

# Science and the Library<sup>1</sup>

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THE KINDLY, humorous and learned words with which Dr. Chalmers has characterized some of the mathematicians of the past strengthen a resolution which I have long entertained, to seek an alliance with humanists of his type on behalf of those scientists who are against the growing scientific materialism of the present day. I accept his description of the intellectual agility and formidable severity of some of the historic figures in my profession, and recall the story of Euler and Diderot at the court of Catherine the Great. According to this legend Diderot had finished his supposed proof before the assembled court, of the non-existence of God, and it was Euler's duty to reply. Knowing well that Diderot was weak in mathematics Euler turned to Diderot and declared with great solemnity and perfect conviction: "Sir

$$\frac{a + b^n}{n} = x,$$

hence God exists; reply!" The helpless Diderot retired in confusion. The nice question as to whether the end justifies the means arises here.

When your librarian, Mr. Parker, first asked me to speak on science and the library, I was a bit puzzled as to what to say. One takes a library for granted to such an extent that reflection was required. The first idea that came to me concerned

the use made of the stacks of the Harvard library by a former graduate student, now a distinguished professor. Among the other graduate students using the stacks was a particularly beautiful Radcliffe student, and my friend made the stacks the scene of a successful courtship of this young woman. After they were married the firstborn was appropriately named Widener. Here there was a felicitous use of the library in the pursuit of beauty. However, this illustration seemed to me to be lacking in universality, so that I felt compelled to drop it.

Then it occurred to me that a library was indispensable in laying the foundations of knowledge. This idea was brought home by my two-year-old Peter, who employed my books as building blocks. The trouble with this illustration was that the edifices which he laboriously constructed always toppled over; besides, the choice of the books was not discerning, so that this lead had to be abandoned along with the first.

In the meanwhile, if we may believe the psychologists, my subconscious mind had been working, and a serious idea came to the surface. It was that a library is an integral part of life, and that the philosophy of its use must flow from a general philosophy of life. My convictions as to the nature of values in science were definite, and it at once appeared that these concepts of value had the most intimate connection with the problem of the growth, use, and meaning of a library.

How then to convey an accurate conception of a more or less individualistic

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philosophy in a few moments? I could resort to terms: I could say that I was a realist, and be mistaken perhaps for an empiricist or a Republican; or I could say that I was an idealist, and be mistaken for a conceptualist or a Democrat. In spite of the obvious dangers in my course I shall nevertheless begin with a label.

Seriously, with some hesitation, and with more pretension than I like I shall call myself a scientist-humanist-theist. To drop any term in this trilogy would mar the synthesis I have in mind. That humanism and theism are sometimes regarded as contradictory everyone knows, but I doubt the presence of anyone in this audience who feels this contradiction. To say that true humanism denies theism in the Christian sense is to deny the fatherhood of God. I am a scientist by inclination, a humanist by experience, and a theist by the light of reason and a great need.

In all that I have seriously to say I am assuming that the attitude of my listeners is one that belongs to a liberal arts college. If I deplore certain new tendencies toward scientific materialism, it is not implied that such tendencies exist here. I hope that what I shall say may reinforce your convictions and make you realize a little more keenly the great dangers immanent in the impetuous evolution of the present day.

The library of a college, whether small or large, is the symbol of the continuity and universality of our civilization. There has never been an age more in need of the wisdom of the past, or a country more likely to suffer from scientific or philosophic provincialism, than our own. Activity for activity's sake, computation without understanding, statistics as an end, gadgetry instead of science—these things are marks of today.

In the world at large confusion about value and significance in science is widespread. The contrast is not one between

state-controlled scientific materialism as it exists in Russia and the idealism historically associated with science, but a contrast between scientific materialism and confusion. To this confusion there is added a generally unrecognized, and increasing determination of the sense of scientific values by the events of the day, as interpreted by the press, radio, and screen. It matters little if science is valued more highly, if it is valued more highly for specious and fortuitous reasons. The fact that today's history is fateful, that life and death are at stake, explains in part an increasing perversion of scientific values; but there can be no real justification of a failure to more perfectly relate values in science to the inner life and to the dignity and serenity of man.

Our age has substituted the idea of control of things and of men for the ideal of wisdom and understanding. The size of a man's laboratory and the number of dollars in his budget have become the measure of his value. Let us begin education with understanding and never forsake this ideal.

The library is a symbol of this ancient objective and a principal instrument in its pursuit. The young student in science (including mathematics) must be intellectually aroused and properly led. For these ends there has never been any one book thoroughly adequate. A student can approach science in many ways; he can approach mathematics, for example, by way of algebra, or geometry. By taste or aptitude he may find one of these ways more natural than the other. This variability of aptitude in algebra and geometry is found even in the greatest mathematicians. I have in mind the case of the leading geometer in Oxford at the present day. As a student he was regarded as uninspired by his teacher, the greatest mathematician in England. A mathematician from this country who was for one year an exchange professor at Ox-

ford discovered other tastes and talents in this student with a resulting transformation, first in enthusiasm, and second in attainment, so that this student is now a famous scholar.

In the library then, there must be the books which inspire, and those which lay enduring foundations. Such books vary with the subject and the age; their suitability depends upon the student. Even the foundations of logic change from age to age. Only the most skilful educator can properly apportion the emphasis on logic or intuition which is appropriate for a given student. The books for the undergraduate can be small in number if wisely chosen.

In following the democratic ideal of primarily serving the undergraduate students, American colleges uphold our tradition and fill our greatest needs. However, in too exclusively following this path some American institutions of learning have wellnigh lost sight of the great objectives of medieval universities. As avowed carriers and custodians of the knowledge and culture of the past, the ancient universities—Paris, Pisa, Oxford—regarded themselves as belonging to all time and ages. We can abandon this old concept of a university only at our peril. The underlying ideals are in the heart of every true scholar, and are fortified by every good library.

When, for example, a mathematician has done what he can to understand relativity, he may turn back to Newton. If he reads carefully he will be surprised to find that Newton, like Einstein, doubted the constancy of mass, something that seems to have been unrecognized for several centuries. Or if he turns to the *Comptes Rendus* around 1908 he may find Einstein, Lorentz and Poincaré in a discussion of the antecedents of modern physics. One sees how the intuitions of Einstein and Lorentz could be shaped and in part antici-

pated by the logic of Poincaré. From these records it is clear that advance in science is inevitable, but that the path is as fortuitous and as variable as the genius of the men involved. It is the library which makes this discovery possible.

There is a very practical sense in which a college must recognize the dependence of a theoretical scientist on the library. The demand for competent scientists on the part of industry and the research agencies of the government has been augmented to such an extent in these last years that colleges and universities are finding it extremely difficult to retain their staffs. This has been brought home to me very vividly by the experience of two of my former students. One has had his salary tripled in the last three years and has moved three times. The other has refused a salary twice his present salary, because his university has recognized his scholarly interests and has made the circumstances surrounding his work most favorable. The conclusion in the present connection is that the existence of an adequate (but not necessarily large) reference library in a theoretical science is indispensable to retain any young scholar worth retaining. At one time it used to be the case that a scholar could go through life as a teacher on the momentum of his doctor's thesis. With the pace of advance what it is now, I doubt whether this point of view is tenable any longer. Young men know that to keep alive intellectually they must write and create. It is thus clear that an improvement in the qualities of a library is one of the best ways to reward the young scholars in any college.

The opportunity of obtaining a journal by loan from another library is not an adequate substitute for having the journal at hand in the home library. I have gone to the library as late as ten o'clock in the evening in order to resolve an uncertainty that might leave me sleepless that night.

Waiting several weeks for a book would necessitate a choice between various alternatives, all undesirable—trying to duplicate the research already in print, being frustrated for a month, or breaking the continuity of the research program.

For the scholar at work today there is another reason why the library is indispensable. The world is divided—almost but not wholly. We still get journals from Russia, Poland, Czechoslovakia, and we know that in science the intellectual activity in these countries is intense. The receipt of their journals is one of the effective realities of the present day preventing us from underestimating these separated nations. It is the slender thread of a common interest which must someday grow into a proper understanding. The scholar of course cannot afford to ignore the research behind the iron curtain. He penetrates the iron curtain not by bullets but via the library.

I have spoken of the conventional needs of the student and the scholar for a good library. A word may be added for the value of the library for the few, for those who are seeking to reformulate the philosophy of history and culture, of science and religion. For these the library is indispensable. They must go beyond the platitude that there is no conflict between science and religion. What is needed is an active

*rapprochement* between science and religion, a mutual adjustment of language, a removal of ambiguity, a sober and just recognition by natural science and theology of their common boundaries—not less faith, but more faith, with less doubt as to what is reason and what pretense to reason. The thoughts of St. Augustine must be retraced in their dependence on Plato, and those of St. Thomas with his preference for Aristotle. With a science and logic now available far beyond that of Aristotle, there should be a comparable advance in the form of presentation of religion in its relation to science, and the way in which reason may lead to belief.

For some this may not be necessary; by many others it will not be understood. For the few, the future scientists and philosophers—the potential Whiteheads, Toynbees and Maritains—such a clarification is overdue. For these there is no other approach so consistent with the tenderness, severity and integrity of their minds, or the decisive role which they are destined to play. In some quiet library with its treasures of the past and its record of the present, with its air of otherworldliness, if you please, but with its very real concern with what is to be, the student of today and the scholar of the future may one day bring these things to pass.

## Instruction in Library Use

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concentrate on one (here considering objectives one and two as a unit) fundamental, realizable aim is likely to result in riding off in all directions at once. The course should eschew anything but the severely practical. Secondly, it is unwise to attempt to accomplish what is better and more easily accomplished elsewhere. It is entirely fitting that librarians wish students to make more use of the library

and to adopt more effective methods of study. This concern should, however, take the form of exerting pressures where they will do the most good. If, as seems probable, this instruction has not enjoyed the fullest success on the elementary and secondary school levels, it is also true that there has been only a qualified success on the collegiate. This has been due partly to the lack of definite objectives.