INVERTEBRATES

North Pacific Catch

This crustacean, *Caprella pustulata*, is one of six new species described, together with a new genus, *Pseudoliropus*, in an account of the Caprellidae of the American North Pacific (Laubitz, D. R., *Publications in Biological Oceanography* No. 1, National Museums of Canada; 1970). The animal shown here is a male *C. pustulata*, and it is 7.9 mm long.

RIBOSOMES

Phosphorylated for Storage

from our Nucleic Acids Correspondent

A STORAGE function has been suggested for ribosomes which are phosphorylated and apparently inactive. D. Khabat has made this suggestion after extensive investigations of the occurrence and properties of phosphorylated ribosomal proteins from rabbit reticulocytes (*Biochemistry*, **9**, 4160; 1970).

Ribosomes from this source have the particular advantage that the phosphorylation of the proteins can be studied by incubating cell suspensions with ^{32}P -orthophosphate, in the absence of any *de novo* synthesis of ribosomal RNA. Any other residual nucleic acid synthesis within the cells can be blocked by the addition of actinomycin and the bulk of the label is incorporated into the ribosomal protein fraction. Acid hydrolysis of the ribosomes yields phosphoserine and phosphothreonine.

Khabat found that about 40 per cent of the phosphorylation was associated with as many as ten loosely bound proteins, associated with polysomes, single ribosomes and ribosomal subunits. These can be removed by thoroughly washing the ribosomes. A further component, which may be GTP but is certainly not a protein, is specifically associated with the polysome fraction, and can be released by dissociating this fraction. He detected at least three *bona fide* phosphorylated ribosomal proteins among the remaining material, by electrophoresis through polyacrylamide gels containing sodium dodecyl sulphate.

One of these proteins, present in the larger subunit, is only found phosphorylated in single ribosomes, although the corresponding non-phosphorylated component is present in the other ribosomal fractions. The molecular weight of this protein is estimated to be about 21,000. A further phosphoprotein, with a molecular weight of about 70,000, is specifically associated with the smaller subunit, but is not found in single ribosomes or polysomes (or in the supernatant fraction) and might well be identifiable with some type of factor, particularly because it can be removed by washing the subunits with buffers of high ionic strength. A further phosphorylated protein, of molecular weight 33,000, is also present in the smaller subunit, and is present in all the ribosomal fractions.

Although ideas about the role(s) of such phosphorylation are very unclear, Khabat makes a salient observation about the kinetics of phosphorylation of the protein from the large ribosomal subunit. It seems that the turnover of the phosphate is comparatively slow, and therefore such phosphorylated single ribosomes do not participate in the usual subunit-polysome cycle of protein synthesis. He therefore suggests that these are inactive ribosomes, and that they may have a storage function. It seems unlikely that reticulocyte ribosomes are unique in this respect; Khabat also reports the occurrence of phosphoproteins in the ribosomes of various chick embryo tissues, promising further information later.

BACTERIA

Group with Obscure Function

from our Nucleic Acids Correspondent

THE little single stranded DNA bacteriophage ϕX174 continues to occupy a place in the hearts and minds of many molecular biologists, and is particularly associated with the untiring efforts of Sinsheimer and his colleagues, who have used it as a tool to examine many of the problems of DNA replication. Recently, Razin, Sedat and Sinsheimer have illuminated the abstruse but important problem of the methylation of ϕX174 DNA (*J. Mol. Biol.*, **53**, 251; 1970).

Although it is widely believed that the introduction of methyl groups into DNA *in vivo* must have some major significance, direct support for this article of faith is regrettably sparse. An exception is the likely relationship between methylation and host-controlled modification or restriction. (DNA from *Escherichia coli* strains K12 or B is "modified" in different ways, and if introduced into the other cell type is thereby recognized as "foreign" and degraded-restricted.) Razin *et al.*, however, studied the methylation occurring during growth of the phage in a C strain of *E. coli*. This host does not display modification or restriction, ruling out in this case any link between methylation and these phenomena. They used ^{14}C -methionine to label specifically the methyl groups introduced, with the additional precaution of the strain being a purine auxotroph, so that growth in the presence of adenosine depressed background labelling of the purine rings. Hydrolysis of the phage DNA with trifluoroacetic acid yielded principally radioactive 5-methylcytosine, although a far from negligible amount of thymine was also inexplicably labelled.

They determined the amount of 5-methylcytosine present in the DNA, and conclusively showed by four different methods that there is likely to be one methyl group in each DNA molecule. This suggests that here, as with methylation of RNAs, a specific site within the DNA is subjected to methylation. Additional support for this assumption was afforded by the finding that after depurination of the DNA with diphenylamine and formic acid, fractionation of the pyrimidine isopluiths by chromatography on DEAE-cellulose yields a single radioactive dinucleotide. This was identified as either $\text{m}^5\text{C-T}$ or $\text{T-m}^5\text{C}$, suggesting that the methylation occurs in one or other of the sequences $\text{pu-m}^5\text{C-T-pu}$ or $\text{pu-T-m}^5\text{C-pu}$. The magical function of this solitary methyl group sadly remains unresolved.

In the same issue of the *Journal of Molecular Biology* (**53**, 205; 1970), an equally esoteric and important