

## MOLECULAR BIOLOGY AND HUMAN NEEDS

1. In a general sense molecular biology refers to a physico-chemical approach to biology. This is not very new. From very early times scientists have attempted to interpret biological phenomenon in term of physics and chemistry. In its more restricted usage molecular biology denotes a new trend in biological research that originated from recent work on proteins and nucleic acids. In many ways this new trend is comparable in its import to modern physics after the splitting of the atom and the development of quantum theory. The ferment in contemporary biological thinking is very similar to that in the physical sciences during twenties and thirties, and just as the abstruse ideas of physics revolutionised technology, one may safely predict that molecular biology will profoundly influence human affairs.
2. The significance of molecular biology is two-fold. Firstly, it provides a strong theoretical basis for biology. Classical biology is largely descriptive. Ideas trail behind observation. There are notable exceptions to this but on the whole theory does not play the leading role that it has in the physical sciences. It is no more so in modern biology. Biological ideas are beginning to acquire a rigour and precision that enormously increases their heuristic value. Secondly, the fusion of physics and chemistry with biology has greatly improved experimental methodology.

3. The two major areas where biology is applied to human needs are agriculture and medicine. I have pointed out the possible applications of molecular genetics to agriculture (note on genetic engineering). Here I confine myself to certain aspects of medicine. It is clear that with increasing knowledge of molecular biology medicine will change from a largely empirical to a rational science. I illustrate this with a few examples.

- a) Recent research has thrown much light on the action of drugs. A great deal of recent work on proteins and nucleic acids is concerned with the action of antibiotics on their synthesis. Pharmacology need not in future be based on a trial and error selection of chemicals. Drugs will be designed on the basis of well understood principles.
- b) The understanding of drug action has been accompanied with a deeper knowledge of how organisms become resistant to drugs or the ways in which resistance can be transferred from one organism to another. This should lead to changes in measures of social and preventive medicine.
- c) Molecular biologists have made notable contributions to immunology. Much has been learn't about the structure and synthesis of antibodies. The problem of immune response will probably be solved in the next few years. This will lead to greater advances in medicine and surgery. Organ

transplantations for instance, cannot be successful until the problem of immune rejection has been solved.

- d) We now know something about the regulatory mechanisms that operate in a living cell. In the coming years these ideas will be applied to a study of development and differentiation. This, in turn is closely connected with the understanding and cure of cancer.
- e) Lastly the ideas of molecular biology are likely to exercise influence on neurobiology and psychology. The feasibility of molecular psychiatry has been strongly advocated by Linus Pauling. A deeper knowledge of the working of human brain will inevitably carry with it the possibility of greater intervention and control (for good or for worse).

- 4. These are some instances of the ways in which molecular biology may serve human needs. It can, of course, be employed with great effect for destructive purposes such as chemical weapons and germ warfare.