of the sensitizer, which can be a dye molecule, is thought to interact with the substrate in one of several ways including direct energy transfer or by way of a second reactive species such as singlet oxygen. Dr Knowles indicated that his studies on the photoinactivation of nucleotides could be explained by a free radical hydrogen abstraction process which forms peroxides.

Whereas most research on photochemical mechanisms has involved the use of isotropic fluid solvents, there were two reports at the meeting that suggested the need for new studies using reaction media which more closely simulate natural conditions occurring *in vivo*. Dr M. Weese (Davy Faraday Laboratory, Royal Institution) told of her work on photoactivated electron transfer from chlorophyll *a* to quinone in a rigid lecithin matrix. The phospholipid solvent allows this reaction to be investigated under conditions close to that found in the chloroplast: high concentrations of reactant which are constrained in their diffusional motion. The kinetics of the electron transfer process indicate that the reaction occurs between pairs of nearest neighbour molecules and the speed of the reaction is quite sensitive to the shape of the quinone used. Another atypical reaction medium was discussed by Dr F. McCapra (University of Sussex) who indicated that the efficiency of chemiluminescence can be strikingly increased when the reaction is allowed to proceed in solvents which form micelles.

The general feeling of the participants was that a better understanding of these reactions could result in the selective photomodification of certain biological systems. The use of light energy to inactivate viruses or to destroy individual amino-acids of a protein was discussed. Professor F. R. Whatley (University of Oxford) pointed out that paraquat, a bipyridylium salt, only showed herbicidal activity on green plants in the presence of light. This may mean that incident radiation and an appropriate sensitizer can be used to limit the effective life of these growth regulating substances.

MESSENGER RNP

Informofers

from our Cell Biology Correspondent

ONE of the more notable contributions made by Russian molecular biologists has been the investigations of Georgiev and his associates into the state of messenger RNA and its precursors in the nuclei of eukaryotic cells and the transport of messenger from nucleus to cytoplasm. In 1968 (*J. Mol. Biol.*, **33**, 251 ; 1968) Samarina *et al.* presented evidence which indicated that the DNA-like RNA in rat liver cell nuclei is complexed with protein particles to form a ribbon-like structure with a series of 200 Å, 30S ribonucleoprotein structures along its length; they proposed the name informofer for these 30S protein particles, anticipating that this protein would prove to be involved in the transport of segments of DNA-like RNA from the nucleus to the cytoplasm where it might act as messenger. Lukanidin, Aitkhozhina, Kulguskin and Georgiev (*FEBS Lett.*, **19**, 101 ; 1971) now report a simple procedure for the isolation of intact unaggregated informofer particles which are free of RNA.

By dialysing nuclear ribonucleoprotein aggregates against 2 M NaCl and then separating the products of dialysis by centrifugation through sucrose gradients Lukanidin *et al.* were able to isolate the free informofers. When exposed to urea each informofer dissociates into its subunit polypeptide chains, over 90 per cent of which are identical and have a molecular weight of about 40,000. Intact informofers readily interact *in vitro* with DNA-like RNA to reform the ribbon-like aggregates which, with a series of 30S informofers strung out along an RNA chain, superficially resemble polysomes.

With Williamson, of the Beatson Institute in Glasgow, Lukanidin and Georgiev (*ibid.*, 152) have compared the informofer protein with the protein to which the messenger RNA moiety of cytoplasmic ribosomes is associated. Their aim was to discover whether or not informofer protein is transported across the nuclear envelope and into the cytoplasm with messenger RNA. To avoid the possibility of artefacts stemming from the leakage of informofer protein from the nucleus during the experimental manipulations they used reticulocyte polysomal ribonucleoprotein, for reticulocytes lack nuclei. Polyacrylamide gel electrophoretograms of informofer protein and the protein associated with globin messenger RNA reveal that the two classes of protein are very similar but definitely not identical. It seems therefore that informofer protein probably does not cross the nuclear envelope or, if it does, it is modified.

The disturbing possibility that the protein found associated with the messenger moiety of isolated polysomes is an adsorption artefact, generated as the polysomes are extracted, is shown to be highly unlikely by the recent experiments of Olsnes (*Europ. J. Biochem.*, **23**, 248 ; 1971). By a series of reconstruction experiments he has shown that artificial ribonucleoprotein complexes produced by incubating nuclear DNA-like RNA with cytoplasmic extracts are less stable than the messenger containing ribonucleoprotein complex isolated from polysomes; the artificial complex, for example, does not survive centrifugation through sucrose gradients. Olsnes concludes therefore that the polysomal, messenger ribonucleoprotein is probably not an artefact but exists *in vivo*.

Ribosomes and tRNA Recognition

IT is often convenient to imagine the ribosome as a simple piece of cellular machinery the job of which is nothing more than to catalyse the formation of peptide bonds between a peptidyl-tRNA and an amino-acyl-tRNA which have reached juxtaposition as they decode a messenger. But that is a gross oversimplification of the ribosome's role in protein synthesis as investigations stemming from the discovery that the antibiotic streptomycin interferes with the codon-anticodon recognition process have amply proved. Indeed, Gorini suggests in next Wednesday's *Nature New Biology* (December 29) that the ribosome plays a considerable part in screening incoming transfer RNA molecules before and at the same time as they interact with messenger RNA.

Gorini has obtained strains of *Escherichia coli* which have mutated ribosomal proteins and has studied the effects of these mutations on the misreading of the genetic code and the suppression of nonsense codons by different species of suppressor tRNAs. The results of his experiments lead Gorini to suggest that there exists "a ribosomal screen which allows the binding of tRNA to the ribosome but antagonizes tRNA from reaching the stage of codon-anticodon interaction". The extent to which any particular species of tRNA participates in protein synthesis will as a result depend not only on the strength of the codon-anticodon interaction but also on the ease with which the tRNA can penetrate the ribosomal screen.

A complete understanding of precisely what happens during protein synthesis depends eventually, of course, on elucidating the three-dimensional structure of transfer RNA molecules and of ribosomes and messengers and finding out how mutations change the structure and function of these components. Little progress has so far been made with this structural analysis but as Kurland and Green report, also in next Wednesday's *Nature New Biology*, strains of *E. coli* with mutationally altered ribosomal proteins, which differ from their wild-type counterparts in the strength with which they interact with ribosomal RNA during the assembly of ribosomes, can be isolated by screening cells that have reverted from a state of dependence upon streptomycin.