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DEDICATION OF THE NORMAN BRIDGE LABORATORY OF PHYSICS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY

PRESENTATION BY NORMAN BRIDGE

THIS is one of a series of pleasant occasions that have attended the growth and metamorphosis of this school for nearly a third of a century.

Each one has marked some accession of value in its progress from a small affair with varied aims and moderate ambitions, to a concentration of effort on the most ambitious plans for the selection and excellence of the few. Sometimes the acquisition has been a material one, as of buildings, grounds and tools; sometimes it has been spiritual and intellectual. To-day we welcome both forms.

The changes in the institution have come through a process of elimination of the casual and easy—designed for the many; and of the engrafting upon it of the more difficult, the more costly—and ultimately the more potent, for the few who can measure up to its requirements.

And the most telling addition of all has been the deliberate movement toward systematic research—otherwise the search for additions to the knowledge of the world.

We are gathered here to take note of the latest material addition to the equipment, as well as the latest spiritual and intellectual accession. This laboratory is undoubtedly a long step toward an ideal outfit for teaching, and for the research that is in the greatest demand at this time. But no man can guess what new facilities will be needed within a few years, for novel lines of research not now even thought of.

The growth of knowledge comes step by step; sometimes the steps are short, frequent, and strictly progressive; at other times they

are long, infrequent, and so radical that one step may require the recasting of a whole science. A hundred such instances stare us in the face, each one having sent a lot of the old apparatus of research to the scrap-heap. Such may some day be the fate of half the apparatus of this laboratory. If and when it comes it must be welcomed; if it will mean the achievement of vital economies for mankind—the exchange will be profitable, and the trade will be a good one. And you will then probably buy new and better apparatus, and go on with your research, but with new angles and for newly discovered purposes.

It was to be expected that such an expansion and elaboration in exacting education would occur here, on this hill—and with some such an institution as this. For, eons ago Providence, by the forces of the stars, made it certain that some day there would be here a great community of people, capable of such achievements as this movement represents, *provided* the land could be blessed with a stable and enduring government. Ages ago it was foredained to happen; it was bound to come, and come here —but with the indispensable peace-protecting and industry-protecting government.

Millions of years ago—yesterday morning it was, by the calendar of geologic time—the nearby mountains were lifted up by the buckling forces from below; and the off-shore currents of the more distant sea were then ordained to flow southward, and to flow *cold*. Then it was that the good luck of the low latitude and the right width of the low littoral, made it as sure as fate that here would be a wholesome climate, highly conducive to work and achievement, and that superior people would one day come hither in great numbers—given always a protecting government.

The influence of the mountains and the ocean—the shape and height of the mountains and the currents of air and sea; the width of the plain between, and the fortunate latitude, have made an ideal atmosphere on one lofty spot on the mountain for astronomical study—which study in our time has been realized in astounding fashion. In that day those forces also created here a multitude of engineering problems that are good for instruction, and for a challenge to research by some far-off generation of men. We stand to-day in the mid-period of that generation; and it would be a shame for us to fail.

Providence seems to have guided the human hands that have developed this institution as it is to-day. Really, it was a late discovery of a few people that nature had provided here the best conditions to make it the logical spot for a movement of this kind.

The first inspiration came to Amos Throop, a rugged, great soul with a far-reaching vision, who had been enticed here by the natural advantages for health and comfort. He knew how great these advantages are, and he knew that before many decades there would come about in this Southland the rapid growth of cities and the beehive of activity that we now see all about us. He saw that this community needed and deserved the best advantages of education and power. No such advantages had been provided for Pasadena. He had an ideal of a school to equip men to *do* things as well as to think and remember. His life had been keyed to practical in contradistinction to scholastic achievements. So he founded a Polytechnic Institute, and gave it all the money he had. By the measures of today the gift was not large, but it was greater than Mr. Carnegie or Mr. Rockefeller ever gave —for it was all he had. And he did what many givers of money forget to do; he gave himself with his gifts.

From that laudable beginning, this school of high college grade has grown. Now it summons from afar, and ofttimes invents, tools for its art unheard of before; and it calls from the ends of the earth the ablest experts into its faculty. Moreover, men famous in science come here to pursue further research with its facilities, under the inspiration of its work, and in the midst of its many advantages.

With all this development, the Institute has never departed from the original ideas of Mr. Throop ("Father Throop," as he was lovingly called) that it must in the highest degree possible give an education that shall fit men to *do* things in this rushing world of useful achievements—and a new civilization.

The new laboratory is the latest step in this practical direction, but by no means the last step. It is being equipped with all the practical things its designers could think necessary —but no human mind can foresee what new machinery may be needed on tomorrow—or some other morrow. In this particular the end is not yet; and the equipment will never be finished. It will always be growing and changing.

Another inspiration came out of a search for a good place for a Carnegie Observatory for the study of the sun and other stars. Should it be located here or across the sea; or across the equator? It must be put in the best place—for millions of money were sure to be spent upon it. The incomparable director of that work soon demonstrated the natural advantages of Mt. Wilson for the observatory. More than that, as this region bristles with scientific problems and interrogation points, he saw that here was the place of election for a great scientific school of the future. It not only belonged here, but it would be a wholesome neighbor to the Observatory. Then it was that Dr. Hale consented to become a trustee of this corporation, on the condition that the Board should fix a standard for the school, a little higher than that of any other then in existence. The Board, under the enthusiastic leadership of the then President, Dr. Scherer, promptly accepted the challenge; and it has, I believe, kept its promise, and maintained the condition.

But the plans for this higher emprise could not have been carried out, but for the vision, faith and unfalteringness of the Chairman of the Board, Mr. Fleming. His wisdom has, if possible, exceeded his determination; he has asked from others large gifts and got them; and, like the true soldier he is, he has led the way by making larger gifts himself. To use a colloquialism, he has been for years the very "angel" of the Institute. He does more good things, and talks less about them, than anybody else—and I nominate him as the most useful citizen in this community.

The evolution of a great laboratory is an absorbing subject—absorbing both in interest and money. Two years ago a laboratory of the physical sciences became a vital need of the Institute, if it were to go on in its progress without halting. It required a large expenditure of money. Some folks at our house, who had watched the growth of this movement from its beginning—and helped through its first two decades and more—had for long expected to do something more substantial toward its perfection than they had done before. Of course they knew of this urgent need and opportunity. But they were unable to see how they could provide even a small laboratory without losing so much time that opportunities and treasures of the first order were likely to be lost before the building could be completed. And the need was for a *great* laboratory, not a small one. Then a new light dawned, a hint from a genius, and the laboratory began to take form as a reality.

The program of this occasion says that the presentation of the laboratory is to be made by the donor. It ought to have said *donors*. For myself and Mrs. Bridge, some personal facts should be stated here; and one of them is that I appear here rather under false pretences. We could not have rapidly provided this magnificent and elaborate structure without the influence and connivance of that remarkable man already named, the wise and unselfish Chairman of the Board of Trustees. So, constructively he is in very essence one of the donors. Without his wisdom and faith, this building could not have been provided in time to function early, and early to embrace the greatest opportunity the institution has ever had. And as I am speaking in the presence of—as well as at, the head of the governing council of the Institute, who is also the Director of the Laboratory, I will, at the moment, spare his embarrassment by merely hinting at what that opportunity was. This community and the educational world are fast finding out what it was; and if God and the fates spare his life, they shall in good time realize it completely.

For myself, I beg to make a personal explanation and a confession—wherein may appear the evidence of the amazing vacillation of man. I

had long protested that my name should not be given to any endowment of anything that I might ever make; I protested against the use of it on this laboratory building; and the arguments of members of the Board and other friends, including the Director of the Laboratory himself, failed to move me in this particular—until I found that the vital member of my own household, who had for half a lifetime helped toward this opportunity, was in league with these people—then I surrendered. And I am ready now to confess to one comfort in seeing my name chiseled over the chief portal: it ought to tend toward discouraging the public from longer trying to impose on my name a final *S* and a middle initial!

As to the material contributions toward the building, they are made with utter gladness, with the knowledge that here shall develop a great center of education and resarch that will give the start and found the careers of many of the scholars and super-engineers of the future —and make life easier and more joyful, as well as more worth living, to vast numbers of people —for the men who are graduated here will carry the torch to others, and they to still others, on through an endless succession. Certainly no gift of mine already made, or that shall hereafter be made here, can possibly be a measure of my faith in this institution, and I have not for years had any official connection with it. My faith in it is greater than if I had a hand in its management.

Finally now, and in behalf of the donors and all the friends who have encouraged this consummation—those who have hoped and prayed for it; those who have planned and designed it and watched its growth; and those who have devised and furnished the sinews of construction that have made its walls arise into being—in behalf of all these and in their name, I commend and present this Laboratory of Physics—the last and best word in a modern workshop of nature's philosophy, to this corporation, and to you, Dr. Millikan, its Director—to you, Sir, who embody in your person the new spiritual and intellectual gift that comes with the Laboratory. And you are the hope and sure promise of the future!

ADDRESS OF ACCEPTANCE OF THE NORMAN BRIDGE LABORATORY OF PHYSICS

IN accepting in the name of American physics this beautiful and well-appointed laboratory, I wish first to express on behalf of my colleagues and myself the appreciation and gratitude which we feel because of the opportunity which you, Mr. Fleming, and you, Dr. Bridge, have jointly opened up to us, not only of devoting ourselves to the intensive pursuit of the science which we love, but also of assisting in the solution of the fascinating and vitally important problems which the extraordinary developments in physics during the past two decades have pushed to the forefront of the world's needs to-day.

In the second place, I wish to accept this gift on behalf of the California Institute of Technology, with which I now have the honor to be connected, and to express its gratitude for the opportunity which is thus afforded it of taking another long stride forward toward the realization of the ideal which the far-visioned men who constitute the Board of Trustees have had from the beginning—an ideal not very common in American educational institutions, an ideal not of large growth in numbers, nor of the extension of the field of study over a large range of subjects, but rather the ideal of doing work of superlative quality in the chosen and relatively limited field of the Institute's activities—*the cultivation of the mathematical and physical sciences and their applications.*

In the third place, I wish to accept this gift on behalf of all those who, like myself, believe that the private educational institution still has a very vital role to play in the development of American civilization. I am no opponent of state education. From the common school up it represents one of America's most important contributions to modern life, and that contribution should be greater in the future than it has been in the past. But state-education is not all that is needed in this country. It can do something but not everything. Indeed, one of the most dangerous tendencies which confronts America to-day is the apparently growing tendency of her people to get