Science and Education

Among those who are thinking and writing about the crisis in contemporary education James Bryant Conant is respected as the model of the scientist-turned-educator, the scientist who approaches the problem of preparing the next generation for life in a free society as he would a problem in chemistry. He formulates his questions clearly, examines his assumptions, marshalls the relevant facts, draws his inferences cautiously, and where the facts are insufficient, as is usually the case in education, concludes by asking further questions. His recent books have stirred up a good deal of invigorating controversy among educators, and it may well be that the future historian will rank him with John Dewey as one of this country's really constructive educational rebels.

This little book, **Two Modes of Thought: My Encounters with Science and Education** (Trident Press, New York, 1964. 128 pp. $3.95), edited by Ruth Nanda Anshen, is also about education. It is not Conant at his best, but it is eminently worth reading. The "Credo Series," to quote from the editor's eloquent if somewhat inappropriate preface, is "designed to present a kind of intellectual autobiography of each author, to portray the nature and meaning of the creative process for the creator and to show the relevance of his work to the feelings and aspirations of the man of flesh and bone." Few self-respecting scientists would care to bare their souls in this way, and certainly not Conant. He makes a polite but slightly embarrassed bow to the series, but his "credo" is essentially a sober examination of a question that has become increasingly pertinent in 20th century America: Are the ways of thinking which we have developed in the natural sciences applicable in the fields of the social sciences, and especially in the field of education? The question is not a new one, nor is Conant's answer a simple yes or no. The book provides a clarification of the question rather than a firm answer.

Anyone who has lived on both sides of the Atlantic will recognize the stereotypes of the theoretical-deductive European and the empirical-inductive American. These are obviously oversimplified, but certainly there is a difference between the "typically American" Edison and the "typically European" Clerk Maxwell or Helmholtz; and Conant finds counterparts of these in American and European approaches to education. To American eyes the European seems lost in a fog of theory; the practical American, as seen by the European, is lacking in *Gründlichkeit*. Do these really represent two different ways of thinking? Was Bacon right in his radical distinction between inductive and deductive methods in science? Conant draws on his knowledge of the history of science and technology to demonstrate, not surprisingly but very cogently, first, that the distinction is meaningful but not nearly as sharp as we have sometimes been led to believe, and, second, that an overemphasis on either may have unfortunate consequences. Certainly there are two modes of thought, and perhaps more than two, but none of the great scientists and inventors, or even philosophers, has ever been exclusively inductive or deductive. Both approaches are necessary, but there must be some sort of meaningful balance between the two.

This does not sound like a very exciting or disturbing judgment; and it is not, as Conant presents it. As a physical scientist and a gentleman Conant is always courteous to his colleagues in the social sciences, hinting between the lines that he is not deeply impressed by their accomplishments, but evidently hoping that a friendly word or two will spur them on. One would like him, perhaps in his next book, to speak out more forcefully. Social scientists, and especially those whose work borders on the field of education, are open to two criticisms; either, to use Conant's terms, they are too theoretical-deductive or they are too empirical-inductive. At one extreme are the self-styled "learning theorists," whose elegant miniature models bear little relation to human learning in human situations. At the other extreme are the survivors of the ultrapositivistic age, who recoil from theory of every sort and for whom science seems to mean laborious accumulation and meticulous statistical analysis of unconnected trivialities. Neither type has much of value to say to the educator, and each might with profit give heed to Conant's interpretation of both science and education.

Whether or not there can be a proper "science" of education is a debatable question, but probably not worth debating at great length. As Conant points out, with apt illustrations from a variety of fields, the distinction between science and technology is at best a tenuous one. But, he intimates, there can be an *approach* to the problems of education that is scientific in the best sense of the term, and this must involve a nice balance between the two modes of thought. To repeat, this is not a particularly startling thesis, but it is an important one, and Conant presents it with the wisdom and clarity which we have come to enjoy in all his writing.

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Russian Translation

Radiation Biochemistry. A. M. Kuzin. Translated from the Russian edition (Moscow, 1962) by Y. Halperin. M. R. Quastel, Translation Ed. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1964. iv + 284 pp. Illus. $15.25.

In the Russian edition of 310 text pages, reduced to 284 in this able translation, Kuzin defines radiation biochemistry as that broad area lying between the extremes of pure radiation chemistry and the radiation biology of intact living organisms. The author is an active contributor to the field, and the text is intended primarily for scientific workers and graduate students. As a result of its tardy appearance, the English language edition has lost some of its usefulness. The radiation effects