established that changes in nuclear activity can be rapidly induced by components or conditions of amphibian egg and oocyte cytoplasm (see review by Gurdon & Woodland, 1968). The changes include gross transitions from DNA to RNA synthesis or vice versa, as well as changes in the classes of RNA (ribosomal RNA, transfer RNA) synthesized. In all cases a nucleus changes the nature of its synthetic activity so as to conform rapidly to that characteristic of the host cell to whose cytoplasm it has been exposed. A temporal relationship has been established between a rapid nuclear enlargement (of up to 60-fold volume increase) and changes in synthetic activity induced by egg or oocyte cytoplasm. During the nuclear enlargement chromatin becomes dispersed throughout the nucleus; the staining properties of the nuclear material change, probably on account of the entry of cytoplasmic material into the nucleus.

The entry of cytoplasmic protein into nuclei induced to change synthetic activity has been demonstrated by Arms (1968), who injected adult frog brain nuclei into *Xenopus* eggs whose cyto-

plasm contained labelled proteins. Labelled macromolecules accumulated in the enlarged nuclei, and protein synthesis was suppressed by puromycin. These results were confirmed under different conditions by R. W. Merriam (unpublished work). Experiments are now in progress with fractions of saline-extracted oocyte proteins that have been iodinated before insertion into eggs or oocytes containing transplanted nuclei. It is hoped by this means to find out whether the classes of cytoplasmic proteins that enter transplanted nuclei differ according to the kind of nuclear activity induced.

The changes in nuclear activity studied in these experiments are the same as those that take place during normal embryogenesis. The conclusions are presumed to be relevant to the processes that lead to changing nuclear activity during normal development.

This work was supported by the Medical Research Council (J.B.G.) and by the Agricultural Research Council (R.S.W.).

Arms, K. (1968). *J. Embryol. exp. Morph.* **20**, 367.

Gurdon, J. B. & Woodland, H. R. (1968). *Biol. Rev.* **43**, 233.

COMMUNICATIONS

The Aggregation of Calf Thymus Histone Fractions in Solution

By P. A. EDWARDS and K. V. SHOOTER. (*Chester Beatty Research Institute, Institute of Cancer Research, Fulham Road, London S.W.3*)

Sedimentation-velocity experiments indicate that histone fractions F2(a), F2(b) and F3 are present as aggregates in solution in 0.1 M-NaCl, the degree of aggregation being independent of pH in the range 1–7. Dissociation of the aggregates occurs in 6 M-guanidine hydrochloride, but even under these conditions fractions F1, F2(a) and F2(b) exhibit heterogeneity. Molecular weights determined in this solvent system are comparable with those reported by other workers (Hnilica, 1967).

It has been found that the degree of aggregation can be decreased by decreasing the concentration of NaCl. Detailed studies have been made with fraction F2(b) only. The effect of concentration on rate of sedimentation has been determined for solutions containing different concentrations of NaCl. The results indicate that aggregation is at a minimum in 0.01 M-NaCl and increases with increasing salt concentration. In 0.01 M-NaCl the effect of charge on the histone accounts for nearly 90% of the decrease in sedimentation coefficient observed at finite concentration. In 0.1 M-NaCl charge effects account for 50% of the observed

change and in 0.5 M-NaCl about 10%. Application of the theory of Alexandrowicz & Daniel (1963) and Daniel & Alexandrowicz (1963) shows that the charge/mass ratio is not affected by the aggregation process.

Measurements of the weight-average molecular weight of fraction F2(b) have been made by the method of Archibald (1947). In 0.01 M-NaCl, after correction for charge effects and for bound chloride, the molecular weight calculated at infinite dilution of histone is 14 000. This value is somewhat greater than the value of 10 000–11 000 calculated from end-group analysis (Phillips, 1963). It would appear that, even under conditions minimizing aggregation, fraction F2(b) in solution exhibits some heterogeneity. With increasing salt concentration, the polydispersity of the solute, as judged by the change in the observed molecular weight with time of sedimentation, increases. In 1.0 M-NaCl the weight-average molecular weight is 87 000.

Alexandrowicz, Z. & Daniel, E. (1963). *Biopolymers*, **1**, 447.

Archibald, W. J. (1947). *J. phys. Colloid Chem.* **51**, 1204.

Daniel, E. & Alexandrowicz, Z. (1963). *Biopolymers*, **3**, 473.

Hnilica, L. (1967). *Progr. Nucleic Acid Res. molec. Biol.* **7**, 51.

Phillips, D. M. P. (1963). *Biochem. J.* **87**, 258.