for use in space, and preferably with higher analysing power, would have to be developed if gamma-ray astronomers hope to find antimatter by this method.

Manipulation of industrial microorganisms

from Juan-Francisco Martín

The fifth FEMS Symposium entitled Antibiotics and other Secondary Metabolites: Biosynthesis and Production was held on 14 16 September at the Ciba-Geigy Research Laboratories in Basel (Switzerland) under the auspices of the Federation of European Microbiological Societies.

WHY microbial strains used in industrial processes produce such large amounts of a particular metabolite in spite of the strict control of metabolism existing in most microorganisms, and how it is possible for scientists to improve the production of pharmaceuticals such as antibiotics, ergot alkaloids and so on, was the main subject of the symposium. One of the great advantages of this meeting was the participation of scientists from the academic world and industry both as speakers and in the audience. The limitation usually imposed by industrial secrecy was not so evident in this meeting and the flow of scientific knowledge in the lectures and discussions as well as in the corridors was quite free.

New approaches to the search for new metabolites of industrial importance were discussed in the first lecture by H. Zähner (Tübingen). Some of the new techniques he suggested such as 'the chemical test systems' where the search for totally new antibiotics is based on screening unusual metabolic products following feeding of the culture with fluor or sulphur radioactive label, were compared with more classical approaches in the search for new drugs such as the tests of antimicrobial and other biological activities or the use of cell free test systems for highly specific activities. It was the feeling of most participants that while the search for unique chemical structures may be useful, more rapid progress can be made using specific 'in vitro' assays to look for inhibitors of those enzymes which are known to be involved in the synthesis of essential microbial macromolecules or in animal cell transformation in cancer formation.

The denomination of the so-called 'secondary metabolites' was the subject of an interesting discussion. It was felt that although these compounds present some peculiarities (for example, their chemistry is unusual, they seem to have no essential role in the survival of the producer strains since the ability to produce them is easily lost by mutation, and their production is restricted to certain taxonomic groups), there are no major biochemical differences in the biosynthesis of these metabolites to justify a separate grouping under the name of 'secondary metabolites'.

The new approaches to the biological and bioengineering aspects of fermentation development were presented by J. F. Martín (Salamanca) and M. Kuenzi (Basel) respectively. The general feeling was that we are on the threshold of great advances in the field of genetic and biochemical manipulation of industrial microorganisms, whereas new developments in bioengineering, such as programmed sub-

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Coupled transcription/translation

from Pamela Hamlyn

OOCYTES isolated from the ovary of the frog *Xenopus laevis* made their reputation as a valuable tool for molecular biology when they were used to settle disputes concerning the function of the poly(A) tail—the string of adenylic residues added post-transcriptionally to eukaryotic mRNA. Translation of mRNAs into protein in heterologous cell-free systems proceeds for a few hours at most, compared with several days when mRNA is injected into oocytes and so it is not surprising that only in the oocyte translation system was it shown conclusively that the poly(A) tail ensured the stability of mRNA (Huez *et al. Eur. J. Biochem.* **59**, 589; 1975).

Although the translation of mRNA into protein has proved to be reasonably amenable to study in cell-free systems the faithful transcription of RNA from DNA has been difficult to reproduce *in vitro*. It now seems that the use of oocytes will have an important role in elucidating the mechanism of transcription and other related problems of gene action, particularly its control.

Recently Gurdon, De Robertis and Partington (*Nature* **260**, 116; 1976) demonstrated that nuclei from human tissue culture cells continue to function (synthesise RNA) when injected into oocytes. Further work from the group showed that intact nuclei were not necessary, but that isolated DNA injected into the nucleus of oocytes could be transcribed into RNA (Mertz & Gurdon *Proc. natn. Acad. Sci. U.S.A.* **74**, 1502; 1977). Several DNAs were found to be effective, but most of the experiments were done with simian virus 40 DNA. It is important to be certain that the new RNA synthesised is transcribed from the SV40 DNA and is not new oocyte RNA transcribed in response to the foreign DNA. To achieve this the authors compared the RNA with that transcribed when SV40 is growing in its normal host (monkey cells) and found that they were the same size and hybridised to the same region of the viral genome. The same group has now produced much better evidence, not only that the RNA is viral in origin, but also that it is being transcribed correctly. De Robertis and Mertz report (*Cell* **12**, 175; 1977) that they are able to detect specific viral proteins in the oocytes after injecting SV40 DNA into the nuclei. The extra proteins were detected by displaying the total cell protein using the 2-dimensional polyacrylamide gel electrophoresis separation method of O'Farrell. If an inhibitor of SV40 DNA transcription was injected together with the DNA the new proteins did not appear and, most convincing, if SV40 mutants, which code for smaller viral proteins in their normal host, are injected into oocytes the new proteins produced in the oocytes are correspondingly smaller. These results clearly establish that the viral DNA is correctly transcribed in oocytes.

The demonstration that the RNA can be translated into the expected protein is good evidence that the initial transcription was biologically significant—starting and stopping at the right place. It is exactly this kind of precision which has been difficult to achieve in *in vitro* cell-free systems and which is essential for detailed experiments on the control of gene action.

De Robertis and Mertz have also shown that *Drosophila* histone genes cloned in a plasmid have produced 'histone-like' protein in the oocyte coupled transcription translation system indicating that this technique will be of general application in the study of the control of genetic expression.

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