Reprinted from Turtox News, Vol. 38, No. 8, August, 1960

Art, Music, and Fundamental Research

by Louis S. Kornicker
Institute of Marine Science
The University of Texas
Port Aransas, Texas

In recent years considerable emphasis has been placed on the need for scientific research. Terms such as "fundamental research" and "applied research", which were previously seldom heard outside scientific circles, have become commonplace. It is quite apparent to one working in science that many people do not understand the difference between fundamental and applied research. Many underestimate the importance of fundamental research. It is true that the borderline between fundamental and applied research is sometimes thin and ragged, but the underlying philosophies are extremely different.

Applied research is directed towards practical goals, e.g. research initiated to develop methods for catching more fish, or growing larger oysters. Research going into our efforts to shoot a long range missile across the Atlantic also comes under the title of applied research. In applied research there is always an immediate practical application of the results coming from the research effort.

Fundamental or basic research is not directed towards immediate practical goals. Fundamental research is the probing of the unknown, the expanding of horizons of our knowledge. It is seldom done aimlessly. Each gained piece of factual knowledge is fitted together to form principles or natural laws which help in understanding natural phenomena. Although fundamental and applied science can be easily separated by definition, they are not so easily separated in practice. Quite often both fundamental and applied results are obtained from a single research effort, e.g. a man-made satellite encircling the earth may have a practical application in allowing one country to spy on its enemies but it also increases our knowledge of outer space and therefore may help in understanding natural laws. Occasionally the difference between fundamental and applied research may be only the frame of mind of the investigator, e.g. a scientist studying the relationship between marine plants and marine animals so that he may have a better understanding of natural laws is doing fundamental research; whereas, a scientist studying these relationships in order to devise a way of supplying food for needy nations, which is certainly a worthy cause, is doing applied research.

History has shown that the great advances in technology have developed by applying principles developed through fundamental research. Examples of these are the telephone which is based on fundamental knowledge derived from studies of sound waves, and the electric light which is based on principles discovered long before Edison, who was a genius at applying scientific principles to solving practical problems. The atomic age has developed from fundamental principles developed by scientists too near the birth of their theories to see the ultimate practical or impractical applications of their work. The fact that a certain percent of fundamental research effort in the long run leads to practical applications is the most common argument used when urging further support of fundamental research. Individuals supporting fundamental research on this basis are really saying, "Support fundamental research because it is applied research in disguise". This type thinking intimates that fundamental research which does not lead to a practical application is wasted effort. This is not seeing fundamental research in its proper perspective. Fundamental research belongs in the same pew as fine art and classical music, which are food for the soul rather than the stomach. Nations of the world could not function if their citizens practiced art or music to the exclusion of everything else. But then it is a poor nation that does not have artists or musicians. Likewise it is a poor nation that does not have fundamental researchers pushing forward frontiers of knowledge.