The activity (mean ± S.E.M.) was found to be 53·2 ± 1·2 after 16 hr. overnight starvation. Feeding of the T+ diet produced an immediate increase in activity, which rose to 119·9 ± 5·0 at 60 min. and fell to 78·2 ± 3·6 at 120 min. The T− diet gave no immediate response until after 45 min., when the activity rose to 92·7 ± 2·8 at 60 min. and then fell to 54·4 ± 3·8 by 120 min. The activity of the enzyme appeared to correlate with the free tryptophan content in liver in both groups of animals. The enzyme activities in the starved rats, in those given the T+ diet for 1 hr. and in those given the T− diet for 1 hr. were compared for Mg^{2+} optima, pH optima and sensitivity to actinomycin D. They were all similar. A group of animals was pretreated with puromycin or cycloheximide, and the enzyme activity was assayed 15 min. after the animals were given the T+ diet. The activity did not differ significantly from that in the starved rats, and it can therefore be suggested that the rat liver nucleus responds to an increase in the amino acid supply by synthesizing Mg^{2+}-activated RNA nucleotidyltransferase.

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Incorporation of [3H]Uridine and [3H]Thymidine by Murine Peritoneal Macrophages *in vitro*

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A new species of RNA, or an RNA associated with extremely immunogenic antigen, has been postulated in antigen-stimulated macrophages and it is suggested that this material is the stimulus to antibody production by the lymphocytes (Fishman & Adler, 1967; Gottlieb, 1968). Few data on RNA metabolism in macrophages cultured *in vitro* are available, and it seemed likely that useful information about this suggestion might be obtained by studies of nucleic acid synthesis in macrophages antigenically stimulated *in vitro*.

Mouse peritoneal macrophages were planted on stainless-steel squares essentially as described for mouse-embryo fibroblasts by Birnie & Simons (1967). Within 3 hr., macrophages had attached to the steel squares and the majority of lymphoid cells could be removed by vigorous washing with culture medium. Cultures were incubated for 3 days at 37° in air + CO_2 (95:5), either in serum-free medium or in the same medium with 10% calf serum (Glaxo). They were then labelled with [3H]thymidine (0·85 μc/ml.; 25 c/m-mole) or [3H]-uridine (0·85 μc/ml.; 5 c/m-mole) for 40 min., washed, fixed with acid and dried, and the radioactivity incorporated into nucleic acid was measured (Birnie & Simons, 1967). Digestion with deoxyribonuclease and ribonuclease confirmed that the radioactivity was in DNA and RNA respectively.

Very little [3H]thymidine was incorporated into macrophage DNA (0·75 c.p.m./10^3 cells in serum-free medium; 0·3 c.p.m./10^3 cells in the presence of calf serum). In contrast, extensive incorporation of [3H]uridine into RNA was observed, which much exceeded that found in mouse-embryo fibroblasts under similar conditions (Birnie & Simons, 1967). In serum-free medium, the cultures incorporated 32 c.p.m./10^3 cells and this was not increased when they were maintained in medium containing 10% of isologous mouse serum. However, in the presence of calf serum, the amount incorporated was increased to 54 c.p.m./10^3 cells. Similar stimulation by calf serum was observed with macrophages cultured for from 18 hr. to 15 days.

These results show that calf serum stimulates the incorporation of [3H]uridine into macrophage RNA and suggest that this stimulation may be produced by the 'foreign antigens' of this serum. The observations will be discussed in the context of current concepts of the role of macrophages in antibody production.

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Effects of Limiting Different Purine Nucleotide Precursors on Nucleic Acid Synthesis and Nucleotide Pools of Purine-Requiring Mutants of *Escherichia coli*

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Adenylosuccinase is involved at two steps in the biosynthesis of adenine nucleotides but is not required for converting IMP into GMP. We have studied the effects of supplying either adenine or guanosine singly to an adenylosuccinase mutant of *Escherichia coli* (AB-1325) or to another strain (AG-1) that requires both adenine and guanine for

growth and was obtained by introducing a mutated XMP aminase gene into strain AB-1325. Strain AG-1 is thus unable to convert adenine nucleotides into guanine nucleotides and vice versa. Guanosine gave faster growth than guanine and so it was used in the following experiments.

Synthesis of nucleic acids in strain AG-1 as measured by the incorporation of [^{14}C]uracil or [^{3}H]thymine is negligible on transfer to a medium lacking guanosine whether adenine is present or not. However, addition of guanosine without adenine promotes synthesis of both DNA and RNA for a short period at a rate comparable with that in complete medium. Hypoxanthine and xanthine have no effect. On transfer from complete medium to one deficient in both adenine and guanosine, the contents of ATP and ADP fell after the first 10min. A greater and much more rapid fall occurred when guanosine alone was supplied, probably as a direct consequence of the removal of adenine nucleotides for net synthesis of nucleic acid.

In strain AB-1325, there is a similar stimulation of nucleic acid synthesis and a similar behaviour of the ATP and ADP pools on supplying guanosine. Only a very small increase in the GTP content was detected during the period in which most RNA was synthesized and there was no increase in GDP or GMP. It is suggested that the rate of synthesis of RNA may be sensitive to very small changes in the intracellular content of GTP.

Measurements of the incorporation of [^{14}C]-phenylalanine into protein and of the formation of β-galactosidase indicate that synthesis of messenger RNA occurs in the presence of guanosine alone. RNA–DNA-hybridization experiments show that in the first minute after the addition of guanosine there is an unusually high ratio of the rate of incorporation of [5-^{3}H]uracil into messenger RNA to the rate of its incorporation into ribosomal RNA.

The Distribution of Deoxyribonucleic Acid-Like Ribonucleic Acid in Rat Liver Cells

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Fractionation of total cellular RNA on columns of kieselguhr coated with methylated albumin has proved a useful method of separating DNA-like RNA from ribosomal and transfer RNA (Ellem, 1966; Ellem & Rhodes, 1969). DNA-like RNA can be subdivided into two groups: one that is eluted towards the end of a sodium chloride concentration gradient (called Q_2-RNA), and the other that is tenaciously bound to the column after salt elution (called TD-RNA). The latter can be eluted with a solution of sodium dodecyl sulphate at 35° and then at 70°. The function and relationship to one another of these species of DNA-like RNA is not known. The sedimentation coefficients of Q_2- and TD-RNA are 50s (Yoshikawa-Fukada, Fukada & Kawada, 1965) and 16–18s (Ellem, 1966) respectively.

In this series of experiments, rat liver RNA was labelled by injecting 5μc of [^{3}H]orotic acid 0·5, 2 or 18hr. before death, and cytoplasmic RNA was isolated and fractionated on columns of methylated albumin. No TD-RNA was detected in the cytoplasmic fraction after any of these periods of labelling and no Q_2-RNA was found in the cytoplasmic fraction after a 2hr. labelling period, the only time when Q_2-RNA was investigated.

The percentage of labelled TD-RNA in total or nuclear RNA from liver declines with length of labelling time, suggesting that TD-RNA has a rapid turnover.

These results may be interpreted as indicating that (1) DNA-like RNA is restricted to the nucleus, or (2) DNA-like RNA combines with ribosomal RNA and is eluted from the column with another fraction, or (3) there are two different species of DNA-like RNA, one behaving as in (1) above and the other as in (2) above. Two possible functions for these species of RNA are (1) repressors that are restricted to the nucleus and (2) precursors of messenger RNA.

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The Mechanism of Action of Interferon: a Comparison of Ribosomes from Interferon-Treated and Control Cells

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Recent work on the mechanism of action of interferon has been concerned with the hypothesis that interferon induces the cell to produce anti-viral protein(s) that inhibits viral replication by preventing the translation of viral, but not host-cell, messenger RNA. The work of Marcus & Salb (1966) clearly indicated the ribosome as the site of action of this translation-inhibitory protein. Accordingly, a study has been made of ribosomes from interferon-treated and control chick-embryo fibroblasts. If new protein(s) is synthesized in response to interferon and is associated with either the ribosome or the cell-sap fractions, we have been unable to obtain unequivocal evidence for it, despite extensive