NUCLEIC ACIDS

Control of Nuclear Activity

from a Correspondent

DNA replication and RNA transcription are the only easily monitored functions of cell nuclei, and a symposium on the control of nuclear activity, held by the British Society for Cell Biology at Southampton on April 16, revealed how little is known about these processes in the ordinary nucleated cell. Most available data are from slime moulds, amoebae and the artificial situations created by nuclear transplantation and cell hybridization.

The slime mould *Physarum polycephalum* leads a highly regulated existence, as Dr H. P. Rush (University of Wisconsin) described. DNA synthesis occurs immediately after mitosis, as in unicellular amoebae, so that the usual G₁, S and G₂ periods of the cell cycle, seen in most nucleated cells as the periods before, during and after DNA synthesis, are reduced to S and G₂. The synchrony of mitosis in the plasmodium is remarkable; 99 per cent of nuclei reach metaphase within ± 3 minutes. Such precision suggests a commanding role for the cytoplasm, facilitated by the constant swift cytoplasmic streaming. Rush was disenchanted with the concept of a single inducing substance for initiating mitosis, and demonstrated that protein synthesis is necessary to allow DNA synthesis to continue once it has started. A glimpse of a possible additional marker feature in the mitotic cycle in these organisms is the appearance of a new type of histone similar to F₁ at metaphase, suggesting that it has a role in chromosome coiling. Histone synthesis occurs during the S period and most other proteins are synthesized during G₂. Starved animals differentiate and produce spores. Competitive hybridization demonstrates that new kinds of RNA are then produced.

The Oxford laboratories of Dr J. B. Gurdon and Professor H. Harris were represented by Drs H. R. Woodland and E. Sidebottom respectively. The former related how nuclei transplanted from various tissues of later developmental stages into oocyte or fertilized egg cytoplasm swell characteristically several hundred times their initial volume. Enormous quantities of protein enter the nuclei. In the maturing oocyte cytoplasm, transplanted nuclei, for example from brain, develop large nucleoli and synthesize RNA. In the fertilized egg the same type of nuclei synthesize DNA. Even injected DNA apparently replicates, as shown by banding in CsCl and after labelling with tritium. The influence of the egg cytoplasm in initiating DNA synthesis or transcription is thus manifest. Similarly in cell hybrids induced by Sendai virus, previously inactive erythrocyte nuclei are "switched on" by the active recipient cytoplasm. Unlike the hen HeLa hybrids originally used by Harris's group, in the hen-mouse A9 cell the erythrocyte nucleus develops nucleoli and incorporates labelled uridine. Apparently unequivocal proof that specific synthesis of hen proteins results is still needed, but the results so far are highly suggestive. In spite of the criticism that interspecific hybrids may highlight irrelevancies, there is clearly much more to be gained from studying this system. Differential microbeam X-irradiation of the nucleolus, nucleoplasm and cytoplasm emphasizes the crucial role of the nucleolus in mediating the transfer of RNA from nucleus to cytoplasm but does not, according to

Dr J. M. R. Hatfield (University of Cambridge), affect DNA synthesis.

Protozoa resumed a commanding interest in the account by Dr M. J. Ord (University of Southampton) of the role of amoeba cytoplasm in controlling DNA synthesis, but not apparently in initiating and terminating this process. Thus for each of the cellular systems studied the role of the cytoplasm in controlling nuclear activity differs in detail. Results obtained by Dr S. E. Hawkins (University of London) suggest a transmissible, self replicating ribonuclease-sensitive factor, from the lighter zones of sucrose gradient fractions from amoeba cytoplasm, which confers increased resistance to antibiotics in recipient animals.

ENTOMOLOGY

Fatal Immaturity

from our Biological Chemistry Correspondent

"THE study of living matter is no longer the prerogative of the biological scientists—its problems are being solved by interdisciplinary collections of scientific forces." Professor F. Sorm, of the Institute of Organic Chemistry and Biochemistry, Prague, voiced the contemporary approach of the Czechoslovak Academy of Sciences to biological problems when he spoke about insect hormones as potential insecticides at the Ciba Foundation on April 22. He proved that his institute is a fine realization of this philosophy by recounting how its chemists, biochemists and entomologists wage the fight against insect pests on a rational basis.