

## COUNTDOWN FOR LIFE

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Honored Faculty, Proud Parents, Guests, ---- and Graduates of 1960.

Today is a day of hope and of promise. Hope -- that the peoples of the earth will be able to effect peaceful coexistence; to develop the desire and the ability to be (mutually) helpful to one another; to build together instead of to destroy. This has been the basic hope of man since his beginning. Promise -- of the most exciting era ever to confront man in the history of the human race.

Since the Dark Ages we have seen the Golden Age of Art, the Age of the Industrial Revolution, the Age of Locomotion, the Age of Flight, the Nuclear Age, and now we are confronted with the Age of Space. These last three ages have occurred in the short span of sixty years, just twenty years for the last two, and only two and a half years for the Space Age. For the first time it is possible to see into the future with enough certainty to predict that man will leave his terrestrial environment and explore the unimaginable vastness of space ! Yes, you are truly at the threshold of a thrilling period in history.

What does the space age mean to us? Why is it important? Why is it thrilling? Let us consider these questions.

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+ Presented as a Commencement Address, Idaho Springs Colorado High School, May 26, 1960.

First of all, reasearch in any field -- science, literature, law, music -- is an information-gathering activity. Research is necessary to acquire new knowledge. Each bit of newly acquired knowledge generates a new question, or several questions. (Each new answer generates more questions.) Continuation of this process builds an inverted pyramid the base of which is ever increasing in size. Several pyramids, widely separated, begin to grow closer together at their bases until eventually they touch and then overlap. This broad spectrum of information acquired becomes useful to man in improving his lot and fulfilling his mission here on earth. In the past centuries, numerous separate disciplines have been defined -- physics, chemistry, physiology, psychology, etc. -- have been studied as completely separate entities. These are the pyramids of which I spoke. The trend in recent years has been toward the narrowing of the gaps between these disciplines. Examples of this trend are: 1) the union of biology and chemistry into biochemistry, 2) the marriage of physics and chemistry resulting in physical chemistry and 3) the mating of biology and physics begetting biophysics.

What does this combining of sciences mean? It means that, after decades of studying separate sciences, we are discovering that these sciences are not separable. We try to avoid this fact by coining new titles which are combinations of existing titles. We think that we have created new sciences, but in truth are only discovering that our separate sciences are really the parts of one great science -- life itself! The interactions of the sciences are becoming more apparent and the bases of the pyramids are beginning to touch and overlap. Space research and space technology are doing more than any other single effort to unify <sup>these</sup> all disciplines.

A concrete example of this problem is in the field of medicine. In order to study man, we first divide him into a large number of parts. We study



histology and learn of the cellular structure of his various tissues. In biochemistry we study his chemical reactions. In anatomy we study his gross structure. Embryology deals with his formation and growth from the fertilized ovum to birth. These and others are basic sciences -- so-called because they are building blocks of which the foundation of medicine is made.

Next we study the functions of the various organs and systems of the body, their relationships to each other, and the effect of the malfunction of one on another and on the body as a whole. These subjects include cardiology, neurology, urology, gastroenterology, psychology, and so on. While it has been convenient to study these parts as separate entities in the beginning, it eventually becomes necessary to correlate each with all the others. In order to effectively treat an individual for any disease the physician must regard the patient as a complete organism and not as collection of specialized parts operating independently of each other. So it is with all sciences. So it is also with the humanities.

I have used the scientific field to illustrate this point. But the problem of deriving a single objective is by no means limited to science. The same singleness of purpose should prevail in all areas of human endeavor -- that of increasing our fund of knowledge for the betterment of all mankind which in turn helps us to fulfill our destiny on earth, as God intended us to do. ~~Stop~~ *Think for a moment!* ~~to think!~~ Why does the lawmaker study legal problems? Why does the physicist study physical matter and the mathematician the laws of mathematics? Why does the biologist study living matter? Why does the theologian study the laws of God? There can be only one answer! Each discipline has a common desire to increase knowledge in that discipline. For what purpose? Many individuals do not know for what purpose! A little thought makes one realize that man's destiny in this world cannot be fulfilled unless all possible knowledge is put

*Relate to various engineering specialties*

*Think for a moment!*



to use to that end! We must compare this patient -- in this case, the problems of man and the world at large -- with the patient under treatment by the physician. Our "patient" encompasses many fields of endeavor and we, as the physician, cannot adequately nor wisely "treat" him as a collection of specialized parts functioning independently of one another. All the parts of the problem must be considered together, with their inevitable interactions and effects of one part upon the other.

Dr. Wm. H. Pickering, director of Cal-Tech's Jet Propulsion Laboratory, Pasadena, California, in making a plea for better communication between political and scientific groups in the United States, makes this statement. I quote:

"It is not necessary for politicians to become scientists, or scientists to become politicians. It is essential, though, that better rapport be created between these two groups.

" This should be pursued through a broadening of the educational system so that science is as much a requirement to the well-educated man as knowledge of the classics has been in the past.

" I do not mean everyone will become a scientist, but I do believe everyone should understand the fundamentals of science. This will be exceedingly important to the leaders of our government because they will be governing a society where technology plays an increasingly important role."

Dr. Pickering's remarks were directed at the development of the national space program but they apply just as well <sup>to other problems and to</sup> our fundamental objective. In the light of what I have already said, the national space program is only a small part of our primary complex objective -- the betterment of mankind and the fulfillment of our earthly destiny. But the national space program is a good example of the need to develop a unity of purpose in attacking whatever task



is facing us.

The threat of a nuclear war is a serious one. The consequences of such a war might be relatively minor or could be major. However, the peoples involved in this great problem can rise above their petty differences and can integrate their various efforts in pursuance of the common objective, before serious consequences result.

Never before in the history of the world have the challenges to the graduate been as great as those existing today. No field of human endeavor is excluded. You, as High School graduates today, are the principle recipients of these challenges.

Let's suppose that I am addressing a High School graduating class at the time the Wright brothers first tried their wings. What would be considered the challenges of that day? Were the implications of manned flight even guessed at that time? That one would fly <sup>by 1960</sup> across the continent or the ocean with nearly the speed of the sun! Or that conversation with another person half way around the world would be common? Or that you could watch a picture of him while conversing? Who would have dared to make such predictions -- other than a Jules Verne in fiction? It is easy to look back and see what predictions we could have made. It's not so easy to predict for the future. But I would like to say that the future holds more promise than we can even imagine!

We like to think that we are more open-minded than our forefathers. That one who makes such fantastic predictions today is not crazy. Yet we scoff at those who say man will go into space, to the moon, or to the planets! But remember that the technical achievements of today were impossible yesterday. "It can't be done" are words used by the man who is ignorant, who has no faith, who has no vision. Anything can be done, if we acquire the knowledge necessary to do it! And this is your challenge as well as mine!



Your own education and careers can be compared to a multistage rocket from its launching to completion of its mission. Flight preparation and launching of the rocket compares with your growth and your education.

Present concepts of rocket design are that the more stages a vehicle contains the greater its capabilities for higher achievements. Your stages are the steps in your education. Flight preparation and launching includes the period of your lives up to the present. You are ready to be launched. First stage is college, second stage graduate school. Education is a never ending process of improvement. The more stages you can build into yourselves, the greater will be your achievements and recognition in the eyes of your fellow men.

Now is the time in your lives at which you can assume responsibilities in the improvement or sophistication of your own design. From here on it is up to you. You can be a short range ballistic missile, an intermediate range missile, a long range intercontinental missile, or a space ship with an infinite capability. You can fizzle out, explode on the pad or in flight, you can achieve a stable orbit, or go to the moon or planets. What you do now in improving your own design depends on the degree of your determination, your desires, and your motivation. Don't be timid; don't be afraid to be different! You be the leader to whom someone else is always brought!

Whatever field of endeavor you decide to enter, strive to add more stages to yourselves, more capabilities, to broaden your interests in other fields. Your lives will be enriched in doing so. Specialization<sup>^^</sup> today is almost a necessity, but don't overdo it. It can be carried to the point where you know more and more about less and less until you know all there is to know, -- about nothing!

Use your knowledge to help achieve our primary objective -- the betterment of mankind and the fulfillment of your own destiny.

Congratulations! And the best of wishes to you all. The hopes of your parents, your teachers, the nation and the world are with you on your launching pad tonight.