different investigators[9–14]. A divergent finding on the occurrence of 7 pairs of metacentrics due to Robertsonian fusions has also been reported in tobacco mouse, Mus poschiavinus from Switzerland[15]. Previously it was generally accepted that the wild populations of house mouse have a fairly uniform karyotype of 40 telocentric chromosomes[16]. But recently the occurrence of variable metacentrics (2–9) due to Robertsonian fusions has been reported from different regions of Switzerland[17,18] and Rome[19]. So far as we are aware, there is no report on the occurrence of Robertsonian fusion in any of the house mouse populations of Asia. This first report on karyotype variation due to Robertsonian fusion in house mouse from two widely separated localities of Eastern India will add further cytological data to the problem of chromosome polymorphism of the species and the probable trend of its evolution.

It is somewhat difficult at present to suggest with confidence whether the occurrence of Robertsonian fusion in these three specimens collected from 2 distantly located populations is accidental or has any evolutionary significance. But it is evident from different research reports published in recent years that, like laboratory strains, the wild populations of house mouse also tend to undergo centric fusion relatively easily. Moreover, the data compiled in the table also indicate that in most cases the fusion has taken place between chromosomes belonging to groups II and IV[5–8] in laboratory strains and between groups I and IV[1,2] in wild populations of mouse.

Recently an extensive review on the causes and consequences of Robertsonian exchange has been published by John and Freeman[20]. But it is not very easy to conclude how these fusion (sub)metacentrics have originated in our material. Although the rods of mouse have been variously christened as acro- or telocentrics, according to the choice of individual authors, yet by whole mount EM studies Comings and Okada[21] have confirmed that the rods of mouse are telocentric in nature with no evidence of a short arm. It is, therefore, quite plausible that the (sub)metacentric in these 3 female specimens has originated either by a simple breakage reunion event within the centromere itself, or else is due to fusion between 2 eroded centromeres. The results of our C-banding analysis (figure 5), by following the technique suggested by Sumner and Evans[22], and the absence of any minutes or any supernumerary like elements are also in support of this view.

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On the location of the tetrapyrrole macrocycle of chlorophyll a in phospholipid vesicles and in hexadecane

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Summary. The state of chlorophyll a in phosphatidylcholine vesicles was examined. The results indicate that the chlorophylls are present in monomeric form. A kinetic study of chlorophyll reactions with $K_2S_2O_8$ and piperidine showed that these substances react with the porphyrin rings of pigments located on both vesicle faces, most probably within the polar headgroup region.

Artificial membranes containing chlorophyll have been used as models for the study of photosynthesis[2–4]. Since the membranes reproduced certain spectroscopic characteristics and photochemical reactions of in vivo systems, investigations were undertaken towards the elucidation of the chlorophylls arrangement in the lipid layers. Steinemann et al.[5] reported the preparation of a lipid bilayer (BLM) containing chlorophyll a (Chl-a) and suggested that the pigments are localized on both membrane faces with the tetrapyrrole macrocycle either a) in the 2 membrane-solution interfaces in contact with the aqueous phase, or b) inserted into the phospholipid core. The location of Chl-a in a bilayer as it is predicted by the first model is thermodynamically unstable. It suffices to note that one edge only of the macrocycle (figure 1) may eventually have contact with a layer of water[6].

Recently, a spin label study of Öttmeier et al.[7] on chlorophyll-containing phospholipid vesicles favoured the presence of Chl-a porphyrin within the polar headgroup region; and Katz et al.[8] remarked that the best location for antenna and special pair chlorophyll aggregates in the

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Logarithm of pseudo-velocity constants* for the reactions of chlorophyll a with piperidine in n-hexadecane and in phosphatidylcholine (PC) vesicles

	Per cent of piperidine (v/v)	Log k' sec^{-1} at 27 °C**
n-Hexadecane	3.2	-3.067 ± 0.097
PC vesicles	3.0–3.5	-2.643 ± 0.077

*$k't = \ln(A_0 - A\infty)/(A - A\infty)$, where k' is the pseudo-first-order constant, A is the absorbance at time t, A_0 the initial absorbance and $A\infty$ the absorbance at reaction completion. Reactions were followed by decrease in absorbance at 670 nm (PC vesicles) and 663 nm (n-hexadecane). **Data are based on 6 kinetic runs.

chloroplast thylakoids would be between the hydrocarbon moieties of the lamellae lipids. I wish to report new evidence which shows that the latter arrangement of chlorophylls in a vesicle bilayer does not seem to be unique.

Methods. Phospholipid vesicles containing chlorophyll were prepared by the colyophylization procedure of Thompson et al.[9]. This method promotes mixing of the phospholipids with the chlorophylls, and thereby facilitates the pigment insertion into the bilayer. Dried chlorophyll a and egg yolk phosphatidylcholine (ratio of lipid to chlorophyll of about 35:1) were dissolved in diethyl ether (AR grade) and the mixture was evaporated to dryness. The mixed lipid preparation was added to 4–8 ml of 0.1 M NaCl, 0.01 Tris-HCl buffer (pH 8.0). The chlorophyll-lipid dispersion was then subjected to sonication under a constant flow of argon and fractionated in a Sepharose 4B column. The fractions which contained multilayered vesicles were discarded. The vesicles prepared according to this method exhibited a red absorption band with a maximum at 670 nm which is characteristic of monomeric chlorophyll[4].

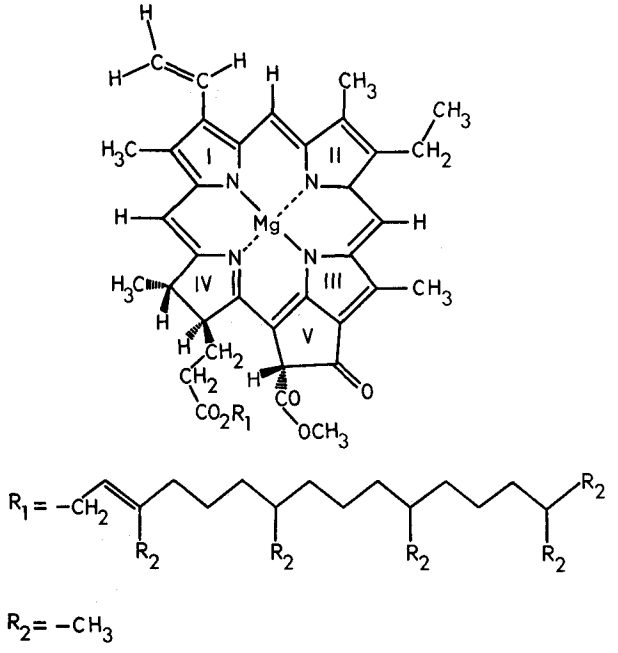

Fig. 1. Structure of chlorophyll a. It is seen that only the structural element which contains the carbonyl groups of the cyclopentanone ring V and the propionic acid chain of ring IV may have contact with a layer of water.

Results and discussion. The relative amount of Chl-a on both faces of the phospholipid vesicles was determined with potassium peroxodisulfate ($K_2S_2O_8$), a non-permeable reagent which causes bleaching of the red absorption band of chlorophyll[10]. The ratio of Chl-a in the outer bilayer face to the total amount of pigment in the vesicle (C/C_t) was established according to the expression $C/C_t = (A - A\infty)/(A_0 - A\infty)$, where A is the absorbance of the vesicles measured during the course of the reaction with $S_2O_8^{2-}$, A_0 the initial absorbance and $A\infty$ the final absorbance upon disruption of the vesicles with n-propanol[11]. Figure 2 shows that at least half of the chlorophylls is incorporated in the outer face of the vesicles. These findings are consistent with the view that Chl-a is inserted within the lipid bilayer as is postulated in Steinemann's second model described above. Moreover, the observations reported here corroborate the suggestion of Briantais et al.[12] that the porphyrin rings of the 2 photosynthetic systems are located in vivo on opposite sides of the thylakoid membrane, with photosystem I at the external surface.

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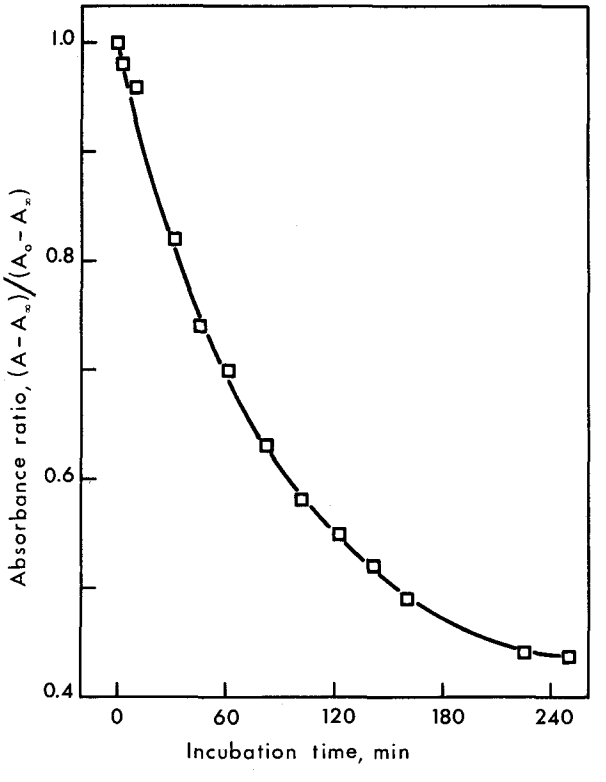

Fig. 2. Kinetics of chlorophyll a reaction with potassium peroxodisulfate in phosphatidylcholine vesicles at 27 °C, followed by decrease in absorbance at 670 nm as a function of time. A is the absorbance of the vesicles measured during the course of the reaction with 2 mM $K_2S_2O_8$, A_0 the initial absorbance and $A\infty$ the absorbance at reaction completion upon disruption of the vesicles with n-propanol.

In addition, Katz et al.[8] proposed that chlorophyll in hexadecane solutions represents one of the possible states of the pigment in a bilayer, namely the distribution of Chl-a oligomers between the hydrocarbon moieties of membrane lipids. If this arrangement simulates the state of chlorophylls in phospholipid vesicles, one expects to obtain indentical values for the rate constants of Chl-a reactions with piperidine[13] in hexadecane and in a bilayer. However, the table shows that the reaction rates in phosphatidylcholine (PC) vesicles in the form of pseudo-first-order rate constants k′ exceed by a factor of about 2.7 the values obtained in hexadecane. In this connection, it can be shown[14] that the rate constant of reaction of uncharged particles in condensed media is given by the expression $k = 8\ RT/3000\ \eta\ M^{-1}\ sec^{-1}$, which is one form of Smoluchowski's equation[15] where R is the molar gas constant and η is the viscosity of the medium. The equation indicates that the rate constant decreases as the viscosity increases. One may conclude, therefore, that the porphyrin environment in the vesicle membrane is more fluid than in hydrocarbon phases like a hexadecane solution, or the centre of a lipid bilayer. The results suggest further that in PC vesicles and in BLM the Chl-a porphyrin is exposed – to an extent yet undetermined – to the water embedded on the outer and the inner faces of the vesicle bilayer. These interpretations are in good agreement with viscosities of 17 to 32 centipoise (cP) which prevail at the annular region of lipid micelles and 2.98 cP for liquid n-hexadecane at 27 °C[16], compared with a viscosity value of 0.8513 cP for water at the same temperature.

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Methodische Untersuchungen zur Messung der Erythrozytenverformbarkeit (Filtrabilität, Flexibilität, Fluidität) in Abhängigkeit der Plasmaviskosität, der Plasma-Proteine, des Hämatokrits, des Filtrationsdruckes sowie der Osmolarität

Methodical investigations concerning the measurement of red cell deformability dependent on plasma viscosity, plasma proteins, hematokrit, filtration pressure as well as osmolarity

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Summary. The measurement of red cell deformability (flexibility or fluidity) according to the method of filtration strongly depends on the suspension medium, the hematokrit, filtration pressure as well as osmolarity and is hard to differentiate over the influence of red cell aggregation. Therefore, data concerning the flexibility of red cells have to be established under standardized conditions, e.g. suspension medium, such as albumin, stabilized hematokrit, constant osmolarity and pressure.

Neben der Bestimmung der Vollblut- und Plasma-Viskosität, dem Hämatokrit und der Erythrozytenaggregation ist die Messung der Erythrozyten-Verformbarkeit ein wichtiger Parameter zur Beurteilung der Fliesseigenschaft des Blutes. Da bisher ein breites methodisches Spektrum von der Filtration ungerinnbar gemachten Vollblutes durch einfache Filter bis zu dem Versuch, möglichst den isolierten Erythrozyten durch eine grössenmässig definierte Pore oder Kapillare zu filtrieren und die Formveränderungsfähigkeit pro Zeiteinheit zu registrieren, besteht, sollten systematische messtechnische Untersuchungen mit dem Filtrationsgerät nach Schmid-Schönbein durchgeführt werden[1–7]. Ziel der Untersuchung sollte es sein, Möglichkeiten und Grenzen dieser Methodik aufzuzeigen, dargestellt an der Reproduzierbarkeit, der Abhängigkeit der Messung vom Hämatokrit, der Plasmaviskosität, den Plasma-Proteinen, dem Druck und der Osmolarität.

Material und Methodik. Alle Filtrationsmessungen wurden mit der Apparatur nach Schmid-Schönbein[7] durchgeführt[8]. Filtriert wurde mit Sartorius-Filtern, Typ SM 11 301, mit einem Porendurchmesser von 8,0 µm bei einem

Darstellung der Messergebnisse zur Reproduzierbarkeit der Erythrozytenfiltration für Erythrozytensuspensionen in Plasma und Serum bei unterschiedlichen Hämatokritwerten

Probe		Hämatokrit (Vol.-%)	Mittelwert (sec)	Standardabweichung (sec)	Variationskoeffizient (s_D in Prozent)
I	Plasma	7,3	41	± 9,3	23
	Serum	7,5	11	± 2,6	23
II	Plasma	13,6	61	± 7,1	12
	Serum	12,8	37	±13,7	37
III	Plasma	27,9	152	±46,9	32
	Serum	27,1	111	±26,6	25

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