# COMMENCEMENT ADDRESS

PEABODY DEMONSTRATION SCHOOL

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by

Stanford Moore

The Rockefeller University

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When one of you, as a member of the Class of 1975, speaks to the graduating class of a Nashville high school 44 years from now, you will also look around the audience and experience the pleasure of seeing a number of your classmates who have contributed to the progress of the community in many significant ways in the years since you were students together at Peabody. This afternoon I feel myself a representative of our class of 1931.

But you will probably not remember who spoke at your Peabody graduation. If we took a poll of the audience today, probably only a few members could recall the name of the person who delivered the commencement address when they were sitting on this platform. A graduation ceremony is a very special occasion when your minds are occupied with many thoughts.

One thought that is on my mind this afternoon is that today is the last day of the Peabody Demonstration School, and those of us who are Peabody alumni are saddened by that thought. But that is no way to begin a commencement speech! Today is also the first day in the post-high school careers of one hundred young people; it is in that spirit that I am going to devote most of my fifteen minutes to thoughts about you and the future.

But the future grows from our past experiences, and by way of introduction I wish to dwell for a moment on one aspect of your Peabody years. It is difficult for any of us, while we are in school, to place true value on the contribution of our teachers. When we are out in the world, earning a living, we can look back on our high school days with a little more perspective on the importance of gifted teachers and the contributions that they have made to our lives. Many is the time that I have thought with deep gratitude about the members of the Peabody faculty who stimulated me to learn English, French, mathematics, history, and science. Actually, when I was in high school, French and history were not my favorite subjects. Yet when later I worked in Europe, I grew to appreciate fully the Peabody education received in those subjects. You will experience similar feelings in the years ahead.

There is one teacher whom I especially wish to acknowledge this afternoon. At Peabody he gave me an initial appreciation of the science of chemistry that deeply influenced my career. He is one of the great teachers of the Peabody Demonstration School, Dr. R. O. Beauchamp.

If some of you enter the teaching profession (and on the campus of the George Peabody College for Teachers it is likely that some of you might), you can do so with the knowledge that the skilled teacher in our society elicits heartfelt appreciation, even if our recognition of the contribution is not expressed as frequently as it should be.

Dr. Pratt has happened to invite a scientist to speak to you today, and one fairly general characteristic of scientists is that they are optimists. There is not much room for a pessimist in the research business. I am glad to note that the poem that you have selected for the program today expresses the research spirit well, as the author writes of the "unborn paths" that lie ahead. You are entering your careers at a time when problem-solvers with youthful enthusiasm are urgently needed. There are more problems in the world than I ever dreamt of when I was in Peabody.

And there is the solemn realization that today you are graduating from high school during an economic depression. Perhaps it will cheer you up a little bit if I mention that my graduation came during the major depression of the 1930's. The short-term outlook was grim. Yet the decades since then have encompassed a dramatic recovery and more economic and social progress than in any comparable period in the history of the world. The challenges were met by human ingenuity. The problems faced today are different and more complicated, but there is also a vastly greater wealth of knowledge to draw upon. The information explosion is having a helpful effect on most fields of human endeavor. Fortunately, you are living in the computer age; the memory banks of large computers are making it easier to keep up-to-date in the handling of information, both in business and education.

In our complicated world most (but not all) of the technical discoveries that can be made by a lone inventor working in an attic, with only the modern equivalents of string and sealing wax, have been made. As one of the exceptions, I think of the work of the brilliant contemporary British scholar, A. J. P. Martin. After producing two ingenious inventions, he has now decided that the scale of biochemical experiments needs to be reduced one-thousand fold. He lives in a rambling house outside of London and has a workshop in his spacious basement. After supper one evening he took me down to the lab to demonstrate his current micromanipulator. You have seen pictures of the instruments at Oak Ridge in which, as you move your hands huge arms inside a sealed room move large caldrons of isotopes. But Martin put his hands in two gloves and showed how they activated two little hands one-tenth the size of human hands. He lifted tiny beakers and pipets. With those little hands he was also building miniature machine tools - little lathes, drills, and milling machines - in order to build littler hands.

You may smile at his idea, but he was being financed by a major electronics firm to work thus in his basement. Miniaturization is a very practical concern in industry.

But A. J. P. Martin is a genius. Progress in science by most of us usually involves close cooperation among individuals with different specialties and the sharing of expensive equipment. The ability to work generously with others is becoming increasingly important in science, as it also will be in the solution of many of the complex problems that you will tackle in your careers.

I hope that you will forgive me if my main theme is science today. If you had engaged a clergyman to give this address, he would probably have drawn his theme from his specialty. But you have invited a scientist, who most logically draws his illustrations from biochemistry, which is a part (albeit a small one) of the culture of our times.

Last week I received a letter from a high school student in New York. She was writing a term paper and asked what in my opinion was the most important scientific discovery of this century. In science we learn that it is difficult to deal in absolutes, so I answered in terms of <u>one</u> of the most important discoveries. My nomination was the solving of the genetic code (a discovery, I might add, into which I had no direct input). The knowledge of how nucleic acid in the cell nucleus codes for the syntheses of the myriad proteins of living systems has opened many new avenues of thought. The universality of the code emphasizes the unity of nature's design - one code, one genetic

language, applies to all forms of life on our planet, to man, to animals, to bacteria, and to plants. In more practical terms, now that we can read the code we can see how certain previously not understood human illnesses can arise and perhaps can be alleviated through research in the years ahead.

Our own experiments have dealt in large part with the chemical structures of the proteins that are coded for by the nucleic acids. Many of these proteins are the enzymes that make it possible for us to do our jobs. Whenever we speak, or move a muscle, or think, we are using enzymes as catalysts. The human body is about half protein in terms of its solid constituents and one of the aims of the biochemist is to be able to write the structures of the thousands of proteins whose normal function is essential to good health.

In thinking of the future, those who are exploring the frontiers of biology suggest that the next major break-through in biochemistry may well be an understanding of the codes by which we learn and remember. In terms of human concern, nothing is more socially relevant than optimum mental function in the generations to come around this world of ours. Nobody yet knows whether the codes for learning and remembering are imprinted chemically in nucleic acids, or in proteins, or electrically in molecular circuitry.

You are entering an era in which progress is being made toward understanding some of the ways in which the human brain accomplishes the immensely intricate tasks that we take for granted in our daily life. But let me hasten to add, in deference to the theologians, that true scientists suffer no delusions of grandeur; the more we learn about the brain the more we stand in awe of the complexity of nature's most elegant design.

Progress in science and technology has been inspiring in the past forty years. When I was in Peabody I never dreamed that I would live to see a man walk on the moon. You have grown up in a period in which human understanding of the universe has reached a new dimension. But understanding of the men and women on this planet of ours is an even higher priority subject for research. You are beginning your careers at a time when enrichment of the understanding of human nature will have an important role in the increasingly populated environment in which we live. You will be sharing in that endeavor in your respective ways.

These have been my thoughts on this special occasion. I realize that there are more immediate problems on the horizon - receipt of your diploma, dinner tonight with your family, vacation, college, and a job.

You are looking forward to the excitement of new challenges, and the Peabody Demonstration School looks forward to meeting its responsibilities under a new aegis as the University School. The outcome of both ventures will be followed with great interest by the alumni, both the old and the new. It is important to Nashville and the world that both experiments be highly successful.