assumption of random distribution of adenylyl groups between the subunits of the dodecamer. The same law applies to activation dependent on alanine at low substrate levels. The catalytic behaviour is therefore evidently controlled in an unusual manner by heterologous interaction between subunits.

NUCLEOLUS

Gene Expression

from our Cell Biology Correspondent

DURING the past several years Henry Harris and his colleagues at Oxford have consistently championed the idea that the nucleolus, far from being simply an assembly site for ribosomal subunits, plays a crucial part in the expression of probably all structural genes in eukaryotic cells. This idea stems, of course, from the series of experiments, done by Harris and his associates, which have probed the reactivation of chicken erythrocyte nuclei after they are introduced, by cell fusion mediated by inactivated Sendai virus, into the cytoplasm of actively metabolizing cells of other species, notably cultivated mouse fibroblasts. The results of these various experiments showed that the transfer of detectable amounts of labelled RNA from erythrocyte nuclei to the cytoplasm of the heterokaryons, the appearance in that cytoplasm of chick proteins and the appearance in the reactivated erythrocyte nuclei of nucleoli are more or less coincident events. Not until erythrocyte nucleoli have appeared can newly made chick RNA and protein be detected in the cytoplasm. Harris and his colleagues have argued that this correlation is neither fortuitous nor the consequence of a species-specific restriction of translation of chick RNAs, but rather that a functional nucleolus is essential for the transfer of messenger RNAs from nucleus to cytoplasm. The group's latest experiments reported by Deák, Sidebottom and Harris (*J. Cell Sci.*, **11**, 379; 1972) certainly seem to confirm this interpretation of their accumulated data.

Deák *et al.* prepared heterokaryons by fusing chick erythrocytes with mouse A9 cells, which lack inosinic acid pyrophosphorylase (IPP) activity. They then inactivated all or some of the nucleoli in individual heterokaryons by microbeam ultraviolet irradiation and as controls left some heterokaryons unirradiated or irradiated at some other site in the erythrocyte nucleus. They then compared the appearance of chick IPP activity in these variously treated heterokaryons. To cut a long story short they find that in heterokaryons, all the erythrocyte nucleoli of which have been inactivated, IPP activity decays after nucleolar irradiation, whereas if one or more erythrocyte nucleoli are left intact IPP activity appears and is maintained. Clearly these data indicate first that IPP is continually being turned over and that continued synthesis of the enzyme depends on a functional nucleolus in the reactivated chicken erythrocyte nucleus.

The appearance and maintenance of chick specific surface antigens and chick cell receptors for diphtheria toxin at the surface of heterokaryons also apparently depend on the integrity of the erythrocyte nucleoli. It is highly improbable that the structural genes for all these markers of chick gene expression are clustered around the nucleolus and are, therefore, inactivated directly by the irradiation procedure; by far the simplest interpretation of these results is that messenger RNA precursors, no matter where they are synthesized in the nucleus, must pass through the nucleolar region of the nucleus where perhaps they are processed and packaged before moving to the cytoplasm.

The experiments of Deák *et al.* depend, of course, on the technique of cell fusion mediated by Sendai virus, and the same is true of the experiments reported by Darzynkiewicz and Chelmicka-Szorc (*Exp. Cell Res.*, **74**, 131; 1972) who have analysed DNA repair synthesis in the nuclei of ultraviolet irradiated chicken erythrocytes fused with HeLa cells, rat fibroblasts and fibroblasts from patients with xeroderma pigmentosum. They find that, within 16 h of fusion with HeLa cells and rat fibroblasts, repair DNA synthesis can be detected in the chick erythrocyte nuclei but not, of course, in the dormant nuclei of unfused erythrocytes. Furthermore, this repair synthesis, the rate of which increases as the chick erythrocyte nuclei are progressively reactivated, does not apparently depend on the transcription and translation of erythrocyte DNA, and it does not occur after the erythrocytes are fused with xeroderma pigmentosum fibroblasts, which are genetically incapable of DNA repair. These experiments prove, of course, that DNA repair is not a highly species-specific process; human and rat repair enzymes can apparently diffuse into chick cell nuclei and repair chick DNA.

ANTARCTIC

Effects on Man

from a Correspondent

THE first symposium on human biology and medicine in the Antarctic was held at the Scott Polar Research Institute, Cambridge, from September 19 to 21. The programme included sessions on physiological and psychological aspects, microbiology and clinical studies. The opening papers by Sir Vivian Fuchs, Director of the British Antarctic Survey, and A. Stephenson, a veteran of polar travel, dealt with polar exploration yesterday and today; their contributions were followed by one from Professor A. Asahina (Japan) who described the little known Japanese Antarctic Expedition of 1911–12.

Work carried out at different national bases was reviewed by G. Budd (Australia), J. Rivolier (France), I. Tikhomirov (USSR), H. Yoshimura (Japan) and J. Shurley (USA). Acclimatization to cold occurred in members of an Australian base, according to Budd who described changes in the response of body temperature to a standard cold exposure test at Melbourne before departure, at intervals in Antarctica and on return to Mawson. His findings have been confirmed in more recent observations. A. Rogers (USA) could not, however, find any indication of acclimatization to cold in members of the Trans-Antarctic Expedition, whose clothing records he had analysed.

Several speakers emphasized the effects of heavy muscular work in the cold—sweating and heat discomfort—and D. Wilkins (Britain) described experiments at Halley Bay which showed that men develop acclimatization to heat during and following sledging journeys. The high level of energy expenditure in the Antarctic, according to J. Brotherhood (Britain), was due not only to the arduous work of man-hauling but also to the cost in terms of energy of essential tasks such as digging snow for water or to gain access to stores. Although it turns out that there is wide variation between individuals, men living at Halley Bay expended 3,000 to 3,500 kcalorie a day. R. Shephard (Canada) estimated, in a brief account of a comprehensive study of an Eskimo community, that Eskimo hunters expend energy at a similar rate. This implies a high level of food intake, with a large proportion provided by fat, and has prompted studies of blood lipid levels. G. Budd (Australia) and D. L. Easty (Britain) reported that they had found little change throughout the year in levels of serum cholesterol.

Professor Asahina contrasted the traditional dietary pattern with that at Soyara base in the Antarctic. In Japan, 15 per cent of the energy expended is derived from fat (compared with approximately 40 per cent in Britain), but in the Antarctic this increases to 27 per cent. Blood cholesterol levels of members of the Japanese base, although initially significantly lower than in either the Australian or British expedition members, rose throughout the Antarctic year to similar or even higher levels.

A very marked fall in the level of ascorbic acid in blood was observed by the Japanese; I. Tikhomirov (USSR) also emphasized the need for a greatly