

SCIENCE AND WISDOM

The 1956 Commencement Address

by HENRY ALLEN MOE

Secretary-General of the

John Simon Guggenheim Memorial Foundation

AT LEAST to the layman like myself, today the scientist, as scientist, seems to be stepping high, wide and handsome. Like the artists of the Italian Renaissance, when art flourished under the twin stimuli of popular enthusiasm and princely financial support, you, the scientists of today, have caught the popular imagination, and, no less, make appeal to the benevolent impulses of the rich and the urgent necessities of government. This is fine, for you and for everybody. You deserve it; for in your science, in your important—important for everybody—search for new scientific truth, things are going well for you, and you are moving forward. Science has its method for going forward and you know the method. You do not know all the methods, but the larger aspects of the method of science you do know.

Once outside your science, however—outside in the world, where, if you proceed at all, you proceed by value judgments and where you, like the rest of us, live most of your lives—you are like the rest of us. There are those who say that, in the present day, you affect the course of the world more than do the rest of us. There are those who say—and some say it without approval—that, as scientist citizens, you have a preponderantly greater weight *per capita* than the rest of us. But I do not disapprove, *provided that* you have wisdom and do not think that the sciences will give you all the answers, or even the most important parts of them. They will not, for the simple reason that in most areas in which you live your lives, there is no applicable science, and there may never be.

Perhaps, therefore, a person like myself with a train-

ing and a long experience so different from most of yours may have something to say with enough validity to go into your thinking. I ask you to believe that this is said very modestly: it may or may not be so. Of that, you will judge when I have done.

At this point perhaps I ought to say, to reassure you, that I am not going to say that, for wisdom, humanistic education is the only answer. Nor am I going to raise what has become the usual hue and cry, that science is the devil and humanistic learning the savior.

What then will I say about science and the road to wisdom? Assuredly, I will not say that science is not the road. Assuredly, I shall not say that science may not be as much a part of humanistic learning as, for example, literary criticism may be. Assuredly I shall not say that there is any conflict between the learning of science and the learning of the so-called humane and liberal studies. In the world of value where we all live most of our lives, the humanities are not the only teachers of values, nor the principal teachers, as often is claimed.

Assuredly, I do say that the study of science, any science, can be humanistic, and be as liberal as the study of, say, Greek sculpture of the age of Pericles, and can teach us just as much about the world of value. Assuredly, I do say that study of Greek sculpture of the age of Pericles can be as narrowing, can be as non-humanistic, as the study of the properties of prime numbers can be—but either study is not necessarily narrowing in either instance. The main point is that the pursuit of any study into and for itself alone makes a situation from which no great things can come.

The humanities relate only to a part of the life of

man, only to a part. Like the humanities, science relates only to a part of the life of man, only to a part. To think any other way is nonsense. To think that science and the humanities are separate, is equal nonsense. To think that they are naturally at war with each other is the way to more nonsense. Science is not isolated in the lives of men, nor is it isolable. Like everything else experienced—everything else—it is only a part of the matrix in which we live our lives.

John Livingston Lowes explained this in *The Road to Xanadu*: “. . . the imagination voyaging through chaos and reducing it to clarity and order is the symbol of all the quests which lend glory to our dust.”

“All the quests,” be it noted; and be it noted also that “the imagination voyaging through chaos and reducing it to clarity and order” is what lends “glory to our dust” and makes all scholarship and all art worthy of the best in men.

Einstein's new universe

This is what Dr. Einstein did when, by a few deductions out of scientific observation, he saw the universe anew—a few deductions out of scientific observation plus a feeling, which I can only describe as aesthetic, for symmetry.

He reduced to clarity and order a large segment of the matrix in which we live our lives. It was scientific, yes: It was humanistic, equally yes. No thinking men's lives, not even—if I may fragment my statement this way—their non-scientific, humanistic lives, can ever be the same after Einstein's daring symbolism of observation, deduction and generalization.

The trouble is not with Einstein's science, the trouble is with the humanists who do not see the humanistic values in the imaginative Einsteinian voyage through a segment of chaos, a voyage which reduced that segment to clarity and order. They do not see because they do not understand that, in the post-Einstein world, their aesthetics, their philosophy, even some of their values, never can be the same.

The new knowledge exposed the limitations of their values, as pathbreaking new knowledge always has done, and, what philosophers ought always to know, the extent of the contingent nature of their values. I say “contingent,” for what ought to be the queen of the humanities, philosophy, is viable, has present-day life, only if it encompasses the new knowledge and the new understanding of the physical world, as of all worlds. Philosophy is contingent upon mastery of knowledge: if it has not that mastery, reasonably up-to-date, it can only be a rehash of the old or a battle of words.

The classical antiquity of Greece and Rome, added to the patrimony of Palestine, has long supplied us with a moral and intellectual heritage—and a great and still viable heritage it is. But as far back as in the city of Alexandria in Egypt, under the Ptolemies, that inheritance was worked over, largely mechanically one must say, into a series of erudite and complex com-

mentaries contributing practically nothing to that besetting question of the mind: Where do we go from here?

Thus it is that the adjective Alexandrine, even in the ancient world, was applied to narrow erudition for the sake of such erudition, learning for the sake of being learned in a field; and it was applied, it ought to be remembered, not to scientists but to humanists. And I shall say that, viewed from where I sit in a foundation office, the term Alexandrine has much more general application now to non-scientists—in the 20th century United States—than it has to scientists of the 20th century. The reason may be that, whereas the scientist generally has some education other than scientific, and generally can understand the humanist, the non-scientist rarely has any knowledge of science beyond the fragmented, headlined bits he dimly is aware of from the popular periodical press. He simply does not have the intellectual tools to open for him any vistas of what science has done, does, and will do to his Alexandrine learning. What Galileo said of philosophy still relates to all branches of knowledge, “True philosophy expounds nature to us; but she can be understood only by him who has learned the speech and the symbols in which she speaks to us.”

The narrow view

But neither is all well with the scientists. From where I sit again, it sometimes looks as if a seemingly so-thought scientific prudence—that is, the thought that the narrower the problem the more safely scientific it will be—coupled with what seems like indifference, leads to choice of narrow problems in which there is no risk and, indeed, which do not demand much ability, nor much work, for solution. But having said this I must go on to say that, while this is not a besetting sin only of the scientists, still it comes home to me the more because at least you know what some of your big problems are.

Alexander Pope was inclined to think that “The proper study of mankind is man.” There is much to be said for his aphorism and certainly there are no “outs” to it if it be understood to refer to the great questions of man's mind. To the extent that you do not tackle them, you too are Alexandrine. To the extent, also, that you limit yourself only to what you can prove by demonstration, experiment and observation, you are doing less than your best to bring order out of chaos. For, if I mistake not, the best of you are usually a bit ahead of your data. But this statement, like most statements, needs qualification to make complete sense; and the needed qualification is that the best of you are—as you ought to be—undogmatic about those matters where you are ahead of your data, and regard them, at best, as hypotheses to test with additional data.

This is what I did not understand when, long ago, I sailed from Norfolk, Virginia, for Europe with a cargo of steel rails under a magnetic compass. As we cleared

the Virginia Capes the fog closed in so thickly that no sight of any celestial body could be had to check our compass error. In these circumstances I retired to my room to calculate, mathematically, what that probable compass error was; and I gave a compass course to the captain in accordance with my calculations. He, knowing little mathematics, could only approve, for this was before the days of radio bearings; and on my calculated course we steamed for six days without a sight of anything celestial or terrestrial. At the end of the sixth day, when confidently, even dogmatically, I thought we were comfortably on the modified great circle course, the captain ordered soundings and in an hour it was clear that we were not where I thought we were, but a few miles off the tip of Cape Race, Newfoundland. I had conceived the problem narrowly and had thought I could solve it from the point of view of one discipline; but the captain had the wisdom of the sea and solved it with all he had—my calculations, his knowledge of the set of the Gulf Stream, the feel of the breeze, the temperature of the water, the chop of the sea, and I don't know what else besides. It gave me a lesson I never have forgotten, nor should you.

Specialization plus wisdom

I am, you see, talking about, pleading for, wisdom added to specialization, and, in this place, specifically for wisdom and science, wisdom added to science. There is, alas, no method and no formula for the acquisition of wisdom. But while there are no sure-fire methods for the acquisition of wisdom, there are sure-fire methods for its non-acquisition.

One of these is narrow specialization in education. I know, I know well, that you, like the rest of us, have to specialize and acquire detailed knowledge. Still, somehow, for wisdom, you like the rest of us also have to acquire the capacity for coordinating, for seeing relationships; and you can neither coordinate nor see relationships if you have nothing, or too little, else, to coordinate and see relationships with. For, assuredly, without a certain inclusiveness of vision, pathbreaking steps, seldom, if ever, are taken. Without a certain inclusiveness of vision, the road ahead appears to be the only road worth travelling. But this, all history shows, is not so. For if you cannot see the territory contiguous with yours, you cannot know what it may contain of value for you or anybody else.

So far as known to me, none of the world's great men—great, that is, in things of the mind and spirit—were specialists solely at the times they achieved greatness, although they might well have had to be specialized when young. And I freely concede that the conditions seeming to require early specialization today look more persuasive than they seem to have been in earlier and perhaps simpler days. Nevertheless, it should not be forgotten that Copernicus was lawyer, theologian and astronomer; Maimonides was jewel trader, physician, rabbinical scholar and philosopher; Voltaire was poet,

historiographer, and political thinker; Jefferson was farmer, botanist, natural philosopher, political thinker and politician. Benjamin Franklin was practically everything! Churchill is journalist, man-of-letters, statesman and somewhat of an artist and bricklayer. Leonardo was engineer, painter, sculptor, musician and poet. Thomas Aquinas was a pupil of Albertus Magnus, known as *doctor universalis*—theologian, ancient historian, mineralogist. Newton was mathematician, physicist, theologian, and a first-rate Warden of the Mint. Darwin studied theology and medicine, was entomologist, geologist, and from this varied background became the author of his great work *On the Origin of Species*.

These are all individuals, and I think it needs no argument in this place to sustain the thesis that all knowledge and all understanding are the results of the intellectual processes *only* of individual persons. Whatever the results—good or evil—they all start with an individual. I think this needs no argument, despite the recognition that, nowadays especially, some work of the mind—but by no means all—has to be done by teams. For I am not saying that a pathbreaking work of the mind is necessarily one mind's work. Ever since creative work of the mind began, it has always been so that no mind, great or small, has gone it alone. Shakespeare doubtless was a good listener to other men's ideas and, according to some, was a very skillful plagiarist, or at least was a fine adapter to his own purposes of others' work. And, more likely than not, the most original men are both—a thought I think I had better not develop any further.

Freedom of mind

It also, I think, needs no argument to sustain the thesis that such individual development can only take place where the mind of man is free. We see this through all history; in the history of Babylonian mathematics and astronomy under the earliest codes of law that safeguarded the rights of the individual to think. We see it in the history of Arabic medicine and algebra, before Islam became a set of doctrines to be taken on credence and a code of law to be applied rigidly and blindly.

The conditions of freedom prevailed also in ancient Greece, and thus there the mind of men also soared as the eagle flies. They prevailed also in ancient Palestine, else Christ would not have been possible. Such were also the conditions in ancient Rome when the rule of law achieved a firm expression and the concepts of equity and justice and freedom of thought were both developed and applied to be every man's due. Such were *not* the conditions of Europe's Middle Ages when, for many centuries, the letter—the rule book of life, in modern terms—killed inspiration and progress: It was then that the world of Europe, mistrustful of reason, trustful of revelation, weary of argument and apathetic to the wonder of the capacity of men's minds, stamped free inquiry as a sin. And until the stagnation of the Middle Ages went by the boards in the re-found free-

dom of the Renaissance, the search for truth was hopeless. But again the conditions were right in Tudor and revolutionary England; and such again, and most decidedly, were the conditions here in 18th century North America.

I have the Middle East and the old Arabic learning very much on my mind these days; for I have recently come home from there. I had been given what the Navy calls a roving commission to find out what I could about the present state of higher education in the Middle East. After I got out there, it came to me that I was not as ignorant, nor as unqualified for the assignment, as I had thought—for one reason and that was because, in a very modest sense, I am a historian of the law of Rome. The ancient Roman Law, I should explain, the writ of the Roman Law ran all through the territory that we now call the Middle East.

It was not that I studied or learned, last autumn in the Middle East, anything that I had not known in the way of a lawyer's specialized learning about the law of the sale of goods or of commercial practice, or of any other branch of the law, in ancient Egypt or Phoenicia. It was rather that as a historian of the Roman law I could not help becoming aware, out there, of the intellectual scope of the men who made the Roman Law the force for civilization that it was in the ancient world.

History, recorded history, is long in the Middle East—five thousand years or so; and the sensing of past values of past civilizations gives a man a certain perspective on his own.

Past and present

Contrasting the present with the great Middle Eastern past, I asked myself *why*. In the Middle East, I stress again, the present has deep roots. What happened to the deep roots of the law? And lest I seem legally parochial, I call to witness that one cannot look at a clock without being in debt to the method developed in ancient Babylon for reckoning time; one cannot read or write a western language without being in debt to what went on in Byblos in ancient Phoenicia; for it was there that our western alphabet, if not invented, was certainly developed to be the sharp intellectual tool we know. When, at the site of ancient Babylon, I was viewing the old irrigation ditches, dating from at least the time of Daniel—he of the lion's den—I asked an American reclamation engineer how far off his modern surveys showed them to be: he said they were off, in vertical distance, at most only fractions of an inch over hundreds of miles of extent.

And again I asked *why*: I asked why they could do it and did it then, and why not now?

I could not find complete answers out there, nor have I been able to find them in scholarly works since my return. But one thing is clear and it is this:

Just as in our Western world the pathbreaking steps have always been taken by men who were free to think and by nobody else; and, just as in our Western world

the pathbreaking steps have not been taken by men who wore the blinders of one discipline, so it was in the great periods of the historic Middle East.

Omar Khayyam, he of the *Rubaiyat*—in Fitzgerald's translation, he of "a loaf of bread, a jug of wine—and thou"—was also and perhaps principally a mathematician. His *Algebra* is a first-rate pathbreaking work, including a kind of analytical geometry as it was conceived before Descartes, at a period when the systems of co-ordinates and mathematical notations were not established. He was also a superior political thinker and astronomer.

The great jurists of the Roman Law were rhetoricians in the ancient and honorable sense of that word, sometimes governors of provinces, sometimes quaestors—that is, secretaries of the Roman Treasury in our terms—as well as lawyers. All of them, as Mr. Justice Holmes was fond of saying of men for whose judgments he had respect, had formed their inductions as jurists out of experience in other fields, under the burden of responsibility.

Wideness of vision

So it was in the great and historic past of the Mediterranean, so it is in our own era, and so therefore I expect it to continue to be. The pathbreaking steps of the human mind are not taken by specialists who are specialists only. They are taken, always, by specialists who have a wideness of vision, who see relationships, who can coordinate the observations and deductions of fields besides their own. If to this capacity to see relationships, there be added precision of expression, purity of diction, fine wit, concern for the spirit of man, then the labor of those who have those abilities, in the difficult and obscure field of final principles, surely will rise to heights otherwise impossible. Then they, like Omar Khayyam, will not only advance knowledge but will also have attained to wisdom; and they, and only they, will place their intellectual and spiritual signatures on their days.

There is another facet to the lesson that specialization is not enough which I learned in the perspective of the history of the Middle East. It is this:

Beginning in the 19th century, the Middle East eagerly took to Western inventions; but those inventions, it now is clear, did not produce for them the good things they seemed to produce for the West. By Western inventions I mean not only the tractor, the bull-dozer and the motor car, but also, for example, secular education, technical education, and the ballot box. And the reason that the western inventions did not produce for the Middle East what they seemed, to some, to produce for the West is clear; and some men of the Middle East said it to me clearly: "We know we could not achieve your material position—let alone your other positions—without the breadth of your education which you have and which we used to have but have no more." That is, ladies and gentlemen, a message from the cradle of our civilization.