Biology, History, and Natural Philosophy

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**This volume is dedicated
with esteem and admiration to
*Albert Szent-Györgyi***

Foreword

In a world that peers over the brink of disaster more often than not it is difficult to find specific assignments for the scholarly community. One speaks of peace and brotherhood only to realize that for many the only real hope of making a contribution may seem to be in a field of scientific specialization seemingly irrelevant to social causes and problems.

Yet the history of man since the beginnings of science in the days of the Greeks does not support this gloomy thesis. Time and again we have seen science precipitate social trends or changes in the humanistic beliefs that have a significant effect on the scientific community. Not infrequently the theoretical scientist, triggered by society's changing goals and understandings, finds ultimate satisfaction in the work of his colleagues in engineering and the other applied fields.

Thus the major debate in mid-nineteenth century in which the evidence of natural history and geology at variance with the Biblical feats provided not only courage to a timid Darwin but the kind of audience that was needed to fit his theories into the broad public dialogue on these topics. The impact of "Darwinism" was felt far beyond the scientific community. It affected social thought, upset religious certainties and greatly affected the teaching of science.

We could find many other such examples. They lend hope to the belief that there is great worth in bringing together scientists and scholars in other fields for colloquia such as the one whose proceedings make up the main body of this book. In the presence of the philosopher of science, the pure researcher, the historian—in the community of minds and skills that is the very essence of a present and future world—one must hope that the past will repeat itself and new understandings, adequate to our needs and our times, will be the result.

That this could happen at all, here in the foothills of the great Rocky Mountain range, is one of those minor miracles of determination, organization and support that seem to occur less frequently today than a decade or two ago. Thanks are very much in order, and should be addressed first to the scholars who came to the University of Denver from far places and always at the expense of other work and other demands on their time and skills.

We also owe a vote of thanks to the Martin-Marietta Corporation for their contribution of funds and enthusiasm, which made this and its predecessor Colloquium possible. The proximity of one of their major installations to the University of Denver and the common interest which pervades their research and ours have always provided a close bond in the development of solutions beneficial to the future.

In the deepening sea of troubles which surround us many pray for another Renaissance, a rediscovery "of man and of nature" with its roots, as before, in classical thought and humanistic involvement in scientific ways of thought. Just as the turmoil and new ideas of the Renaissance had their roots in all that had gone before, so may another turning point in history rest on the foundations of scientific discovery and social awareness of the century now nearing its close. The great hope that this might indeed come to pass may well be our willingness to keep the talk going, to share ideas, to take the time from our specialized fields to try to understand both the men and the ideas that exist in other private and little-known realms. To do this in the natural sciences seems one of the highest orders of priority, and the usefulness of the effort may be estimated after one has read the pages that follow.

Since I am already convinced that we have done a most useful thing in holding and publishing this Colloquium, I can only close by expressing the hope that many of us will meet again one day on another such occasion.

University of Denver
Denver, Colorado
November, 1971

Maurice B. Mitchell
Chancellor

Preface

The First International Colloquium on *Physics, Logic, and History* held at the University of Denver in May 1966, produced a scholarly volume of papers and comments; it was published in 1970 by the Plenum Press, New York. The success of that conference and the predictable response to the diverse papers and their discussions emboldened its organizers to gather another distinguished group of thinkers for a second Colloquium in the fall of 1967. The results of that conference are collected in this volume.

Again, it was our hope to contribute to some kind of understanding among academic disciplines only too often thought to be quite separated in purpose, formulation, and intrinsic technique. It is one of the most tragic difficulties of our time that scientists, historians, and philosophers have failed to listen to each other. The inevitable and dramatic advance in the various aspects of systematic knowledge has, unfortunately, led to an almost cavalier disregard for those aspects or elements essential to all pursuits of knowledge based on intelligible communication.

Thinkers like Nietzsche, whose anti-scientific attitude is proverbial, stated shortly before his mind deteriorated in the quicksand of mental disease, that he would like to study biology in a systematic manner and he even flirted with the idea of enrolling as a student of this subject. He recognized, as one among the first so-called non-scientific thinkers, that a deeper insight into the biological sciences may be imperative for his philosophy of life, which had been based entirely upon his intensive study of the Greek classics and some subjective philosophic ideas in general.

This second Symposium places the biological sciences at the center of our attention, flanked by some excursions into history and an occasional journey into natural philosophy. When we decided upon the issues which were supposed to be considered, we intended to explore topics like: "Is biology an autonomous science?"; "'Organisms have been likened to machines'—is this assertion true?"; "Schrödinger and Teilhard de Chardin—two controversial credos in contemporary biological sciences"; "Historical systems considered from a biological point of view," etc.

The diverse papers and the ensuing discussions among biologists, historians and philosophers, historians and philosophers of science, are here presented

because we were guided by the possibility that the search for a comprehensive understanding of nature may be pursued along a broader spectrum of knowledge by means of objective investigation, discussion, and hopefully inspiration.

It should be noted that the lectures contained in this volume do not correspond exactly with those given at the Conference. In a few cases authors requested permission to withdraw their papers rather than see them in print. All contributors were given a chance to make such revisions as would bring their conclusions up to date when new discoveries were made in their respective fields or further reflection altered some aspects of their views. But, the most fruitful contribution of the Colloquium resulted from informal discussions of the participants and interested observers.

In one important way, however, this volume differs from its predecessor. The editors thought best to omit the lengthy discussions which followed each paper. The difficulties of transcription, the incredibly vexing problem of editing remarks which were later amplified or discarded, the many *ad hominem* comments—all this made such inclusion less commendable for this specific collection of essays.

Some scholars who had been invited to participate were unfortunately unable to join us. They have been none the less gracious enough to send copies of their papers so they might become a part of this presentation. Special thanks of the editors go to Dr. Maurice B. Mitchell, Chancellor of the University of Denver, for presiding over some of the sessions and for participating from the beginning in making the Colloquium possible. Dr. Edward A. Lindell, Dean of the College of Arts and Sciences, was indispensable in helping to plan the format, complete arrangements for bringing participants to the campus, and carry out the multitudinous details without which the Symposium could never have materialized. The organizing committee consisted of Dr. Breck, Dr. Lindell, and Dr. Yourgrau.

This second Colloquium (as well as the first) was made possible by a grant from the Martin-Marietta Corporation Foundation and further financial support by the University of Denver. The entire manuscript was typed several times by Mrs. Betty Greenwell, secretary of the program in the history and philosophy of science. For all her tireless efforts we are indeed most grateful.

University of Denver
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September, 1971

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