was always the ability of youth that was recognized and rewarded.

The second quarter century of the society's history has seen further development of national policies as distinct from chapter activities, but the purpose of the organization as originally expressed by the nine young men who started it has never been lost sight of—the promotion of research in pure and applied science. On the contrary, the society as a whole is realizing its object to-day more substantially than at any time in its history. The 28 chapters of 1911 have grown to 68 chapters in 1936. Chapters are no longer limited to the United States. Canadian institutions have been recognized, and inquiries about chapters in England and Europe have been received. Instead of 300 young men and women elected annually into the society, there are now some 1,200. A constituency of 7,500 in 1911 has become nearly 35,000 in 1936. The membership of 1911 was largely limited in residence and work to the United States. Members and associates of Sigma Xi in 1936 are residing and engaging in scientific research in fifty-five different countries of the world.

National policies have expanded. The society realizes the fact that there are youths in institutions where there are no chapters who have shown excellence in one or more scientific courses, and since 1934 has issued to such individuals certificates in commendation of their work. Over two thirds of the society's constituency are either not connected with any educational institution, or if they have such connection, it is with institutions where there are no chapters. This large group are many of them engaged in actual research, and all of them are interested in the promotion of research. Sigma Xi clubs are authorized to organize wherever there is an interested group of members and associates, and since 1921 Sigma Xi members and associates outside educational institutions have been supporting a Sigma Xi Research Fund, which is distributed by the national organization in small grants-in-aid of research to young men and women who are carrying on scientific investigations in institutions of limited resources. The close of fifty years of constantly expanding activity is signalized by the award of two prizes of $1,000 each, not for research accomplished, but to young research workers in recognition and support of research in progress—one award to a worker in the biological sciences and one to a worker in the physical sciences.

Thus throughout its fifty years of life, the Society of the Sigma Xi has recognized and rewarded ability in science on the part of young men and women. It is in that important aspect of its policies—the encouragement of youth—that lies the ground for its prominent position among scientific organizations, the explanation of the influence it exerts on the advancement of science all over the world and the confidence its supporters everywhere express in its brilliant future.

EDWARD ELLERY
UNION COLLEGE

THE INCEPTION OF THE SOCIETY OF THE SIGMA XI

IN an examination of the addresses delivered during this commencement season at the various universities of the country, it appears that the main theme is the outlook upon the future—but to me there has been assigned the task of looking backward, and to neglect being a prophet of the future, for all prophets are on uncertain ground, and to give the salient facts of the past which led to the inception of the idea for the organization of the Society of the Sigma Xi.

The need of a society in colleges to recognize the scientific spirit and acknowledge research was not altogether new fifty years ago. Science in fact was energetically pushing up its head amid the devotees of classical culture, and it was occasionally accentuated by profound scholars that the study of the classics, Greek and Latin, while of a certain cultural value, were not of necessity a mental or even educational training such as best fitted students for a scientific career nor for deep research nor even as a preparation for the activities of life.

As a junior student at the Stevens Institute of Technology, there came to my attention a commencement day address before the Phi Beta Kappa Society at Harvard on June 28, 1883, by Charles Francis Adams, Jr., of Boston, for which he selected the unique title "A College Fetich." This address stirred the classicists from one end of the country to the other, and even had its rebound into England and Germany.

First let us indicate who this Charles Francis Adams, Jr., was. At the time he was president of the Union Pacific Railway—hence spoke as one with authority. He was one of the celebrated family of Adams that had supplied two presidents of the United States—(and in passing we can now say that a recent Adams of the same name was our Secretary of Navy during the Hoover Administration). This Phi Beta Kappa address seriously challenged all claims for the study of the dead languages to have educational value. In fact, he said that this study of the Greek and Latin had been like a millstone about the necks of all the family and all others who aspired to careers in science or even in politics and diplomacy, and such study as feats of memorizing was the correct thing for those who expected to become professors of these languages; but that as working tools of life, a knowledge of French, German and Spanish was far preferable, and that for close and exact mental drill, the higher mathematics, chemistry, biology and electricity were then most essential.

Let us quote some of Charles Francis Adams's surprising phrases which still cause students of these fifty years later to think. He states, talking to his classmates of 1856:

> And so looking backward from the standpoint of 30 years later and thinking of the game of life which has now been lost or won, I silently listen to that talk about "the severe intellectual training" in which a parrot-like memorizing did its best to degrade boys to the level of learned dogs, and further "we want no more classical veneer whether on furniture or education, we do not admire veneer."

These were indeed harsh words, from one of a family steeped in the classics; and thus delivered before the Phi Beta Kappa Society, they caused one to think, whether that society's insistence on the classics was well taken, and if so insisted upon whether another society should not be established to recognize high standing of those following scientific studies.

Do not conclude from this that your speaker himself had an aversion to such classical studies—for my own father was a deep classicist and in the ministry delved deeply not only into his Greek and Latin, but into Hebrew and the Germanic languages, and the intention was that his son should follow in his profession.

The son, captivated by the researches of Alexander Graham Bell into telephonic electricity and Edison into the phonographic recording and the incandescent lamp, early decided for himself that the classics had nothing comparable to offer in the pursuit of these new rapidly growing sciences. It should be recalled that these sciences and the researches connected therewith had but barely started fifty years ago, and the crude developments of that time if recounted to you would seem now almost improbable to the young trained scientists of to-day who work with instruments whose names and measurements were then not even evolved.

Finding myself on the instructing staff at Cornell University in 1885 in the Sibley College of Mechanical Engineering, soon friendships of all kinds were made among such instructors and among students, and shortly thereafter four of such were gathered together in one group at a boarding house—still highly remembered for its homelike atmosphere fostered by a most kindly and lovable landlady. Of these four friends—two were deep classicists and two were engineers. Our classical friends, Burr and Thurber (Burr later became a professor in Cornell and Thurber an authority with Ginn and Company, publishers). Both of these attempted to console the two engineers (Van Vleck and Wing—both later becoming professors) that the rewards of an honorary election to the great Society of the Phi Beta Kappa were not for those so soaked in science as we were, and who could not read in the original Caesar's Commentaries nor enjoy the orations of Thucydides or some other Grecian. Thus we did not hold any particular sorrow that we had missed such an honorary election, and both Wing and myself made the pronouncement that a new honor society for scientific men only would in time duly arise —but little did we two dream that we would be the agents for such a new and untried organization, either at Cornell or any other institution.

This start was even sooner than anticipated—and was brought forward by the suggestion of Mr. W. A. Day, Cornell, '86, to myself as we toiled up the Ithaca hill from town in 1886, essentially as recounted in a letter appearing in the quarter century volume of Sigma Xi.

The organizing machinery was soon put in motion, and in the fall of 1886, shortly after the opening of the university, these plans were put into effect.

Here it should be said that our plans were often talked over with our room-mates Burr and Thurber, and they gave much excellent advice, although we jokingly informed them that as sincere friends we could not award them any honor of an election, as, being mere classicists, they could not understand the deep "cultural advantage" to be obtained from a close and exact study of the sciences.

Again these classical friends did come to our aid, for when the subject came up for a new name for the society Mr. Burr at once said, "Don't make the mistake of calling the new society with an English name, but give it at once a Greek classification name—much as you dislike reference to the classics, and if for nothing else the use of Greek initials marks it at once as a thoroughgoing collegiate organization." This appeared sound advice, and it was determined that I should canvass among all the even then large number of Greek fraternities and select some set of Greek initials that had not already been preempted by some other fraternity. There were not many such initials available, but we did find that Sigma Xi was not in use; then came the problem of a definite Greek motto to fit these initials. Wing and myself, having no knowledge of Greek much beyond its alphabet, were helpless, but Burr suggested, "Give me a little time and I can find it for you." Later he evolved the two-word motto and referred it to the then professor of Greek, who polished it up for accent or something. Still later then Professor Henry Shaler Williams, head of the department of geology, was brought in. We had him look over the motto and he approved it without a change, and so it has remained ever since.

An idea of the motto was also that of confirming the thought of a friendship among scientific workers, as it had been observed that in the records of European

scientists, as Faraday, Helmholz and others, there had often been an interchange of scientific views between scientists even when differing in nation and often in language, indicating that they were working as friends and often comparing notes as to their difficulties, whereas in America, outside of the special professional societies, there at that time appeared to be little in the way of close intimacy among scientists themselves. Research workers themselves often need this feature of the personal contact, with some one who can think along the same lines as they are working upon.

As one of this diminishing group of the nine founders of this society, permit me to extend our appreciation of the efforts of the officers of the society and of the Cornell chapter to have us all here for this semicentennial celebration, and to witness the dedication of the handsome monument on this campus, as a fitting mark of this event.

And this little group of founders desire to thus express their deepest sense of appreciation for the excellent administration that has distinguished this society in every phase of its existence for these fifty years and to wish for the continuance of the great and good work of the society for the years to come.

FRANK VAN VLECK

OBITUARY

ARTHUR A. NOYES

ON Wednesday morning, June 3, Arthur A. Noyes died of pneumonia at Pasadena, California, three months before his seventieth birthday. During the past twenty years in which I have been intimately acquainted with him he has never been in robust health, and two years ago he underwent an operation which further weakened his resistance and from the results of which he suffered continually until the time of his death.

Few men have played a larger rôle in the development of American science than Arthur A. Noyes. He was born at Newburyport, Mass., on September 13, 1866; took his bachelor's degree in organic chemistry from the Massachusetts Institute of Technology in 1886, his master's in 1887 and the next year went to Leipzig and started organic chemical research with Wislicenus, but under the influence of Ostwald soon joined the group of young men who were then devoting themselves to the creation of the new subject of physical chemistry. After taking his doctorate in Leipzig in 1890 he returned to the Massachusetts Institute of Technology and for ten years was actively engaged in that institution in teaching analytical, organic and physical chemistry. During this period he published his well-known work on qualitative analysis which has exerted a very large influence in this country. Also during this period he carried out with his students so many researches on the ionic theory of electrolytes that he became recognized both here and abroad as one of the most outstanding leaders of American chemistry. In 1903 he established at the Massachusetts Institute of Technology and became the director of the first Research Laboratory of Physical Chemistry, and for seventeen years personally contributed half the expense of its maintenance. He never married but devoted every ounce of energy that he possessed to the development of his chosen field, chemistry.

Nothing reveals the extent of Noyes's influence better than the roster of the output of that laboratory in men, for on it are found such names as W. D. Coolidge, G. N. Lewis, W. C. Bray, R. C. Tolman, C. S. Hudson, E. W. Washburn, R. B. Sosman, W. D. Harkins, John Johnston, C. A. Krauss, F. G. Keyes and others.

The wide sweep of his influence is also shown by the fact that he acted as president of Massachusetts Institute of Technology from 1907–1909, and was president of the American Association for the Advancement of Science in 1927. In the councils of the American Association, the National Research Council and the National Academy of Sciences he was universally felt to be as objective a thinker, as wise a counselor and as discriminating a formulator of policies as could be found in this country.

From 1913 on he began to divide his time between the Massachusetts Institute of Technology and the California Institute of Technology, and in 1916 organized, built and became the director of the Gates Chemical Laboratory, the first building after Throop Hall to rise on the campus of the latter institution.

The contribution of Arthur A. Noyes to the creation of the California Institute of Technology, to which he devoted his whole time after 1920, is beyond all measure. His rare judgment, his fertile imagination, his conscientious devotion to the institute's welfare, his long educational experience and profound understanding, his breadth of vision, his research enthusiasm, his unwavering forward look, his innate refinement (he was a great lover of poetry)—all these qualities combined to make him a man of rare ability and effectiveness. But he was more than an able man; the far reach of his influence came from the fact that he possessed the greatest and the rarest of all qualities, complete unselfishness. When he had once seen clearly a great objective, he forgot, as few men I have ever known have been able to forget, all about his own place in the picture.