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ENCOURAGING RESULTS OF THE FIRST COMMUNITY RESEARCH PROGRAMME IN THE FIELD OF BIOTECHNOLOGY:

Pooling of the resources of European Laboratories

During the first half of April, a number of symposia (held in Cork, Cambridge and Compiègne) made it possible to evaluate on a sector-by-sector basis the first research and training programme for the European Economic Community in the field of biotechnology, the so-called biomolecular engineering research programme.

The results obtained under this programme, which was launched in 1982 and which officially ended on 31 March, are encouraging; the pooling of the resources of the best European laboratories has produced valuable scientific data in this field where knowledge is increasing rapidly against a background of fierce international competition. The establishment of a transnational European research network in the biotechnology sector is another of the important results of this programme, in which 103 different laboratories participated in conjunction with their research activities; the best of these provided advanced training for a total of 84 young research workers.

Agricultural and agro-industrial applications

The biotechnology sector is vast, covering all the processes and techniques which enable the properties of living organisms to be exploited for agricultural, industrial or medical purposes. With a budget of 15 million ECU, the biomolecular engineering research programme was confined to research into the agricultural and agro-industrial applications of biotechnology.

The research executed produced results of undeniable value in the different sectors covered by these fields, one example being research into genetic engineering, the set of techniques which make it possible to identify and isolate the genes controlling certain properties of living organisms, prior to their transfer to and expression in other organisms.

Transferring genetic information

The most spectacular developments occurred in the field of plant genetics, where research workers from three laboratories (in Ghent, Leyden and Cologne) succeeded in transferring foreign genetic information to onions, asparagus and daffodils, all of which (like cereals) are monocotyledones, a class of plant that had formerly resisted all attempts at modification by genetic engineering.

In addition, research workers in other laboratories identified 20 cultivated-plant genes governing such important properties for agriculture, as the accumulation of certain proteins in wheat grains or the resistance of several vegetable species to insects. To appreciate the significance of this figure, it should be borne in mind that, by end of 1984, only 84 plant genes had been identified throughout the world.

From animal disorders to cheese aromas

Activities in the stock-breeding sector led to the identification of genes belonging to several viruses responsible for such animal disorders as foot-and-mouth disease in cattle, contagious bronchitis in poultry and gastro-enteritis in swine. As a result of these discoveries, reliable and inexpensive vaccines providing protection against these diseases should soon be developed.

Another success in the stock-breeding sector involved the isolation of genes controlling the synthesis and secretion of one of the constituents of milk (casein), which makes it possible to envisage the possibility, in the fairly long term, of modifying the composition of milk by means of genetic manipulation. In the agri-foodstuffs sector, the genes analysed included those controlling the enzymes responsible for individual cheese aromas. The state of the art suggests that it might be possible to transfer these genes between the strains of microorganisms used in the cheesemaking industry.

"Critical Mass"

Undoubtedly, such results (which are merely examples) could not have been achieved by the different teams concerned working in isolation. In biotechnology, as in many other fields, productiveness depends on the attainment of a certain "critical mass", both in human and in financial, terms and this is frequently impossible on the basis of activities undertaken at an exclusively national level. Since the Community programme made the attainment of this "critical mass" possible, it can be said to be directly responsible for the quality of the results obtained.

This observation applies both to the results referred to and to a less visible, but a no less crucial consequence of the programme, namely the acquisition by the teams involved of a complete range of basic information on the behaviour of the organisms studied, transfer techniques and gene-control mechanisms, etc. Acquisition of this knowledge constitutes an essential prerequirement for the success of any future attempt to apply biotechnology.

In this connection, moreover, one of the merits of the programme has been to enable European research workers to identify more accurately all the problems which are still to be resolved prior to the large-scale application of biotechnology in the agricultural or industrial sectors: although knowledge is advancing extremely rapidly, a complete understanding and mastery of the mechanisms involved will still require a great deal of research owing to their complexity.

Continuing efforts

In Europe, this research can be conducted within the framework of the Community "Biotechnology research and training programme", which was launched in 1985 on the initiative of Mr. NARJES, Vice-President of the Commission with responsibility for science and technology. This programme continues, expands and supplements the work done under the molecular engineering programme, from which it follows on; it has a larger budget (55 million ECU at present, which will probably be increased after the upcoming programme review) and, in addition to the sectors already investigated covers such new fields of research as the study of protein architecture, the application of biotechnology to industrial microorganisms, in-vitro methods of analysing the pharmacological and toxicological properties of molecules and the determination of risks associated with genetic engineering.

By virtue of its content and its unmistakably transnational character, this programme is destined to play an important part in the future R&D Framework Programme (1987-919), two of whose main objectives are to place research at the service of industrial development and to accelerate the creation of a research workers' Europe.