

Gene Regulation

from a Correspondent in Cell Biology

THE familiar model of gene regulation in bacteria due to Jacob and Monod (1961) predicts the existence of operon specific repressor molecules. If such repressors exist, it should be possible to isolate them and to study their function *in vitro*. In spite of intensive efforts in several laboratories, the first detection of repressor molecules *in vitro*, the repressor of the *lac* operon of *Escherichia coli*, was achieved at Harvard only last year by Gilbert and Müller-Hill (see also *Nature*, **213**, 329; 1967). From the same laboratory, Ptashne now reports the isolation of the λ phage repressor, the product of the C_1 gene, which is responsible for maintaining the λ phage in the prophage state and for the immunity of lysogenic bacteria to superinfection (*Proc. Nat. Acad. Sci.*, **57**, 306; 1967). With a double labelling technique and chromatography on a DEAE column, this repressor has been isolated free from other proteins. The repressor molecule was identified by showing that amber mutants of the C_1 gene fail to make it and that temperature sensitive mutants make a modified form. The λ repressor is an acidic protein which sediments at 2.7–2.8 *S* and has an estimated molecular weight of 30,000. It is much smaller than the *lac* repressor which sediments at 7–8 *S* and has a molecular weight of about 150,000–200,000.

These experiments of Gilbert and Müller-Hill and Ptashne demonstrate the existence of specific repressors in bacteria, but there is no decisive evidence for their existence in animal cells, and Harris (*J. Cell Sci.*, **2**, 23; 1967) questions whether the Jacob and Monod mechanism of gene regulation operates in them. The important discovery that certain viruses inactivated with ultra-violet light can be used to induce the fusion of cells to produce viable heterokaryons has provided an experimental system for studying gene regulation. Harris, at Oxford, has studied heterokaryons of HeLa cells and chick erythrocytes. He finds that when erythrocyte nuclei in heterokaryons enlarge, their chromatin—which in intact erythrocytes is highly condensed—becomes dispersed and they begin to synthesize RNA and DNA. (In intact erythrocytes, the nuclei are unable to synthesize nucleic acids.) RNA synthesis is in fact directly related to the degree of nuclear enlargement. It is not known whether all or only part of the genome is functioning as a template for RNA synthesis, but since all the chromatin becomes dispersed it seems likely that the whole genome is active.

It is indeed difficult to envisage how these changes in chick erythrocyte nuclei could be induced by highly specific signals from HeLa (human) cell cytoplasm which would be required if the Jacob and Monod mechanism were operative. Harris therefore suggests that in animal cells, cytoplasmic signals of a low order of specificity might control the state of dispersion of chromatin and hence both the amount and type of RNA being made. It is also possible, as the experiments of Hämmerling (1963) and Spencer and Harris (1964) suggest, that precise genetic regulation may occur at the level of translation rather than transcription. Further studies of the properties of both repressor molecules and heterokaryons are awaited with interest.

Parliament in Britain

Oceanography

LORD SHACKLETON said in the House of Lords that the establishment of the Natural Environment Research Council had improved support for and co-ordination of all kinds of marine science. He added that Britain was spending more than any other country except the United States on the oceanographical sciences. As an example of a new initiative, Lord Shackleton cited the Atomic Energy Authority's Conference on the Technology of the Sea and the Seabed, held on April 5, 6 and 7 under the auspices of the Ministry of Technology. (Reply to question, March 21.)

Wash Barrage

MR. J. MACCOLL, joint parliamentary secretary to the Minister of Housing and Local Government, said that his ministry had decided not to authorize, at this stage, the feasibility study for the Wash barrage scheme recommended by the Water Resources Board. The Minister thought that other schemes might be more economical. (Written answer, House of Commons, March 22.)

Post Office

MR. J. SLATER, the Assistant Postmaster General, said that the Government was studying very closely the more technical recommendations in the report of the Select Committee on Nationalized Industries for the reorganization of the Post Office (*Nature*, **213**, 1168; 1967). If the Bill received its second reading before the end of 1967 and Royal Assent before the Summer Recess of 1968, vesting day was likely to be April 1, 1969. Over the next ten years, he said, £45 million was to be invested in the mechanization of the postal services. (Debate, House of Commons, March 22.)

Dragon Reactor

DR. J. BRAY, joint parliamentary secretary to the Ministry of Technology, said that the delay in extending the Dragon programme beyond 1967 was not caused by his ministry but that it was trying to secure an early decision from Euratom. The Belgian government had been assured that any delay in placing the Hinkley B order was not because of doubts about the Advanced Gas Reactor system being installed at that power station. (Reply to question, March 20.)

Hovertrains

DR. J. BRAY for the Ministry of Technology, replying to criticisms of the rate of development of hovercraft in Britain, said that the next stage in the development of the hovertrain was being considered. Hovercraft, he said, came into their own only at speeds of more than 180 m.p.h., and at that speed the propulsion system became a problem. The linear induction motor, he suggested, was the natural means of propulsion. While interested in what the French are doing, Dr. Bray said that Britain was not losing any ground by carrying out simulation studies and smaller scale work. (Debate, March 20.)

Fish

MR. E. DELL, for the Ministry of Technology, said that the Torry Research Station had solved a number of technical problems in the pre-packaging of wet fish. The advances would allow the introduction of such packs on a wide scale. (Question, March 21.)