cations to the classical morphological model of the nucleolus. Evidence was presented by G. Goessens (University of Liege) that the fibrillar centres contain protein and some DNA, are labelled by ^3H -uridine pulses and are always associated with the dense fibrillar RNP components. In some cell types, the fibrillar centre can be followed during mitosis, it is also present in new-born nucleoli of heterokaryon cells (M. Bouteille, Paris).

Variation in nucleolar size and distribution of nucleolar components can reflect changes in activity. The formation of micronucleoli in ageing cells, characterised by degranulation and absence of condensed chromatin, seems related to cessation of RNA synthesis (K. Smetana, University of Prague). In contrast, small nucleolar fragments caused by α -amanitin retain the granular component and remain active in RNA synthesis (R. Simard, University of Montreal). The existence of a true nucleolus was demonstrated also in yeast cells by B. Stevens (University of Paris XI).

Evidence for a nucleolar compensation mechanism was given by V. Sakharov (Institute of Chemical Physics, Moscow) following ultraviolet microbeam irradiation of one of two interphase nucleoli. Cinematography showed an increase in volume of the unirradiated nucleolus simultaneous with a shrinkage of the damaged one.

The beautiful demonstration by the group of W. Franke (Cancer Research Centre, Heidelberg) of the fine anatomy of rRNA transcriptional units using the O. Miller spreading technique brought several new results. The start of the "Christmas Tree" may not correspond exactly to the initiation point since "prelude" transcripts are often seen and occasional long RNP fibrils may be interspersed in the initiation region, indicating that transcription and processing may go on together. The view that the primary transcript is larger than the first stable product and that the spacer is transcribed but immediately cleaved is supported by examples of long transcription units with almost no spacer and by 5-fluorouracil treatment where the spacer is eliminated and a larger than 40S RNA molecule is found in *Xenopus*. Regulation of transcription seems to depend on the rate of initiation. The concepts of heterogeneity and individuality of rRNA genes within one species and even within one nucleolus were subjects of some discussion.

Mapping of genes by restriction enzymes produced two important contributions. The five histone genes were shown by W. Schaffner (University of Zurich) to alternate with each other instead of being clustered in five separate groups. J. Engberg (University of

Copenhagen) demonstrated an unusual arrangement of the rRNA genes in *Tetrahymena* as a palindrome with two gene copies per intact 12×10^6 linear molecule.

Conservation of some rRNA sequences during evolution was demonstrated by S. Gerbi (Brown University) based on competition hybridisation and comparative fingerprint analysis and by M. S. Khan (University of Glasgow) and J. Klootwijk (Free University, Amsterdam) who found conservation occurred around methylation sites.

The three nuclear RNA polymerases can be manipulated and characterised by their different sensitivities to α -amanitin and heat inactivation. The yeast polymerase A studied by J. Retel (Free University, Amsterdam) is active in rRNA transcription *in vitro* with a preference for a high physical integrity of the DNA template and a low enzyme/DNA ratio. Using a technique of subnuclear fractionation J. Tata (National Institute for Medical Research, Mill Hill) emphasised the compartmentation of events in the nucleus. Polymerase B is found exclusively in the nuclear sap and euchromatin-rich fractions and most processing and polyadenylation occurs close to the site of synthesis.

Maturation of rRNA precursors may involve the simultaneous occurrence of more than one pathway (M. Dabeva, Institute of Biochemistry, Sofia) and the two rRNA species mature at different rates and sites. In *Chironomus*, the cytoplasmic distribution of newly-labelled 28S rRNA follows a gradient up to 6 days (U. Lönn, Karolinska Institute, Stockholm).

Research on extranucleolar sites of RNA synthesis and processing has received much impetus from collaborative efforts by J. P. Zalta (University of Toulouse) and E. Puvion and G. Moyne (Institut du Cancer, Villejuif) combining biochemical fractionation and electron microscopy. Newly-synthesised RNA can be located in perichromatin fibrils at the periphery of condensed chromatin; the labelling profile of this product corresponds to HnRNA.

A keyword of the meeting was post-transcriptional regulation. S. Penman (MIT, Boston) showed that growing cells process more of their pre-mRNA into cytoplasmic poly(A)-mRNA than do resting cells. Evidence was presented (K. Scherrer, I.B.M., Paris; E. Egyhazi, Karolinska Institute, Stockholm; E. Serfling, Genetics Institute, Gatersleben) that pre-mRNA genes may be continuously transcribed in all cells but that control resides in the efficiency of processing into mature mRNA.

The next Nucleolar Workshop is planned for 1977 in Salamanca.

A most Friendly meeting

THE article regarding "a most Friendly meeting" (*Nature*, 257, 741; 1975) was flattering, but unfortunately misleading, in that it described as being completed experiments which have not yet been accomplished. Specifically, heterokaryons formed by the fusion of DMSO-induced tetraploid mouse erythroleukaemia cells with diploid human amniotic fibroblasts were said to have synthesised human globin. Unfortunately, these heterokaryons so far synthesise only mouse globin. It is possible that the authors were referring to experiments reported by one of us (Deisseroth A., *et al.*, *Proc. natn. Acad. Sci. U.S.A.*, 72, 2682; 1975), in which continuously proliferating hybrid cells were generated by the fusion of human marrow erythroid cells with diploid mouse erythroleukaemia cells. These hybrids, when induced with DMSO, contain both human and mouse globin messenger RNA.

We do not want readers to think that human fibroblasts have been as yet induced to synthesise hemoglobin; these experiments are in progress.

BLANCHE ALTER
ALBERT DEISSEROTH

Astronomy from the Space Shuttle

from John Gribbin

A discussion meeting of the Royal Astronomical Society and the Institute of Physics—Uses of the Space Shuttle for Astronomy and Geophysics—was held on December 12 in London.

THE meeting highlighted the very different approach to scientific experiments in space necessitated by the advent of the shuttle. Previously, would-be experimenters have to some extent operated on the basis of envisaging a worthwhile experiment and then looking for a suitable way to get it off the ground; now, the American and European space agencies (NASA and ESA) are providing a standard launch vehicle and modular space laboratory, and it is up to the experimenters to make the best use of the facility provided.

J. Burger (ESA) set the scene with a background talk describing the work-