some structure, longitudinal multiplicity of the master-slave kind. John Evans (University of Aberdeen) dealt with problems of chromosome replication, decrying the facile use of the term "replicon" for the unit of replication in eukaryotic chromosomes.

Claus Pelling (Max Planck Institute, Tübingen) gave an account of the current view on puffing in chromosomes of dipteran salivary glands. Sucrose gradients have been used to demonstrate that the range of size of the RNA molecules transcribed in these cells extends to 50S. A rather sharp cut-off demonstrated an upper limit to the polycistronic transcribed RNA. Organ specific transcription was the theme of Brian McCarthy (University of Washington) and John Paul (Beatson Institute for Cancer Research, Glasgow). Reiterating current ideas on the frequency of repeated base sequences of mammalian DNA, which range from about 10,000 copies of very similar short sequences, through a few to 100 copies of sequences of intermediate complexity, to single copies of long unique sequences, McCarthy described attempts to fractionate DNA into such size groups. Shearing for various times followed by separation on sucrose gradients showed that the region of crab DNA which is rich in vitamins and thymine occurs in the least easily solubilized portion of the chromatin, while the intermediate and unique sequences are found uniformly distributed throughout the gradient of solubility after shearing. Claiming that the best estimates for the amount of DNA in the eukaryotic nucleus that is transcribed are about 1 per cent, McCarthy demonstrated how this varies quantitatively and qualitatively between chromatin isolated from different organs.

The specificity of molecular hybridization techniques used for such discrimination was mentioned by John Paul. He emphasized that the differences found between different organs in saturation hybridization were self sufficient. Dealing with the molecular gymnastics at the site of transcription, Paul suggested a model in which histone is displaced from the DNA by the action of non-histone (acidic) proteins associated with the transcribable regions.

LAMBDA PHAGE

What *N* Does

from our Cell Biology Correspondent

SPECULATING about the function of the *N* gene of the lysogenic phage λ has long been a favourite pastime of established molecular biologists and more than one graduate student has hopefully set out to isolate the *N* gene product and define its function only to find genes *O*, *P*, *Q* and the rest of the λ alphabet more fruitful thesis topics. It is known that *N* is a regulatory gene which exerts positive control over a whole series of λ genes effecting DNA replication, recombination and the expression of λ late proteins. Moreover, *N* is itself under the control of the λ phage repressor which Ptashne has isolated and which prevents the expression of the entire λ genome. But so far the function of *N* has escaped elucidation.

When the sigma factor which determines RNA polymerase specificity in *E. coli* was discovered at the end of last year by Burgess, Travers, Bautz and Dunn, it seemed attractive to speculate that the *N* gene specifies a factor analogous to sigma which may

regulate the transcription of various λ genes. But the work of Hallick, Boyce and Echols, reported on page 1239 of this issue, suggests a totally different function for the product of the *N* gene. Echols's group believes that it has a role in associating the phage DNA with the membrane of its *E. coli* host and that this association may be crucial for DNA replication as well as for transcription.

By superinfecting a cell lysogenized with a λ phage that has a temperature sensitive mutation in the repressor gene, Hallick *et al.* were able to show that as soon as the repressor is inactivated by altering the temperature, the superinfecting DNA of the λ phage becomes associated with the *E. coli* cell membrane. This association does not seem to involve a change in the covalently bonded circular form of the λ DNA. Such membrane association is an early step in the lytic replication cycle of λ phage occurring within two minutes of inactivation of the repressor. But does the step involve gene *N* directly? DNA of mutants which lack gene *N* function failed to associate with the host membrane whereas mutants with a functional *N* gene, but defective in genes controlled by *N*, associated with the membrane normally.

The product of the *N* gene may therefore well be a protein essential for the correct attachment of the λ phage DNA to the host cell wall. Once this has been achieved, transcription, DNA replication and recombination can begin. Moreover, Echols's group finds that in the presence of repressor protein active *N* gene product cannot function; they suggest that the repressor blocks the membrane associating activities of the *N* gene protein. Further experiments are needed to substantiate the notion that the *N* gene regulates phage replication by controlling membrane association, but if that proves to be the case there will be an interesting parallel between regulation of replication and expression of λ phage DNA and the chromosome of its host *E. coli*.

BIOCHEMISTRY

Less Familiar Enzymes

from a Correspondent

THE Biochemical Society held a colloquium on recent advances in the study of some less familiar proteolytic enzymes in Belfast on September 5. D. J. Elmore (Queen's University, Belfast), who organized the colloquium, thought biochemists should be made aware of the existence of proteolytic enzymes other than trypsin or chymotrypsin.

Many of these enzymes, like the two well known proteases, have a reactive serine at the active centre but are very much more specific in respect of their substrates. In some instances these lesser known enzymes form part of a complex sequence of zymogen activations, as is found in blood coagulation. M. P. Esnouf (Radcliffe Infirmary, Oxford) reviewed the present state of knowledge of the sequence of these reactions. Since the proposal of the "cascade" hypothesis by R. G. Macfarlane (*Nature*, **202**, 498; 1964), in which it was suggested that all the inactive coagulation factors were zymogens and that coagulation was the end result of the sequential activation of these factors, considerable efforts have been made to validate this hypothesis from the results of biochemical investiga-