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CATALYTIC ROLE OF ISESCO IN THE DEVELOPMENT OF  
BIOTECHNOLOGIES IN ITS MEMBER STATES

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CATALYTIC ROLE OF ISESCO IN THE DEVELOPMENT OF

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by

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Abstract

The need for setting priorities for the development of biotechnologies on the basis of national requirements, indigenous strengths and resources is emphasized. Basic, applied and developmental research is to be treated as a continuum to be supported and encouraged in its entirety.

As an international agency to promote close cooperation among the Islamic countries in the fields of education, science and culture, ISESCO can only play a catalytic role in the development of some specialized scientific fields of high priority. Within the scope of ISESCO's Plan of Action for 1988-91, the programme actions directed towards the development of high priority scientific fields, including biotechnology, are described.

Challenges and Opportunities in Biotechnology

Researches in Biochemistry, Genetics, Microbiology, Botany, Zoology, Pharmacy and Medicine have provided scientific basis for biotechnology. The following four areas of biotechnology have come to the forefront in the last 20 years and are now under rapid development (Office of Technology Assessment,1984):

- 1) Tissue culture technology;
- 2) Monoclonal antibody technology;
- 3) Bioprocess technology; and
- 4) Recombinant DNA technology.

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Tissue culture technology involves cell regeneration (cloning in plants to produce elite biotypes), protoplast fusion, and selection of somatic cell variants. In monoclonal antibody technology, antibodies are derived from a single source that recognises only one kind of antigen. Bioprocess technology utilizes cells or groups of cells to produce chemicals in a process analogous to fermentation processing of yeast. Recombinant DNA technology deals with the identification of DNA fragments, and transfer of genetic material from one organism to another by using a vector.

Biotechnology promises to provide interesting solutions to many problems in the fields of agriculture, animal husbandry, health care, energy, environment, industry and a host of other areas that have direct bearing on human welfare. Universities, research organizations and commercial companies in many countries, especially in the developed world, are involved in research programmes to manipulate advances in Basic Biology for the development of useful products. In view of the recent large investments in the biotechnology industry, the last decade of the 20th century is destined to provide an unprecedented transformation of biotechnology research results into commercially useful products and processes.

#### Setting Priorities for the Development of Biotechnologies

It needs little emphasis that the costs of development of new products of biotechnology are very high. Therefore, there is need for setting priorities for development action based on requirements and indigenous strengths and resources of a country and the desirability of pooling of regional resources to reap the benefits that the modern field of biotechnology has to offer.

Clear identification of the problems that can be solved by biotechnology is one of the major tasks. To cite an example, in setting priorities for solution of agricultural problems the obvious options are: a) increase yield, b) improve quality, and c) reduce production costs. The developed countries, with their large surpluses of most of the crop commodities, will not attach high priority to biotechnological applications in the area of increasing crop yields and for them quality improvement and reduction of production costs will be more attractive. For developing countries, with their ever-increasing demand for food, the increase in crop yields is as important an area for biotechnological breakthroughs and developments as improving quality

and reducing production costs.

### Basic, Applied and Developmental Research as a Continuum

Generally speaking, three types of research are recognised: 1) Basic; 2) Applied or 'problem-oriented'; and 3) Developmental or 'industrial Research & Development'. Basic research identifies the fundamental laws of nature which define physical and biological systems and provides knowledge and understanding for pursuing applied or 'problem-oriented' research. Applied research deals with using fundamental principles for solving specific problems. Developmental research is concerned with problems of scaling up to produce products for use.

The route for the development of new technologies would be the orderly sequence of basic, applied, and the developmental research with each type being carried out by specialists with appropriate skills working in specific organizations. However, in actual practice, clear-cut boundaries do not always exist between these types of research nor the persons who conduct them.

Basic, applied and developmental research must be seen as one continuum to be supported and encouraged in its entirety. This is the sure route to development. Technology cannot flourish in a country without the simultaneous flourishing of science in it. The transfer of technology from developed to the developing countries that one hears so much about, is not really happening because the technology is not coupled with the 'know-how' and 'know-why' (basic science) in the country importing the technology.

### Science Programmes of ISESCO

Improvement of science education at all levels and promotion of scientific research hold the key to the success of the efforts directed towards the attainment of excellence in the modern fields of science & technology for the socio-economic well-being of the Muslim World. The Islamic Educational, Scientific and Cultural Organization (ISESCO) works within the framework of the Organization of the Islamic Conference as a specialized international agency to promote close cooperation among the Islamic countries in the fields of education, science and culture. The emphasis of ISESCO's Science Programmes in the Organization's Action Plan for 1985-88 and the

current Plan of Action for 1988-91 is in the following areas (ISESCO, 1988 a):

- a) improvement of science teaching;
- b) strengthening of scientific research;
- c) development of trained scientific manpower;
- d) promotion and consolidation of mutual contacts and cooperation among Muslim scientists;
- e) support to Muslim scientists in Muslim-minority countries; and
- f) popularization of science.

Within the limited resources available to it, ISESCO is making dedicated efforts to achieve its objectives. With a view to help in the improvement of the standards of teaching of science, ISESCO has completed an exercise in the modernization of curricula in Biology, Chemistry and Mathematics for secondary & higher secondary levels, and prepared model teachers' Guide Books based on modernized curricula in Biology and Chemistry; provided scientific equipment and materials for school laboratories in some Member States; and organized training courses for the repair and maintenance of laboratory equipment. Scholarships have been provided to talented Muslim youth to enable them to pursue scientific studies at undergraduate as well as doctoral levels. A number of symposia and workshops, seminars on advanced research techniques and training courses have been organized and cosponsored with national, regional and international organizations with a view to promote close contacts between Muslim scientists. Quite a few travel grants have been given to Muslim scientists to facilitate contacts between them and the international community of scientists to keep them abreast of recent advances in their fields of research. Technical assistance to certain selected research centres is being extended to further enhance their research capabilities and to encourage them to share their facilities and expertise with the scientists of other Member States. To create awareness of the important advances made in the fields of science and technology and to generate popular interest in science, some books on selected topics have been produced.

#### Catalytic Role of ISESCO in the Development of Biotechnologies

ISESCO's approach is not to dilute its efforts by spreading its meagre resources too thin. Therefore, certain priority areas were supported during the Islamic Organization's Action Plan for 1985-88. In the field of biotechnology, ISESCO supported the organization of <sup>an</sup> international symposium on "Applications of Genetic Engineering" and training courses on "Microbial Technologies" and "Genetic Engineering Technology"

while ISESCO Ph.D. scholars from Bangladesh, Egypt and Jordan are working for their degrees in Molecular Biology and Genetic Engineering at the Centre for Advanced Molecular Biology, Punjab University, Lahore, Pakistan since 1987 (ISESCO,1988 b).

The current Action Plan of ISESCO for 1988-91 (ISESCO,1988 a) includes programmes directed towards supporting the following activities in the Member States for the development of some specialized fields of national importance which, of course, include biotechnology:

- award of fellowships for studies at Masters and Doctoral levels;
- provision of research grants;
- holding of research seminars, workshops and courses in advanced research techniques in cooperation with national, regional and international Organizations;
- provision of spares and replacement parts of scientific equipment, small items of equipment and urgently needed chemicals to facilitate completion of research work without unnecessary delays;
- provision of career development grants to promising young scientists to encourage them to start and develop their research careers in their own countries;
- networking of centres engaged in scientific research in a specific field through the organization of specialized research seminars and training courses, and provision of travel grants for the exchange of research workers in a given network;
- support for the promotion of effective linkages between universities/ research organizations and production sectors through the organization of seminars on 'university - industry interaction', staging of 'exhibitions' / 'open houses' in universities and other research organizations, and holding of 'industrial forums' for researchers from universities/research organizations and representatives of Chambers of Commerce & Industry.

ISESCO can only play a catalytic role and that too in selected areas of high priority and at places where there is already some potential for achieving highest standards. The methodology of ISESCO's actions lays particular stress on providing participation and building on and through national initiatives. There is no gain-saying the fact that the real amelioration of the scientific research and development

situation in a country stems from the initiatives by the country itself and the role of an international agency can only be catalytic.

### Conclusion

Since most of the researches in biotechnology have been conducted in developed countries with emphasis on problems of special interest to them, the developing countries have to undertake researches in this field on problems relevant to their special needs, resources and socio-cultural background.

The critical problems facing the developing countries in the fields of agriculture, food, health, energy and environment necessitate the creation of a realistic awareness of the enormous potentialities of biotechnology among the decision-makers in order that research and development efforts in this area are duly supported. The holding of "The First Arab Conference on Perspectives of Modern Biotechnologies in the Arab Countries" is a very significant step in this direction. The development of capabilities to benefit from science and technology within the framework of the lofty and perennial Islamic values and ideals is an absolute necessity. The opportunities in the field of biotechnology are enormous and in the words of a poet:

"We ain't seen nothing yet.  
We ain't done very much yet.  
We ain't gained glory yet!  
But we can and must!"

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