head has been envisaged by Sundaralingam[5] and it is reasonable that the favourable configuration depends upon the state of hydration of the polar group. Various authors[6,7] have measured the amount of water of hydration associated with lecithin. A value of approximately 20% has been obtained by differential scanning calorimetry[7], a method which does not distinguish between different hydration shells. The change in conformation of the lecithin polar head group suggested by our diffusion measurements might reasonably be correlated with the saturation of the hydration requirements of lecithin.

The ion selectivity of cell membranes is generally accounted for in terms of exclusion effects by net charges at the membrane surface. Our results demonstrate that selectivity may also occur due to differences in diffusion rates through aqueous pathways.

Assuming a membrane thickness of 100 Å, the diffusion coefficient of Cl^- across the red cell membrane[8] and lecithin bilayer[9] are 2×10^{-10} cm^2 s^{-1} and 5×10^{-17} cm^2 s^{-1} respectively. (Since the mechanisms of Cl^- exchange in these systems are not understood, we used the values obtained from total fluxes, including any exchange component.)

The value we obtained in the lamellar phase is of the order of 10^{-6} cm^2 s^{-1}. Red cell ion permeability is therefore higher than that of the bilayer but lower than that observed in the lecithin-water phase. This does not, however, exclude the possibility that mechanisms similar to those governing diffusion in lamellar phases are important in the ion permebility of cell membranes. Since we have studied diffusion within the lamellar phase and not between bulk aqueous phase and lamellar phase, membrane surface effects are absent. Moreover it could be that only a small fraction of the red cell membrane is organised in the form of aqueous pathways similar to those in the system studied here. The mechanisms which lead to abrupt selectivity changes for very small changes in phase composition (2% water) observed in this simple model system could be of relevance in the study of ion transport through excitable membranes.

This study was partly supported by the National Institutes of Health.

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Received July 27; revised October 15, 1973.

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Serum Binding of Ca^{2+} and Cystic Fibrosis

FITZPATRICK *et al.*[1] reported that serum from cystic fibrosis (CF) patients and heterozygotes had an increased capacity to bind Ca^{2+}. These findings, if supported, could be important in the detection of the disease and carriers; however, Smith *et al.*[2], using data from a larger sample of patients, failed to reproduce these findings. We therefore decided to reinvestigate the problem using both serum and plasma for the Ca^{2+} binding assay.

The Ca^{2+} binding procedure was carried out by equilibrium dialysis as described by Fitzpatrick *et al.*[1]. Heparin was used as the anticoagulant when collecting the plasma. IgG was prepared by the method of Fahey and Terry[3].

Table 1 Equilibrium Dialysis Binding of Ca^{2+} by Serum, Plasma and IgG from Controls, Cystic Fibrosis Patients and IgG Myeloma Patients

	^{45}Ca binding c.p.m. dialysis bag/c.p.m. beaker		
	Serum	Plasma	IgG
Controls	1.60±0.16 (10)	1.65±0.08 (9)	2.31±0.38 (3)
Cystic fibrosis	1.35±0.04 (9)	1.70±0.13 (11)	2.12±0.06 (3)
IgG myeloma	—	3.38±0.83 (8)	—

The ratio of counts in dialysis bag to beaker was adjusted for a mean protein value of 2 mg ml^{-1} in the equilibrated sample.
Values are means±s.e.m. Numbers in parentheses are the number of individuals in each group.

As shown in Table 1 there was no increased Ca^{2+} binding by either plasma or serum from cystic fibrosis subjects when compared with normal controls. The avoidance of glass in the experimental procedure made no significant difference to the results. As the CF factor has been reported to be bound to IgG in serum[4], Ca^{2+} binding by this immunoglobulin was also compared in controls and CF patients.

No significant difference was found (Table 1). Our finding that plasma from IgG myeloma patients had an increased capacity to bind Ca^{2+} (Table 1) was, however, of interest. Thus, an increased Ca^{2+} binding capacity by plasma proteins occurs in other diseases.

This work was supported by the Cystic Fibrosis Research Trust.

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Received September 21, 1973.

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Partial Fertility of Artificial Hybrids between Asiatic and American Cocklebur (*Xanthium strumarium* L.)

MORPHOLOGICALLY diverse populations of cocklebur (*Xanthium strumarium* L.) occur sympatrically in Europe and Asia and maintain their identity despite reports of gene exchange within the taxon[1–4]. As early as 1908, Bitter[5] produced