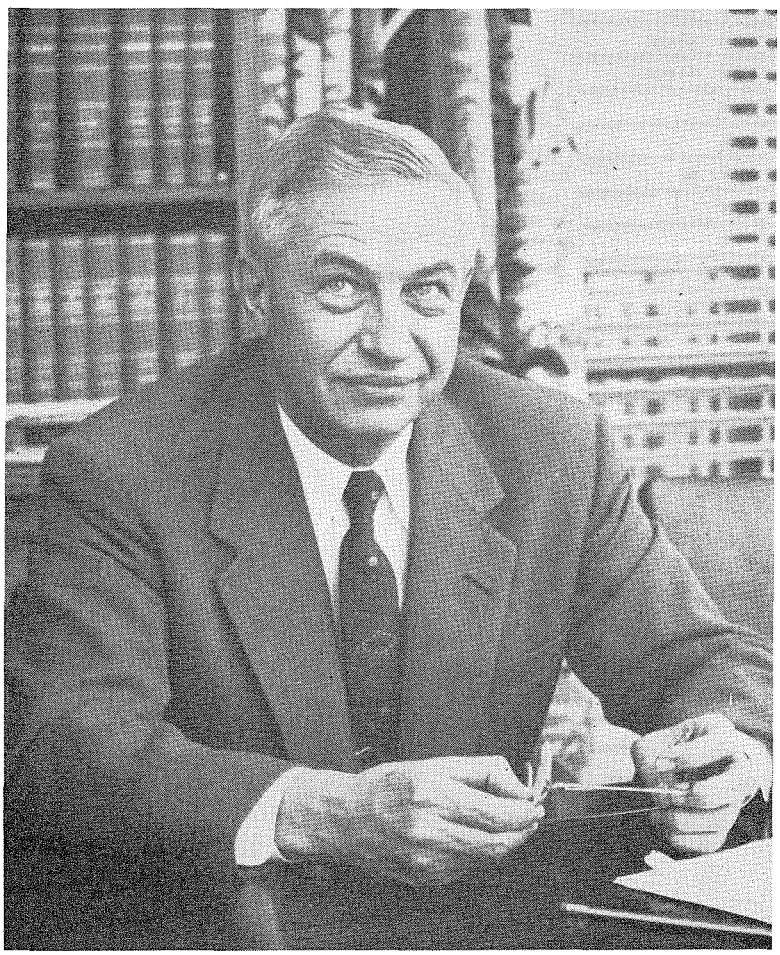


Highlights from Dr. DuBridge's report on the activities of the Institute in 1954-55

THE PRESIDENT'S REPORT

ENROLLMENT FIGURES are not news here at Caltech since we have reached our goal of a stabilized student body of approximately 1000. The undergraduate body numbered 578 in September 1954 and 615 in 1955. It will fluctuate approximately between those limits, depending on cancellations of freshman admissions, academic mortality and transfers to and from other colleges. Graduate enrollment was 429 in 1954 and 420 in 1955.

Although we are fully aware of the flood of young people who will be overtaxing the facilities of American colleges and universities by 1960, the Institute, like many other private institutions, has decided that, in order to maintain high quality instruction and to avoid the frustration of overcrowded laboratories and classrooms, it will maintain a nearly stable enrollment figure.

To enlarge our laboratories and lecture rooms in order to expand the freshman class even only 10 percent above its present limit of 180 would be very difficult. To expand by 20 percent would involve a major construction program. Although we have the problem under study, it now appears wiser for us to devote any building funds we can obtain to creating adequate facilities for a student body of the present size. As has been repeatedly pointed out, our campus is still not complete and we should attain completion before we seek expansion.

The rising flood of college-age students is reflected in the numbers who apply for admission here each fall. Following the veteran flood of 1946-50, the number of applications reached a low point of 407 in 1951. It has since risen steadily. In the fall of 1955, in spite of an increase in tuition from $600 to $750, applicants numbered 1165. It is from that group that we selected 180 freshmen.

The situation has now arisen when we must admit many more students than we can take care of, since only 55 percent of those admitted actually entered this September. The rest chose other institutions. We see no way of avoiding this difficulty, because good students are certain to be admitted to any institution to which

they apply; and many unpredictable factors, ranging from family ties and financial developments to competing scholarship offers, will determine the final choice.

The students whom we do admit are mostly among the top 10 percent in the country as judged by the national College Entrance Board examinations; many are within the first 5 percent. They are students that every college would like to admit. (College classrooms may be getting more crowded every year, but there will always be fierce competition among the colleges for that top 5 percent.)

One would think that none of these students would ever fail. The number who do fail here is small in comparison with the average college. But every single failure is something we take very much to heart. Something other than the student's intellectual capacity must have caused it. Was a scientific course not his heart's desire, after all? Did our academic practices fail to challenge or interest him? Did he spend too much time in social life, or in earning his living expenses? We are earnestly trying to understand each case in order to help each individual find the right solution to his problem.

The Dean of Freshmen reports that the freshman class of 1954-55 lost only 9 of its 170 members through academic deficiency—about half the figure for previous classes. If this new low level can be maintained, it will signal a success in our efforts to reduce academic mortality. A more highly organized plan for bringing freshman and faculty members together is credited for a portion of this success.

If our students are so well selected and if they perform so well with such a difficult curriculum, it is natural to be curious about how well they do after graduation. Here we turn with this question to the companies that employ Caltech graduates. There is no mistaking the reply; they want more!

One hundred and twenty prospective employers sent representatives to the campus to interview seniors and graduate students. They conducted 2437 interviews and collectively made from 1 to 13 offers to each student. These figures are, of course, typical of those to be found in any engineering college in these times. But the exceptionally high regard in which Caltech alumni are held by these employers who seek more of the same is a great tribute to the quality of men who have graduated here.

Graduate students

Our graduate students are a cosmopolitan group. Twelve percent received their undergraduate degrees at foreign institutions; 32 percent from American institutions east of the Mississippi; 27 percent from western institutions other than Caltech; and 29 percent from Caltech.

About 200 new graduate students are admitted each year, but this year nearly 3,500 prospective students sent in inquiries—many of whom were discouraged from applying. About 750 applications were finally received.

At the 1955 Commencement we awarded 126 BS degrees and 195 advanced degrees: 101 MS, 19 engineer's degrees (17 AeE and 2 ME) and 75 PhD's. If the past is any guide, some of the leading scientists and engineers of the future are in that group.

It is natural that a much higher proportion of the graduate than undergraduate students receive some form of student aid: scholarships, fellowships, or teaching or research assistantships. The Institute provides tuition scholarships to nearly half (203) of the graduate students, including many of the 197 who also hold assistantships. The Institute also administers 59 fellowship grants from private donors, while many students receive grants directly from both government and private agencies. We are aiming for the situation where no high quality graduate student need terminate his education for lack of opportunity for financial assistance.

Finance

This year was an especially fortunate one financially. Although a substantial excess of expense over income was originally anticipated, we actually ended the fiscal year with a surplus of $24,281. Our endowment income exceeded two million dollars this year, including about $80,000 taken into the income account from the Spalding Trust oil royalties. Gifts for current purposes—exclusive of gifts for endowment or buildings—amounted to $1,445,748, nearly $200,000 more than for the previous year. The total income available to the normal campus programs of instruction and research was $6,500,090, approximately $500,000 greater than the previous year.

Thirty-five companies are now participating in the Industrial Associates program (each at $10,000 per year). Twenty-two of these 35 and also 40 other companies made additional grants for research, for fellowships or for other purposes. This rise of industrial support of higher education and research in recent years is one of the most promising developments insuring the future stability of our private universities and improving the excellence of the public ones.

Research

The completion of the Norman W. Church Laboratory of Chemical Biology will greatly ease the space problem in this field and will expedite many important programs. Within the Church Laboratory, the equipment of a new special laboratory for virus research is already under way and will be completed as soon as funds are found. This will give our important virus program the special facilities it has long needed.

Attention is now focused on the very critical space problem in chemical and electrical engineering. Plans for a new engineering building are now being drawn and funds are being sought with the aim of beginning construction next summer.

The synchrotron has been undergoing the revisions

necessary to bring its output of electron energy from 500,000,000 to greater than 1,000,000,000 electron volts. Operation at the new level is expected this fall.

It has become apparent that the time has arrived when the Institute must have on campus a major digital computing laboratory. It is necessary to assist in a variety of computing programs in all the divisions; it is vital as an educational asset and as a tool to prosecute research into the design and use of electronic computing equipment. Funds for this purpose are being sought.

At many points around the Institute research programs of great importance are in progress. About 530 scholarly papers were published this year. The various research-supporting agencies of the Federal Government are contributing about $2,000,000 annually to these research activities. Since these agencies submit all proposed research projects for careful review by leading experts, the many grants and contracts now in force here are an impressive tribute to the quality of the Caltech research program. The very substantial support from private sources—foundations, corporations, and individuals—is an additional tribute.

RESEARCH HIGHLIGHTS

IN THE Annual Report of the Institute, published this month, the various divisions summarize their research activities for the year 1954-55. From these voluminous reports we have extracted the following highlights from each division.

Biology

FROM THE SUBMICROSCOPIC viruses to the largest mammals, every living creature known to man contains, as components indispensable to its structure and function, the two classes of giant molecules known as proteins and nucleic acids. Every living cell in the human body contains myriads of molecules of these types. Proteins come in thousands of varieties. The one found in muscle, for example, is responsible for our movement. Many of our hormones—like ACTH—are protein in nature. The thousands of enzymes that make possible the chemical reactions responsible for life processes are proteins or contain them. Proteins protect us against disease and they are responsible for many of our allergies.

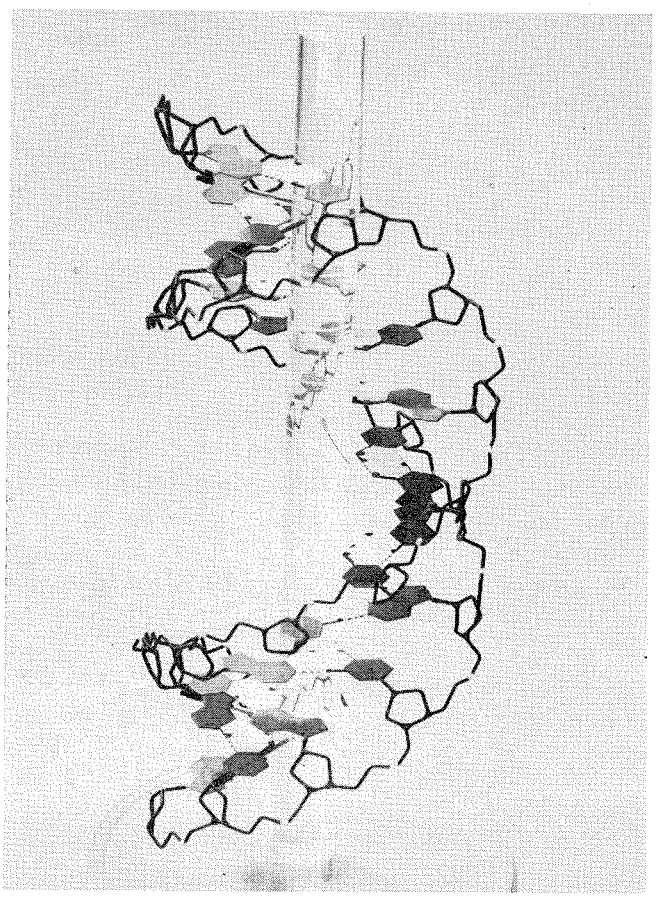
In brief, almost every activity of a living organism is concerned with proteins. Nucleic acids are closely related to proteins. It is natural, therefore, that much of the activity of the Institute's Division of Biology should center around the structures, functions and manner of formation of these remarkable substances.

Members of the Division of Chemistry and Chemical Engineering, as well as those of the Division of Biology, have contributed significantly to our understanding of the structure of proteins. A biologically attractive hypothesis as to the detailed structure of the nucleic acid of hereditary material was formulated at Cambridge University a few years ago. Since then, much attention has been given by Institute workers to problems connected with the reproduction of this type of nucleic acid, and the manner in which it transfers information to a second type of nucleic acid and to cellular proteins.

Molecular structure chemists, biochemists, geneticists, immunologists, and workers in many other related fields are beginning to reach agreement on a working hypothesis as to what these interrelations are and how they are brought about. It is believed by many that units of heredity—genes—contain information in the form of one kind of nucleic acid called DNA.

DNA is thought to be capable of duplicating itself systematically with each cell division, and of serving as a model or template from which a second nucleic acid, known as RNA, is constructed.

RNA, in turn, is believed to serve as a jig or template against which specific proteins are constructed from free amino acid building blocks. On completion of these



A model of the proposed structure for DNA, the nucleic acid of hereditary material.