

# ENGINEERING AND SCIENCE

Monthly



Vol. IX, No. 10

October, 1946

## LOOKING AHEAD

By LEE A. DUBRIDGE

IT IS A pleasure and a privilege on this occasion to extend greetings and best wishes to all Alumni of the California Institute of Technology. As I take up, with humility and considerable trepidation, my new duties at the Institute, I find myself continuously conscious of the fact that I will need to depend heavily upon the Alumni and all other friends of the Institute for advice, encouragement and support in the days that lie ahead.

The alumni of any educational institution are its most important product. The institution, in fact, exists to produce capable alumni. And the institution is judged by the quality of its alumni body, and the leadership which its alumni give to the communities in which they live.

I am already proud of the CalTech Alumni. I was proud of them even before I came to the Institute. I have met them in my travels and duties in recent years through the length and breadth of this country. In every case I have found them to be men of ability and vision — men who hold the highest respect of their colleagues, and their communities. No institution could have a greater asset than such a fine Alumni body. I say this, not in flattery to you, but to assure you of the fact that even an outsider knows that the Alumni of CalTech have assumed a place of importance not only in Southern California, but throughout the United States. The urgent demands of industry for more of our graduates is an impressive tribute to the quality of those who have gone out before.

It will be a pleasure and a privilege for me to become more closely associated with you, and to work with you toward the objective of making the California Institute in the future an even finer place than it has been in the past.

### CHARTING A NEW COURSE

A change of administration in any institution is always an occasion for taking stock of where the in-

stitution stands, and where it is going. But even if there were no change in administration, it would still be appropriate, at this point in the history of this country and of the world, for us to pause and ask how this Institute can adequately meet the many problems which a changed world has thrust upon us. I have already requested the Faculty and the student body to join with the administration in a cooperative attack on the problem of charting our future course. I should like to take this occasion to invite and urge the Alumni to join with us in this cooperative enterprise. We know that the tasks and responsibilities which lie ahead are great. I know that they can be met only through a cooperative effort among all those who are interested in CalTech's future.

### THE INSTITUTE'S MISSION

No educational institution could have a finer set of basic ideals and objectives than those upon which the California Institute has been operating for the past twenty-five years. These were formulated by the late Dr. Arthur A. Noyes, and were adopted by the Board of Trustees of the Institute in 1921. Under Dr. Millikan's inspired leadership they have been brought to practical realization. I could do no better than to quote a few excerpts from this statement of objectives.

The primary purpose of the Institute, according to this statement is "to provide a collegiate education which, when followed by one or more years of graduate study, will best train the creative type of scientist or engineer so urgently needed in our educational, government, and industrial development." (And one might add today, "so urgently needed by society at large.")

In order to accomplish this objective, the undergraduate courses of the Institute should provide "a combination of fundamental scientific training with a broad cultural outlook which will afford students with scientific interests a type of collegiate education which avoids the narrowness common with students in many technical schools, and the superficial-

ity and the lack of purpose of many of those taking academic college courses."

It has been said that the true scientist or engineer, or indeed the true specialist in any field is simply "a broad man sharpened to a point." The Institute aims to provide both breadth and "point" in its educational process. It is hardly necessary to state that the world today needs such men more than ever in the past.

In keeping with these educational objectives, the statement goes on to say, "research shall be made a large part of the work, not only because of the importance of contributing to the advancement of science, and thus to the intellectual and material welfare of mankind, but also because **without research the educational work of a higher institution of learning lacks vitality and fails to develop originality and creativeness in its students.**" (Boldface mine.)

It is worth while to pause for further emphasis on this point. The California Institute is not primarily a research institute. Research institutes, disconnected from the educational process, often grow sterile because of the lack of the stimulus which is provided by fresh young minds. It is equally true that a teaching program, on the level on which the Institute is engaged, also grows sterile if the active and inquiring minds of the Faculty are not given full opportunity to carry forward their investigations, and if the students themselves are not brought into contact with the forefront of scientific and engineering progress. At an institution like California Tech, therefore, research and teaching are not two conflicting objectives, but are rather two essential aspects of the same basic objective; namely, to train **leaders** in pure and applied science.

Dr. Noyes' statement goes on to say, "In order that the policies already stated may be made fully effective as quickly as possible, and in order that the available funds may not be consumed merely by increase in the student body, it is the intention of the Trustees to **limit the registration of students** at any period to that number which can be satisfactorily provided for with the facilities and funds available. (This) limitation has the highly important result of giving a select body of students of more than ordinary ability." (The experience of the Institute has shown that there are additional advantages to a relatively small student body, for in a small, compact organization the spirit of friendliness and mutual collaboration can have its full important influence on the effective development of the Institute's program.)

"For the same reasons it is the intention of the Trustees not to allow the work of the Institute to be expanded into new branches of science or engineering until all the existing departments are brought to the highest efficiency, and until the needs of the student life are fully provided for."

Summarizing, one can say that the aims of the Institute are:

1. To train men for **creative leadership** in pure and applied science;
2. To provide a **breadth** of training and the type of student life which will develop men as citizens and human beings as well as scientists;
3. To encourage research as an essential and important part of this educational process;

4. To limit student enrollment to a number that can be effectively handled by existing facilities and staff and to insure the highest quality in the student body;

5. To concentrate attention on a few basic fields of pure and applied science with the aim of attaining superb quality in them before any new fields are undertaken.

I am sure you will agree that the aims stated above constitute the finest possible set of policies and ideals on which the Institute can develop its program. I personally subscribe most heartily to these ideals, and believe they can be made the basis for our further progress.

#### OUR ASSETS

In charting our course for the future, it is appropriate to take stock of the tangible and intangible assets which the Institution possess, and on which it can build.

The sound ideals which I have already outlined constitute possibly our most important asset. These are supplemented, however, by more concrete ones; the most important of which are an exceptionally fine faculty, an able and spirited student body, and, as I have already pointed out, a great body of loyal Alumni.

Our material assets are no less impressive, although as we shall see, one of the problems facing us is their future expansion. Considering the fact that the material assets of the Institute began to accumulate only 25 years ago, it is truly astonishing, the level which they have reached.

We have, in the first place, a 30-acre campus with a fine set of buildings conservatively valued at not less than \$8,000,000. The buildings are equipped with some of the finest facilities for scientific and engineering education and research to be found anywhere in the world.

In addition to our on-campus facilities, the Institute is also operating several off-campus assets of very considerable value. These include, not only certain small experimental facilities, the Cooperative Wind Tunnel and the large Jet Propulsion Laboratory, but, most important of all, the great Mount Palomar Observatory with its 200-inch telescope, scheduled for completion next year. The telescope and observatory were made possible by a grant to the Institute of \$60,000,000 from the Rockefeller Foundation, and this, the greatest astronomical observatory in the world, will be operated by the Institute under conditions which will assure close collaboration with its sister institution, the Mount Wilson Observatory of the Carnegie Institution of Washington.

On the financial side, we have a respectable, but not unduly large, endowment of about \$17,000,000, which is well invested, and yields a return of slightly over four per cent. In addition the Institute has other sources of income from trusts, from gifts, from the Institute Associates, and from miscellaneous sources which yield amounts which fluctuate between \$250,000 and \$400,000 a year. Income from student tuitions will, in a "normal" year, yield an additional \$500,000.

The Institute's general budget for educational and research purposes, therefore, is in the neighborhood of one and a half million dollars a year. In addition

to this, the Institute is engaged in special research projects, sponsored by industry and the government, which, during the current year, will total nearly \$4,000,000. About three-fourths of this goes into a single large project operated under government contracts; namely, the Jet Propulsion Laboratory, operated in conjunction with the Guggenheim Laboratory of Aeronautics as one of the major research laboratories in the country in this field. (It might be of interest to note in this connection that during the war the Institute handled government contracts for research and education which hit a peak rate of nearly \$5,000,000 per month, and totaled nearly \$85,000,000. Contrary to rumor, however, this was done on a pure "no profit-no loss" basis, as a service to the country on which no financial gain was either expected, desired, or obtained.)

#### FUTURE NEEDS

An intensive study of the future needs of the Institute is now being undertaken by the Faculty and the Board of Trustees. A few of the more obvious needs, however, can be stated at once.

1. The expansion of the Faculty to make up for losses and deaths during the war, and to relieve the heavy pressure under which present Faculty members operate to carry on effective programs of teaching, research, and administration.

2. An extensive program of increased salaries for Faculty and of higher wages for employees to bring these up to the standards of other institutions, to attract and retain a staff of the highest quality, and to meet rapidly rising costs of living, which have been particularly pronounced in the Southern California area.

3. A considerable expansion of physical facilities to relieve present serious overcrowding, particularly in the engineering departments.

4. Expansion of facilities for student life and activities, including additional dormitories for graduates and undergraduates, a gymnasium, a swimming pool, and other athletic facilities, and eventually a student union building. (The possibility of purchasing Tournament Park from the City as site for these developments is being explored.)

5. Expansion of funds and facilities for teaching and research in all existing departments, aimed at the improvement and modernization necessary for the Institute to keep its position of leadership. There should be special emphasis on the fields of applied science not yet fully developed, and on fields which by circumstances are logical ones in which the Institute should take national leadership; such as astronomy and astrophysics, nuclear energy, chemical biology, aeronautics, etc.

6. Expansion of the Institute's public relations program with the aim of bringing before the Alumni, students, prospective students, Associates, and the general public, more information about the Institute's activities, achievements, and resources, with a view to achieving better appreciation and support of the Institute's program on the part of all interested groups.

These are not easy goals to achieve; some of them may not be achieved for years to come, if at all. But it is necessary to achieve all of them—at least in part—if the institution is to retain its position of national leadership in its field. Their achievement will require the securing of tens of millions of dollars of additional funds for buildings, equipment, and endowment, supplemented by annual contributions by hundreds or thousands of people.

There are those who say that institutions like ours must, in the future, look to the government for support of its activities; that private sources no longer exist. To this view I do not subscribe. It will, no doubt, be true that many of our special research activities will receive support from the government agencies. But such support, on such terms as the Institute will wish to receive it, must come in consequence of, and in addition to, the Institute's own inherent strength. The public now, as never before, is conscious of the urgent needs of society for scientific and engineering research, and for the developing of civic leaders who are trained in the fields of science and engineering. I am confident that with enough energy and imagination public support can be secured.

#### WHAT CAN THE ALUMNI DO?

It is obvious to anyone, I think, that a program of the magnitude which has been outlined cannot be put into effect without the active encouragement and help of the entire Alumni body. Every phase of the program can profit by Alumni help and participation. Conversely, I believe it goes without saying that every step which is taken to enhance the Institute's reputation and to enlarge the area of its achievements is of direct benefit to each alumnus.

However, the particular ways in which the Alumni can be most effective, the particular phases of the program on which Alumni should be concentrated, the particular mechanisms by which Alumni help will be rendered effective, are problems which had best be left to the Alumni themselves. I would prefer to regard it as my function to outline to the Alumni the present status and future needs of the Institute, the plans which are being formulated for its development, and then to keep the Alumni continuously informed of the progress of our plans and activities. I can also assure you that the Institute urgently needs and greatly desires your support, and that the Institute will collaborate with Alumni organizations in every possible way to bring them into closer touch with the Institute to the mutual advantage, I hope, of both sides.

It was a source of tremendous pride and satisfaction for me to learn, almost immediately upon my arrival in Pasadena, that there was already a spontaneous movement among Alumni toward the more active participation in, and support of, Institute activities. Your Alumni Association is now studying this problem with enthusiasm and intelligence. The Administration of the Institute will cooperate enthusiastically, and wholeheartedly, in any program which the Alumni themselves wish to undertake. With your help, the Institute can look forward to a future even more glorious than its past.