Corey-Pauling-Koltun atomic models) and in conformity with energy limitations, I found it possible to refine the thesis in that the wide groove of the B-form of the double helix of DNA can be covered by adjacent 'paired', i.e. placed in parallel, histones (respectively linked ionically to the phosphate groups of the parallel DNA chains, as well as by hydrogen bonds to suitably located hydrogen-bond-acceptor sites on the purines and pyrimidines), which may be partnered by interpolypeptide non-covalent linkages. Utilizing the previous conclusions that the amino groups of adenine and cytosine (and therefore the corresponding hydrogen-bond-acceptor ternary nitrogen atoms) and the methyl group of thymine are restricted to the wide groove (Lewin, 1967*a,b*), I have computed that the 64 possible trinucleotides can be differentiated from one another stereochemically as well as by their hydrogen-bond-acceptance potential and hydrophobic attachments. Assuming such differentials to determine the corresponding, specific, histone attachments by hydrogen-bond donation it follows that any two histone sections attached in parallel along the wide groove to particular base-paired trinucleotides cannot be equally bound sequentially to the two respective areas of the base-paired purines/pyrimidines that they cover. Hence a particular set of conditions may weaken the hydrogen-bonded coverage of one histone, thereby allowing it to turn on its ionic linkage, while the other histone, placed in parallel, remains attached. The unmasked DNA section would allow mRNA synthesis, but the corresponding area masked by the histone in parallel would be unable to participate in mRNA synthesis. This pattern can therefore encompass histone specificity with associated repression potential.

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Some Aspects of Phenylalanine Incorporation in Deuterium Oxide (D₂O) Substitution for Water (H₂O) in Polyuridylic Acid-Directed Ribosomal Protein Biosynthesis

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It has been effectively demonstrated that D₂O substitution for H₂O can result in significant effects on biological processes both *in vivo* (for extensive references see Kritchevsky, 1960; IUPAC, 1963; Hübner, 1967) and in enzymic activities *in vitro* (e.g. Henderson & Henderson, 1969; Belleau, 1967).

The finding that D₂O substitution for H₂O can favour the stabilities of polyribonucleotides, DNA and ribosomes (Lewin, 1966, 1967*a,b*, 1969; S. Lewin, B. A. Williams & D. Munroe, unpublished work) and the considerations favouring the thesis that at low ionic strength certain deuterium bonds are stronger than the corresponding hydrogen bonds (Lewin, 1967*a,b*) has prompted an overall investigation of the effect of D₂O on synthetic ribonucleotide-directed ribosomal protein biosynthesis (S. Lewin, unpublished work); the present communication is concerned with certain facets of the incorporation of phenylalanine in polyuridylic acid-directed ribosomal protein biosynthesis.

Ribosomes were prepared from *RNAase⁺ Escherichia coli* (strain B) by using somewhat modified techniques of Matthaei & Nirenberg (1961) or Godson & Sinsheimer (1967) followed by biosynthetic procedures and protein precipitations utilizing the techniques of Matthaei & Nirenberg (1961) or Bretscher & Jones (1967). The concentrations of polyuridylic acid and the magnesium salts were respectively 10 µg/ml and 15–20 µmol/ml.

In general increasing concentrations of D₂O up to 60% enhanced phenylalanine uptake. When, however, only freshly prepared (1–2 days old only) S-30 fractions were used a maximum enhancement of phenylalanine incorporation appeared in the region of 15–20% D₂O. Our results may be contrasted with those of Holland & Antoni (1968), who, using ribosomes from guinea-pig liver, concluded that D₂O did not enhance polyuridylic acid-directed incorporation of phenylalanine, but that increased incorporation of several amino acids results from the corresponding microsomes.

Thanks are due to the Science Research Council for giving support to this and associated investigations.

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Methylation of Ribonucleic Acid in Cells Infected with Herpes Simplex Virus

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A decrease both in the synthesis and in the methylation of rRNA and tRNA has been found after infection of mammalian cells with poliovirus (Grado, Friedlinder, Ihl & Contrevas, 1968) and foot-and-mouth-disease virus (Vande Woude, Arlinghaus & Polatnick, 1967). Tumours induced by SV40 (Mittelman, Hall, Yohn & Grace, 1967), adenovirus 12 (Macfarlane & Shaw, 1968; Macfarlane, 1969), murine leukaemia virus (Silber, Goldstein, Berman, Decker & Fried, 1967) and Marek's-disease virus (Hacker & Mandel, 1969) possess increased activities of tRNA methylases that apparently (Baguley & Staehelin, 1968) give rise to quantitative and qualitative changes in a tRNA substrate. It has been shown (Low, Hay & Keir, 1969) that the DNA of herpes simplex virus is not methylated at the polynucleotide level.

We have examined the synthesis and methylation of rRNA and tRNA in baby-hamster kidney (BHK 21) cells after infection with herpes simplex virus. Incorporation of radioactive uridine and methionine into tRNA between 4 and 8h after infection was inhibited by one-third and one-half respectively compared with uninfected cells. The synthesis and methylation of rRNA was inhibited to an even greater extent.

At 4h after infection the activity of tRNA methylase had fallen to 80% of the control value both in exponentially growing cells and in cells incubated with 5% of the normal serum concentration. Such cells before infection exhibit markedly decreased activities of tRNA methylase.

Inhibition of RNA methylation after infection with herpes simplex virus is not due to the presence of an *S*-adenosylmethionine-cleaving enzyme and

Evidence for the Induction of a New Deoxycytidine Kinase in Cells Infected with Herpes Virus

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After the infection of animal cells by herpes virus a number of enzymes show elevated activities, and there is evidence that some of these are virus-coded (Keir, 1968). As part of a survey of enzymes of nucleic acid metabolism in virus-infected cells, we have studied the deoxyribonucleoside kinases of baby-hamster kidney (BHK) cells before and after infection with herpes virus.

It was found that the kinase activities towards deoxyadenosine and deoxyguanosine were heat-stable and detectable in approximately equal amounts before and after infection. The phosphorylating activities towards deoxycytidine and deoxythymidine, however, showed lower specific activities in uninfected cells than the purine kinases and were much more heat-labile. In virus-infected cells both activities rose about 15-fold by 12h after infection.

The induction of deoxythymidine kinase has already been described (Kit & Dubbs, 1963; Klemperer, Haynes, Shedden & Watson, 1967). The following observations show that the increment in deoxycytidine kinase is due to the development of a distinct activity: (i) deoxycytidine stabilizes the virus-induced deoxycytidine but not deoxythymidine kinase against heat inactivation; (ii) deoxycytidine 5'-triphosphate at 20 μ M completely inhibits the deoxycytidine kinase activity but has no effect on deoxythymidine kinase.

Experiments with puromycin and actinomycin D showed that protein and RNA synthesis were