Basic Research Is Necessary: Remarks on the Lectures of Lehninger and Kornberg

The results of the research by A. L. Lehninger and H. L. Kornberg have greatly increased our knowledge about how living cells and tissues function. In this connection, I would like to discuss some tendencies nowadays in supporting scientific research. Both governments and private foundations are very generous as long as you promise them immediate practical results, such as a cure for cancer, malaria or bilharzia, but are forgetful of the simple fact that we must know the normal functions of cells and tissues before we can correct pathological ones. Let us take some examples from the past.

When Roentgen discovered x-rays, he certainly had no idea whatsoever that they would become of both therapeutic and diagnostic value in the fight against cancer and other diseases. Radium is certainly of great therapeutic value against cancer, but who would dare to say that Marie Curie and Pierre Curie discovered this remarkable new element in some sort of systematic attempt to find a new remedy against cancer? Of course not! A great German biochemist and cell physiologist, Otto Warburg was deeply interested in the problem of cancer, but he tackled the problem from another starting point. He assumed that cancer cells were produced by abnormal metabolic processes in cells and tissues and devoted his long life to studying cell functions chemically and physically. He thereby managed to clear up a long series of fundamental facts. He discovered several new enzymes, coenzymes, and vitamins. Even if he died before the cancer problem was solved, his contributions to biochemistry shall never be forgotten.

Let us take another example. How was penicillin discovered? Certainly not in systematic attempts to find a good remedy against bacterial infections, but by an intelligent observation during ordinary bacteriological work. Fleming, looking at an agar plate inoculated with staphylococcus, observed that no colonies had grown within a round spot on the surface. In the center of that there was a colony of some unknown microorganism. Fleming drew the conclusion that this colony had excreted some substance that prevented staphylococcus from growing. Florey and Chain purified, analyzed, and synthesized the penicillin. An intelligent observation during ordinary bacteriological laboratory work thus led to a great discovery.

Let me tell you a story out of my own experience. Some 20 years ago, I needed an additional building for my laboratory, so I approached the Swedish Wallenberg Foundation for scientific research with an application for money. The president of the foundation came to my laboratory, sat down and asked me the following question: "Which disease do you intend to cure in case we give you the money?" My answer was: "None at all. But do you have a watch?" "Yes." "What do you do in case it stops going on?" "Well, I take it to the watchmaker." "Why do you take it to the watchmaker?," I asked. "What do you mean?" "Well, you do it because the watchmaker knows how the watch is constructed and therefore how he can repair the watch. I try to find out how the living body is constructed, and when we know that we shall be able to repair it." "That was a good answer," Mr. Wallenberg said. "You shall have your money."

I sincerely hope governments, parliaments, research councils, and private donors to science would come to the same conclusion. All applied research is founded upon basic research. Before the basic facts are known, it is a sheer waste of money to support applications on nonexistent basic knowledge.

HUGO THEORELL
Medicinska Nobelinstitutet,
Karolinska Institutet,
Stockholm, Sweden

Notes

1. This comment is text of remarks made on 5 July 1973 at the Ninth World Congress in Biochemistry after lectures by Drs. Lehninger and Kornberg.

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