

QUOTES ON SCIENCE AND THE EDUCATION OF SCIENTISTS

In an address presented at the 74th Session of the Tennessee Academy of Science, Dr. Richard Stevenson, dean of the School of Graduate Studies, offered the following suggestions for a program of general studies in the lower division for majors in the sciences:

"Such a program would involve the big ideas and the unifying themes that run through the humanities. We should draw from art, music, literature, both prose and poetry, because these studies can stimulate creativity, and the scientist without an active imagination is truly a technician. The student should be encouraged to escape occasionally from his usual frame of reference.

"For example, Sidney Lanier once said, 'Music is love in search of a word.' A few years ago, S. E. Luria said, 'A virus is a bit of heredity in search of a chromosome.' Whether this was only a remarkable parallel or an intentional paraphrasing I do not know, but it seems plausible that Luria might have called up that expression from the deep recesses of his mind, having at some time read that line from Lanier. This much is certain: every geneticist appreciated it and I'm sure wished that he himself had thought of it!

"Our most creative scientists have been those who have drawn ideas and inspiration not only from their own specialties but from other sources as well. Robert Oppenheimer's interests range from the Bhagavad-Gita to Seventeenth Century French poetry. Robert Burns Woodward, the chlorophyll chemist, has interests as wide as mathematics and philology. Those of you who have heard or talked with Harlow Shapley surely have been impressed with his appreciation of poetry and philosophy. In biology, the most productive and prophetic often have been those with the widest range of interests, those who can soar above and beyond their own research interests.

"Another element of this program would be the history of ideas, to give perspective; and sociology, in its broadest sense, to remind us that we are a *part of*, rather than *apart from*, society.

"There would be ethics, logic and philosophy, to give a sense of direction, to encourage introspection and retrospection, and even, perhaps, to suggest that there are some metaphysical, even mystical, qualities that the scientist should be sensitive to. 'Science is indeed a truthful activity,' Bronowski writes in his essay on *Science and Human Values*. 'And whether we look at facts, at things or at concepts, we cannot disentangle truth from meaning—that is, from an inner order.'

"Psychology, to demonstrate the learning process, and to introduce the student to himself and his capabilities. This might be our best approach to what Aldous Huxley calls 'education in elementary awareness.' Such a program, I believe, would give the student of science an awareness of what Suzanne K. Langer has called 'the growing center of knowledge.'

Dr. Vannevar Bush, noted scientist and honorary board chairman of Massachusetts Institute of Technology, in an article entitled "Science Pauses" appearing in a recent issue of *Fortune* writes:

"Science, too, has come a long way, in delineating the probable nature of the universe that surrounds us, of the physical world in which we live, of our own structure, our physical and chemical nature. It even enters into the mechanism by which the brain itself operates. Then it comes to the questions of consciousness and free will—and there it stops. No longer can science prove, or even bear evidence. Those who base their personal philosophies or their religion upon science are left, beyond that point, without support. They end where they began, except that the framework, the background, against which they ponder is far more elaborate, far more probable, than was the evidence when an ancient shepherd guided his flock toward the setting sun, and wondered why he was there, and where he was going.

"Science proves nothing absolutely. On the most vital questions, it does not even produce evidence.

. . .

"And what is the conclusion? He who follows science blindly, and who follows it alone, comes to a barrier beyond which he cannot see. He who would tell us with the authority of scholarship a complete story of why we exist, of our mission here, has a duty to speak convincingly in a world where men increasingly think for themselves.

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"As this occurs, and on the essential and central core of faith, science will of necessity be silent.

"But its silence will be the silence of humility, not the silence of disdain. A belief may be larger than a fact. A faith that is overdefined is the very faith most likely to prove inadequate to the great moments of life. The late Mr. Justice Holmes said, "the faith is true and adorable which leads a soldier to throw away his life in obedience to a blindly accepted duty, in a cause he little understands, in a plan of campaign of which he has no notion, under tactics of which he does not see the use." Young men, who will formulate the deep thought of the next generation, should lean on science, for it can teach much and it can inspire. But they should not lean where it does not apply.

. . .

"And the theologian. He can accept the aid of science, which draws for him a wide universe in all its majesty, with life in all its awe-inspiring complexity. He can accept this knowing that on the central mysteries science cannot speak. And he can then step beyond to lead men in paths of righteousness and in paths of peace."