is that, although there is no reason to doubt that reliable ages will ultimately be obtained from some deep sea samples, criteria for the recognition of reliable samples must be developed first.

MYCOPLASMAS

Isolation of Mycoplasmas

from a Correspondent

An International Symposium on Mycoplasma Diseases of Man was held at Erfurt in East Germany on October 2–5. About one third of the contributors were absent as a consequence of the problems associated with the political situation in Czechoslovakia. The papers presented were, however, a useful contribution to diagnostic, biological and epidemiological studies of mycoplasmas in general, and in particular those isolated from man.

The symposium was reminded by Dr B. E. Andrews (London) of the need for mycoplasma reference centres and the difficulties encountered by them. There were several reports concerning improvements of isolation techniques and Dr E. Künzel (Berlin) said that he had increased his isolation rate by incorporating β-propriolactone into medium. Dr J. M. Inglis (London) had found that 10 per cent of specimens taken at bronchoscopy contained mycoplasmas commonly found in the upper respiratory tract.

Dr R. Kundsin (Boston) reported the isolation of T-strain mycoplasmas from the products of conception and indicated that T-strains might be a factor in abortion. This contention provoked considerable discussion. T-strain mycoplasmas had been isolated also by Dr W. Witzleb (Erfurt) directly from the bladder. Attention was drawn by Dr F. Milazzo (Milan) to the antigenic distinctiveness of *Mycoplasma pneumoniae*, and by Dr H. W. Clark (Washington) to quantitative variations of antigen composition of mycoplasmas grown in various media. Dr G. Schabinski (Berlin) had developed an immunofluorescence technique for *M. pneumoniae* in which the antigen is attached to latex particles. Evidence was presented by Dr D. Taylor-Robinson (Salisbury) for the existence on cells, to which mycoplasmas attach, of at least two kinds of receptors, one being N-acetyl neuraminic acid in type. Dr M. Butler (London) discussed the growth of mycoplasmas in organ cultures of human embryo trachea, and Dr E. Stanbridge (London) suggested that the appearance of "leopard" cells in tissue cultures might be used to diagnose mycoplasma contamination. Dr R. H. Leach (London) has shown that such contamination occasionally interferes with multiplication of adenoviruses and herpes simplex virus.

MOLECULAR BIOLOGY

Control of Messenger Synthesis

from our Cell Biology Correspondent

The RNA control gene in *E. coli*—the *RC* gene—regulates the synthesis of ribosomal and transfer RNA but not of messenger RNA, which is made equally well in strains containing either the *RC* relaxed or *RC* stringent alleles during starvation for required amino-acids. That is the conclusion reached independently by three groups, Forchhammer and Kjeldgaard in Denmark, Edlin, Stent, Baker and Yanofsky in California and Lavalle and De Hauwer in Belgium, who report experiments on the synthesis of *m*RNA during amino-acid starvation in the latest issue of *J. Mol. Biol.* (**37**, 245, 257 and 269; 1968).

All these experiments boil down to tests of two closely related theories of the control of RNA synthesis. First, there is Stent's proposal that RNA synthesis is regulated through an obligatory coupling of translation and transcription by which ribosomes moving along nascent *m*RNA molecules free the *m*RNA from the DNA template and so permit continued initiation of more *m*RNA synthesis. The second proposal is that the rate of synthesis of all classes of RNA—messenger, ribosomal and transfer—is regulated in a coordinated way by the *RC* locus and that, in strains with the *RC* stringent allele, synthesis of all classes of RNA depends on the supply of a full complement of all the amino-acids. There is, of course, a long history of conflicting claims for and against both these hypotheses, but the agreement of the three groups seems to settle the issue once and for all.

Stent's model of coupled translation and transcription makes two predictions—first, that a decrease in the overall rate of translation must result in a corresponding decrease in the rate of *m*RNA synthesis; and second, less obviously, that under all growth conditions, cells must contain a constant average amount of *m*RNA per ribosome involved in protein synthesis. The three groups, by showing that *m*RNA synthesis continues in RC stringent strains starved for required amino-acids while *t*RNA, *r*RNA and protein synthesis are all greatly reduced, have shown that the first prediction of Stent's model is not fulfilled and so the model is probably incorrect. As Lavalle and De Hauwer say, "the presence of ribosomes on a growing messenger may just be circumstantial; messenger is being made and ribosomes begin to translate, instead of messenger is being made because ribosomes begin to translate".

The fact that in the RC stringent strain *t*RNA and *r*RNA synthesis depends on a supply of a full complement of amino-acids. whereas *m*RNA synthesis does not, means there are two separate control systems. Edlin *et al.* offer three possible mechanisms. First, there could be two classes of RNA polymerase, one for *t*RNA and *r*RNA and another for *m*RNA which respond differently to conditions during amino-acid starvation in RC stringent strains. Second, some part of the *t*RNA and *r*RNA genes might have signals, which, under the conditions of amino-acid starvation, reduce the ability of RNA polymerase to initiate or continue RNA synthesis. Third, in the prevailing conditions in starved RC stringent cells, *t*RNA and *r*RNA might in fact be synthesized but very rapidly degraded, perhaps because there is no protein synthesis.

Although there is apparently no obligatory link between *m*RNA synthesis and protein synthesis, can anything be salvaged of Stent's idea that ribosomes have some role in regulating messenger synthesis? Forchhammer and Kjeldgaard suggest that *m*RNA synthesis may be regulated by the 30*S* ribosomal subunit and initiation factors in the absence of protein synthesis. They have in mind, of course, the role of the 30*S* subunit in forming an initiation complex with *m*RNA. This might provide a mechanism for releasing *m*RNA from template DNA. The evidence for the suggestion is, essentially, that the amount of *m*RNA in a mutant strain of *E. coli* which makes 30*S* subunits

but not 50*S* subunits is the same as in wild type strains. In other words, it is the 30*S* subunits and other components necessary for initiation and not the 70*S* ribosome which affect *m*RNA synthesis.

GENE CONTROL

Histones—Animal and Vegetable

from our Molecular Biology Correspondent

THE biochemical world has long been divided on the question of whether the histones are actively involved in suppression and activation of genes, or whether they exist as essentially passive—and therefore, according to one view, slightly dreary—packaging materials. Among the indications that the role of the histones is not purely passive are the many observations of the enzymic modification of certain of their side chains under circumstances which suggest that this may somehow be involved in the control of transcription of the DNA. The attachment of acetyl groups to the N-termini of two of the histones, and of methyl and phosphoryl groups to side chains of others, has been demonstrated. Allfrey and his co-workers found that whereas some of these modifying groups remain more or less permanently bound, others are metabolically active, in the sense that a radioactive precursor is rapidly incorporated at these points.

Gershey, Vidali and Allfrey (*J. Biol. Chem.*, **243**, 5018; 1968) have now found, from experiments involving pulse-labelling of calf thymus nuclei with ^{14}C-acetate, that the histone component *f*2*a*1 exhibits this type of rapid turnover. Moreover, proteolytic digestion of the histone and separation of the fragments led to the identification of the label in a single ε-acetyllysine residue. This is therefore the metabolically active site. Rapid labelling also occurs in the arginine-rich fraction, *f*3.

Meanwhile, in E. L. Smith's laboratory in Los Angeles, the latter protein (also termed histone-IV in another system of nomenclature) has been completely sequenced, and the modified side chain located. This work, reported at the autumn meeting of the National Academy of Sciences, must surely be expected to stimulate a wide resurgence of interest in the histone field. The protein has 102 residues, the rapidly labelled site being lys-16. In the protein, as isolated, this residue is acetylated in half the molecules. There is also a fully methylated lysine at position 20, the remaining nine lysines being unmodified. The sequence shows some curious features—in particular a marked polarization of charge, such that the N-terminal end contains a predominance of the positive groups, and the other end most of the negative and hydrophobic side chains. This suggests that the attachment to DNA may primarily involve one end of the molecule, perhaps leaving the other free to engage in some function which is as yet unknown.

The same workers (Delange, Fambrough, Smith and Bonner) also prepared the corresponding histone fraction from pea seedlings—an operation involving germination of no less than 20 tons of seeds—and now have the substantially complete sequence. An early report, in which the first 19 residues from the C-terminal end were found to be identical in the pea and calf thymus proteins, is borne out. Indeed, it appears that the chains are identical in length, and differ only by two replacements, one of arginine for lysine, the other of isoleucine for valine; in addition lys-20 is not methylated in the pea protein. Apart from this astonishing evolutionary conservation of sequence—a phenomenon altogether unique among the very considerable number of known sequences in a range of proteins of the most diverse functions—this result points incluctably to some highly specific and precisely defined biochemical function for the histone.

VIROLOGY

Coronaviruses

A NEW group of viruses with the name of coronaviruses has been recognized by an informal group of virologists who have sent their conclusions to *Nature*. (They are J. D. Almeida; D. M. Berry; C. H. Cunningham; D. Hamre; M. S. Hofstad; L. Mallucci; K. McIntosh; D. A. J. Tyrrell.)

They point out that with negative staining, avian infectious bronchitis virus has a characteristic electron microscopic appearance resembling, but distinct from, that of myxoviruses. Particles are more or less rounded in profile; although there is a certain amount of polymorphism, there is also a characteristic "fringe" of projections 200 Å long, which are rounded or petal shaped, rather than sharp or pointed, as in the myxoviruses. This appearance, recalling the solar corona, is shared by mouse hepatitis virus and several viruses recently recovered from man, namely strain B814, 229E and several others. These viruses also share a number of other properties as indicated in the table. (Anyone interested in the data on which the table is based may obtain a short bibliography on application to Dr D. A. J. Tyrrell at the Common Cold Research Unit, Salisbury, Wiltshire.)

PROPERTIES OF THESE VIRUSES

	Avian infectious bronchitis	Mouse hepatitis	Human strains
Size. Filtration		80–120 mμ	89 mμ
Electron microscopy*	80–120 mμ	100 mμ	80–160 mμ
Characteristic surface structure	+	+	+
Essential lipid (ether lability)	+	+	+
Apparent ribonucleic acid content (unsusceptibility to DNA inhibitors)	+	+	+
Density of infectious unit	1·18	?	1·19
Replication in cytoplasmic vesicles	+	+	+

* Negative contrast technique—projections are included in the diameter of the particle.

Some other relevant properties should be mentioned. There is an antigenic relationship between the human and murine strains, but none has been detected between avian strains and the others. A haemagglutinin has been detected by certain workers using avian infectious bronchitis virus and also antigens separable from the virus particle, but these have so far not been recorded for the human or murine strains.

In the opinion of the eight virologists these viruses are members of a previously unrecognized group which they suggest should be called the coronaviruses, to recall the characteristic appearance by which these viruses are identified in the electron microscope.

These suggestions have been received by members of the Myxovirus Study Group (chairman, Professor A. P. Waterson) under the International Committee for the Nomenclature of Viruses (ICNV). The suggestions were found acceptable and are now to be considered by the Vertebrate Virus Committee of the ICNV.