

Stanford University News

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(NOTE TO EDITORS: Following is the complete advance text of the principal address to be given at the Stanford Commencement Sunday, June 13, 1954, in Laurence Frost Amphitheater on the campus. The exercises begin at 5 p.m. This text not to be released prior to 6 p.m. (PDST), June 13, 1954.)

THE HUMAN TORTOISE AND THE SCIENTIFIC HARE

Dr. Robert C. Swain
Vice-President, American Cyanamid Company

In some sections of our country it is customary for enthusiastic alumni who have become proud fathers to register their offspring at an early age for admission to their Alma Mater. This technique is supposed to be very effective in influencing Admissions Committees who are, of course, notorious for their inability to appreciate the outstanding qualifications of children of alumni.

My parents adopted a much more direct approach to this problem by moving to Palo Alto and carefully arranging for both my sister and me to be born and raised here. This procedure, while a little time-consuming, proved entirely successful and I recommend it without reservation for your future consideration.

One of the more attractive by-products of this plot was to widen my span of life here at Stanford by many years more than the average, so it is a great temptation to take advantage of this occasion to recall some of the heritage of campus memories which we all share. However, I am reminded that by completing my graduation requirements at the end of the winter quarter, I was permitted to escape from the campus in time to avoid listening to a commencement address, and while we unfortunately cannot share this treasured memory, I can at least cooperate by making your present ordeal as brief as possible.

It has been my role in life to play upon the stage of science, so it may not come as any surprise to you if references to things scientific creep into my remarks. But I am not so concerned with the progress of science as I am with the progress of man. This latter subject is one that I would like to discuss with you today.

During the past few decades, we have witnessed tremendous technological advances. Even a casual perusal of our daily newspapers cannot fail to indicate the impact of science on our lives and times. But this was not always so. For many centuries scientific progress was pathetically slow. The Greek philosopher Aristotle proposed the existence of only four chemical elements - earth, fire, air and water - and this false doctrine was accepted with only minor controversy for over a thousand years. The alchemists, reaching their zenith in the 16th century, sought the secret of transmuting baser metals into gold and found no
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lack of greedy patrons to support them in this futile enterprise. The desire to get something for nothing is certainly not restricted to modern thinking.

It was not until the discovery of the importance of the reproducible experiment, which permitted one scientist to duplicate exactly the results of another, that true progress began to be achieved. Trial and error? Yes. But above all else, the documentation of methods, materials, and results, thus permitting those who followed to profit by the past and push on into the future.

All of the natural and physical sciences have contributed to our present stature. Genetics and agronomy, combined with mechanization and electrification of the farms, have made it possible for less than one-eighth of our total labor force to supply all of our food requirements whereas, little more than a half century ago, almost forty per cent of our population was needed in such occupations.

Some of the other branches of science - physics and engineering - have given us such everyday products as the airplane, automobile, television, and air-conditioning. But of more importance, perhaps, than the inventions of the things themselves has been the development of production methods and machines extending back to prime raw materials. These new tools and techniques have made available to our people a vast array of products at prices they can afford to pay - products possessing a standard of quality unknown and unmatched by our industrial counterparts in other areas of the world.

The impetus which chemistry has given to the growth of industry has been even more spectacular, despite the fact that the lay public has not been fully aware of it because so many products of chemistry do not enter the realm of the consumer as such. Chemists have transformed raw materials from mines, farms, oil wells, and the very air we breathe, into useful things having impact on almost every aspect of our living. Today more than twenty per cent of our national product is derived through chemistry. Synthetic plastics, rubber, fibers, detergents, insecticides, and drugs are some of the chemical products which comprise this large segment of the country's total manufacture.

The development of new products has been so tremendous that more than half the output of several leading chemical companies today is devoted to materials which were unknown fifteen years ago. Such advances have contributed to a more abundant life for us all. Perhaps, the most spectacular result of chemistry has been the revolution in medicine. More progress has been made in this field during the past fifteen years than in all previous history. The death rates from most infectious diseases have been more than halved as a result of the introduction of the sulfa drugs and antibiotics, and we have every reason to expect that this trend will continue inasmuch as there probably are more scientists working directly or indirectly in this field than in any other.

It is apparent, therefore, that we are rapidly attaining in this country the long-sought goals of good health, an abundance of material things produced with a minimum of heavy manual labor, and the leisure time in which to enjoy them. But something is lacking. It is becoming increasingly evident that the physical sciences have progressed far

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more rapidly than their political, economic, and social sisters. In fact, it can be questioned whether the average level of moral integrity and social responsibility has changed appreciably in modern times - particularly for the better. We have measured success by what we have, rather than by what we are.

Walk through the slum areas of any of our cities and count the television antennae protruding from the roofs of sub-standard houses. Can those masts be viewed as symbols of science at work for mankind? Is it cause for pride that three out of every five families in Harlem possess the mechanical wherewithal to watch Milton Berle?

Why, in a nation as great as ours, do we have such startling contrasts? I am forced to conclude that it stems from the human animal's failure to change and mature psychologically and to profit from past mistakes. Slowly, painfully slowly, man is learning how to live better with himself and his fellow men, but his progress is far outstripped by that of science. What can we do - what can you do - to help speed up the progress?

For the past four years, you men and women have been members of a very special kind of community. You have associated with people of your own age, of similar intellectual capacity, and relatively equal financial standing. But the picture is going to change. You are about to enter into other, broader communities, and you will discover that your associates there do not fit into such neat patterns as you have known up to now. Perhaps you are already asking yourself: "Where do I fit in?"

There is no doubt but that you will have to undergo a period of adjustment. The transition from academic pursuits to the furtherance of the careers on which you have determined will not be without its difficulties. Your education here, however, should have prepared you to face the obligations which this life of ours imposes, and you will face them best if you remember that the human values to which I have referred cannot be allowed to become lost in the shuffle for material accomplishment and success.

I hope you will try to make those values your guideposts for, by keeping them before you always, you can perhaps make your greatest contributions to the type of civilization which your children and your children's children will inherit.

What are the steps that will help you to make these contributions? First of all, I hope you will never relax in your quest for knowledge and truth. Even though, for most of you, your formal academic training is at an end, I cannot impress upon you strongly enough the desirability of continuing your intellectual and spiritual growth.

The manner of growth will, of course, differ for each one of us. But the point is that there should be growth - and that it should take place not alone on the material but also the spiritual plane. The process of becoming a better, wiser, kinder human being is one which never ends.

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In such a process, your first concern, of course, should be yourself.

Only when you can govern your own existence; only when you can live in peace and understanding with the members of your own family; only when you can recognize, appreciate and forgive the foibles of your associates can you hope to participate in solving the problems first of the community and then of the state, the nation, and the world.

For ultimately and inevitably you will want to look beyond yourself. Year by year it becomes clearer that a truly rich life comes from giving as well as receiving.

What good is all your education unless you can, and will, share your knowledge with your future friends, neighbors, and co-workers? I hope you will see fit to do so with the spirit of the true missionary. But please do not misunderstand me. This being a missionary requires something more than just the desire. You must be prepared for the task, and I believe you will find that the methods of science - critical examination and constructive advancement - will assist you in doing so.

If we look objectively at our modern world we see that three factors, all of them the result of scientific endeavor, underline the importance of placing increasing stress on the moral and social phases of living. Higher wage scales, coupled with lower prices as a result of mass production techniques, encourage more people to procure more of the world's goods; increased leisure time, another concomitant of mass production, taxes the ingenuity of man to devise new recreational and avocational pursuits; the progress made in the field of geriatrics by the medical profession emphasizes the need to find honorable and worthwhile means of utilizing the growing number of citizens of advanced age.

These are not problems to be solved by science alone. To be perfectly frank with you, I doubt whether science has the capacity to solve them because - as I pointed out - they have become problems as a result of science. No, we cannot rely on technology for the solution to the problems that revolve around our lives and the way we conduct them in concert with our neighbors. These are human problems, and they must be solved with the mind and heart rather than with test tubes and machinery.

I like to think of the "Pittsburgh experiment" as an example of how militant citizenship can improve the lot of mankind. A few short years ago, the city of Pittsburgh was a literal and figurative symbol of uncleanness, and the butt of every vaudeville and radio comedian. That is all changed now because an aroused citizenry did what everybody claimed was impossible: dismissed do-nothing city officials, passed anti-smoke laws and made them stick, and then removed the soot and grime which generations of Pittsburghers had simply taken for granted.

It is the obligation of you educated persons to seek out, associate with, and contribute to, the multitude of worthy endeavors in the communities in which you will work and reside. Among others, these include the Boy and Girl Scouts, your community chest, the parent-teacher associations, your churches and schools. Give of yourself and you will someday awake to the fact that, by giving, you have received;

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that you have grown in moral and spiritual stature; that you have learned that the man or woman along side of you is something more than a collection of chemical elements. Your bank statement may never show a profit from such activities, but your whole-hearted participation in such things is your cheapest insurance against moral bankruptcy.

I trust that you will perceive the benefits which can accrue to mankind if men and women of intelligence, good breeding, intellectual honesty, and vision are encouraged to devote their energies to the advancement of these important fields. You cannot hold public school teachers responsible for juvenile delinquency even if they were being paid what they deserve, anymore than you can condemn one or the other of our political parties for instances of bribery or corruption. At least, you cannot do it without subjecting the individual citizen to censure. These situations again are the result of an all too prevalent attitude that can be summed up by the old adage: "Let George do it." Well, I think it is about time all of us took a hand in such matters on a broad and militant scale. If we do, perhaps we can hold some hope of raising man's understanding of his fellow man before some misguided creature decides to split the atom a bit too fine.

Destiny has summoned this nation of ours to play a leading role on the world stage. The challenge which that task imposes can be met only with courage and faith, with wisdom and imagination, with purpose and vision. These are not material commodities. They are products of the heart and the mind and the soul. They are attributes of free men living in a free society, unfettered by false doctrines, uncorrupted by brain washing, and unconfused by greed or selfishness.

Too much has been said of man's ability to unleash powerful physical forces, and too little about the powerful social and moral forces which can be brought to bear by man himself. It took intelligence and imagination to produce the hydrogen bomb. It requires neither to utter the command to activate one. Only a high sense of obligation and responsibility can mark the difference between global tragedy and world tranquility.

Our one great fear should not be of the bomb itself, but of the mind of man who made it.

Scientists are very often right in their conclusions because they accumulate and profit from facts. The other phases of our social system may well benefit from the application of these same methods. If the tried and proved tenets of science - intellectual honesty, knowledge, and experience - are applied to the problems of society which I have enumerated, we may well be on the way to achieving an answer as to how the human tortoise can catch up with the scientific hare.

And now, in closing, I would like to revert once again to thoughts of Stanford as it was and is. Many of you are receiving today its emblem of graduation, for which we all extend to you our unbounded congratulations. However, you have also become shareholders in the Stanford Spirit, which I believe was first defined near his retirement two score years or so ago by Professor M. B. Anderson, a member of the original faculty. He wrote in part:

"Well, it was a dream worth having. But there are those to testify that it was not all a dream. People who have studied the cedar of Lebanon
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with Dudley, the hyssop in the wall with Campbell, the tribes of the seas with Gilbert, the face of the earth with Branner, the impassioned expression that is in the countenance of all science with Newcomer, look to this place as the sun-worshiper looks to the East. With the eye of Faith I seem to see that perhaps we builded wiser than we knew. This or that art or science our students might perchance have learned elsewhere, as well as here - although some of them would repudiate such a concession; but surely the total effect, what they call the Stanford Spirit, they could have become imbued with nowhere else.

"Such then," Professor Anderson continued, "is our creation; assuredly not the layers of masonry yonder, nor yet the outward results of our toil, patience, vigilance, self-sacrifice; nor even the prowess of the heroes of the track and gridiron; but rather the preparation for life, the outlook upon life, the power to hand on the lamp of fire which are acquired here."

All of those members of the early Faculty whom Professor Anderson mentioned are now gone, but others have come who have taken their place and are destined, in their turn, to leave the mark of their work indelibly stamped on Stanford and on you.

Likewise, here among you of this graduating class are many who will rise in time to eminence in various fields of endeavor, just as others before you have done. So you will find, along with the rest of us who cherish the memory of our experience here, that to have lived in a place like this in such an arena of scholarly aspirations and abiding friendships, is an inspiring inheritance which will be with you, and can never be taken from you, as long as you live.

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