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A RATIOCINATION ON THE HISTORY OF SCIENCE

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Students, professors, and busy deans, as they have browsed through the college book store or that other literary center, the drug store book corner, cannot have failed to notice the flood of paper backs that has come out in recent years on the history of science. A similar sudden increase of literature on this subject can be observed also in the hard-cover book market. Some of these books have landed on the shelves of college libraries and perhaps have found their way into the hands of faculty and students. Indeed, there is a great variety of editions on the history of science in general, on special fields of science, on source materials of all centuries, reviews of technological and medical progress, and, last but not least, numerous publications on the so-called philosophical and social implications of science.

Much of the material is clearly education directed, yet there exists hardly a college textbook on the subject. It appears that the publishers count upon a general interest among college people rather than upon large-scale sales to the colleges for the purpose of required history in science classes. And in fact it is remarkable how colleges and universities are reluctant to recognize the history of science as an important educational instrument. Remarkable it is, but to those acquainted with academic "course trading" and the vigilance of faculty factions to maintain a balance of required courses between divisions of the humanities and the sciences, it is not astonishing that a newcomer—such as the history of science—is viewed as an unwelcome competitor by both.

Scholarly research in the history of science is not at all a new endeavor as is the spate of literature now being published. Truly, the passing of the nestors, George Sarton and Charles Singer in recent years, indicated the end of an epoch in which the ground work was laid for the present-day literary and educational activity of their followers. Teachers of the history of science, unable to win support from their scientific colleagues, have had to establish themselves in the twilight zone of the cultural studies for the college multitude instead of in the lime-light of scientific studies for the specialist. As a result, the few historians of science in colleges and universities have found a niche in history departments in the area of "Western Civilization"—entirely outside the pale of college science life.

The history of science thus has been unable to make a significant contribution to the education of the future scientist, engineer, or physician. There is much misunderstanding of the role the history of science can play in advanced studies. Too often the field is seen as a conglomeration of learned irrelevancies and amusing anecdotes in spite of the volume of publications available. At best, this vast volume of material is considered to serve only as an interesting pastime for the science major, but without bearing on his present studies or future work. Regrettably, historians of science have been unable to open a dialogue with their science colleagues and somehow have failed to develop a mutually satisfactory justification for the study of the scientific past within the science curriculum, though it may be ventured that an acceptable ratiocination can be offered along the following lines.

First, the history of science should be understood as a tool of science education in general, by which order can be brought into the bewildering multiplicity of phenomena. Geography cannot be taught without maps and similarly man's scientific achievements need to be projected on a *globus intellectualis* as reference. A fund of historical knowledge can avoid for the scientist the temporal insularity of his present-day scientific existence. A look at Greek science, for example, can show that we are today belaboring the old concepts: we are materialists with the Ionian philosophers of 800 B.C., atomists with Democritos, numerologists and model makers with the Pythagoreans, dynamists with Heraclitos and Aristotle. Even the cosmonaut-scientists of tomorrow will not differ in spirit from the cosmopolitan sophists—the itinerant scientific world citizens of antiquity. A knowledge of Greek science with its intimate proximity of elements helps us to distinguish the same general features in our present wider world. From a study of the scientific past, we gain a sense of modesty and reverence and a retreat for contemplation and composure. For the learner it is very important—despite the modern theories of open-end learning—that he looks at human achievements as a *Non plus ultra,* as a definite, limited, intellectual possession, to be strived for, before he attempts to engage in a search for the still unmapped scientific goals.

Second, the history of science can be of great importance to the individual student in relieving him of the fear of the unexpected and disturbing aspects of modern scientific thinking. Max Planck said that what appears strange to one generation becomes commonplace to the next. This may be a consolation to those who in the course of time see the recognition or acceptance of scientific views, but it does not lighten the intellectual burden of the learner who must adjust to the new ideas. Young students find themselves only too often in a state of doubt and maladjustment *vis-à-vis* the newness of scientific thought and belief. This is similar in character to the discontent with civilization of which Sigmund Freud spoke, wherein the conflict arises from man's natural instincts and the social and

moral order imposed on him by civilization. The conflict within the science novice originates in man's untutored, common-sense notions which may disagree with the concepts he encounters in the study of the sciences. For some students it is a serious matter of conscience that their studies lead them away from the poverty of their intellectual background and that they "can't go home again." In this case the remedy, the Freudian analysis, is the historical analysis of scientific situations, the understanding of similar recurring experiences of the past. A glance at the history of science shows that intellectual uncertainty was present always: among the various Greek schools, the scholastics of the Middle Ages, in the arguments between Cartesians and Newtonians, vitalists and mechanists, metaphysicists and positivists, etc. Historical penetration can free the beginner from this state of intellectual discontent and create for him a home in the perennial community of the scientific mind.

Third and last, the study of the history of science can relate scientific activity and technological progress and social reform. In the education of the scientist it seems less important to spend time mulling over the significance of science research for industrial and sociological advances, the "impact" of science on society, and similar flattering considerations treated in the popular literature *ad nauseam.* On the contrary, what is desired is a strong emphasis on the history of the effects of society on science and scientists. An important component of a worthwhile discussion of this nature is the growth of scientific organizational forms: the medical colleges, the scientific academies, the universities, the public and private research foundations,—all the various types of science patronage. Opportunity is here offered to broaden the field of inquiry, to acquaint students with problems of ethics, religion, the law, and the state; to study the conduct of public affairs and the exercise of authority, as it relates to science and scientists, and in this way to make history of science the focus of a humanistic education of the scientist. Through the medium of history of science so conceived and experienced within the frame of reference of his specialization, a science student's participation in the "other culture" can be expected to become more vital and more lasting—than through the erratic cultural influences to which he might have been exposed in his junior college years.

BOOK REVIEW

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Great Smoky Mountain Wildflowers, Enlarged Edition. Aaron J. Sharp, Carlos C. Campbell, William F. Hutson and Hershal L. Macon. 88 pp. University of Tennessee Press, 1964. $1.50.

The reception accorded the earlier 1962 edition of this little book has already justified a second and enlarged edition. The text is botanically accurate, but is designed for the layman. The book consists of 127 color photographs of the wildflowers of the Great Smokies, of excellent quality, mostly by Hutson and Macon. The arrangement of the illustration is roughly in the order of the blooming season. Anyone who has attended the Wildflower Pilgrimage, or seen the mountain laurel, rhododendrons, and azaleas in bloom will want a copy, the cost of which is very reasonable.

ACADEMY RECEIVES GRANT

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The Academy has just received an appropriation in the amount of $3,000 from the State of Tennessee. These funds, made available through the Department of Education by Commissioner J. H. Warf, will be used to enhance the Academy's programs in the State directed toward the stimulation of interest in science and mathematics among students and teachers in Tennessee's schools. The awarding of these funds is in a real sense a recognition of the valuable contributions made by the several directors of programs in this area sponsored by the Academy. These programs include: The Junior Academy of Science directed by Dr. Robert Wilson, The Collegiate Division of the Academy directed by Dr. Richard Raridon, the Visiting Scientist Program under the directorship of Dr. Roger Rusk, publication of the *Journal of the Tennessee Academy of Science,* Dr. Gustave H. Lundberg, Editor, and the Science Talent Search Program directed by Mr. James L. Major.