some economists drew the inference that depressions were self-accelerating with no bottom. These are the ways the crests and troughs of the waves appear to the seasick. Yet with the present state of social science as a science who could say with assurance, at the time, that the New Era economists were wrong and the doubters were right? Until there is a sounder scientific basis than appears to me yet available one can not be certain beyond reasonable doubt that those who turned out to be right or wrong were not so by chance. And how many of our historians have taught twenty college classes that an armistice was an armistice and that war was inevitable and that all of us should be steeling ourselves for it? What type of analysis would prove in 1935 that war was inevitable? The talk we had by a member of the State Department, I believe at Lake George, was sufficiently realistic so that none of us who heard it need have been heedless. We must have better teaching of history, of cultural history, of history serviceable in the Thucydidean sense to our State Department or the State Department will have to take a hand in the teaching. I hope Mr. Nichols may have something to say to this point.

Appraisal, planning, economic history and cultural history are enough and more to furnish the council with opportunities for exercising what our reviewing committee termed the primacy of its intellectual leadership; but there are of course other topics, some of them close to the heart of the chairman of our Committee on Problems and Policy.

People have talked about social science problems for all of recorded history; they probably have talked about the weather for quite as long. It would be of great benefit to all of us if we could know what the weather would be in the next crop season, but meteorological science has not advanced to where it can tell us. We must not expect too much of social science. We could not regulate the weather even if we could forecast it a season ahead; all we could do would be to adjust our actions to it. There is always hope that if we knew the economic and social future we could do something and would do something about it, other than adjust ourselves to it; but be that as it may, we can at least so educate ourselves as to adjust better to whatever may develop and that is in itself worth while, it is in line with being governed by intelligence.

We meet for the first time with our country at war. This ancient building and the American Philosophical Society have seen meetings during our every war from that of the Revolution to the present. If we disregard Indian wars, the periods of peace have averaged about twenty-five years; none has exceeded thirty-five years. As scientists we have to take the evidence of history that war is a recurrent phenomenon of society. Whether it can be prevented or not is very difficult to say. My old friend, F. A. Woods, biologist and historimetrician, came to the conclusion thirty years ago that war had not been less under the reign of the Prince of Peace than previously. My colleague Sorokin finds little evidence that war is decreasing. Against the background we have, we may infer that it will require extraordinary efforts to prevent future recurrences, and we must in nowise console ourselves that even with extraordinary efforts we shall be successful. If we were to approach scientifically the study of those efforts which might be most likely to succeed we should have intensively to study the conditions which had led in the past to the most enduring peaces and the conditions which had led to their rupture. We probably shall not approach the matter that way, but permit ourselves to be governed by words and things. Already all sorts of persons are coming forward with plans which are little more than emotional slogans, and this will continue, probably with acceleration. I will not advocate preparation for a peace conference; all I would suggest is a better knowledge of the conditions under which peoples live together in peace; I would seek exact knowledge of the past as an aid to the interpretation of the future which in the course of human affairs must resemble if it does not reflect it. The future of this country deserves the effort of the search even though the conclusion be that we must forever "speak softly and carry a big stick," neither of which suits some of our emotionalists.

THE AMERICAN INSTITUTE OF PHYSICS

A REPORT TO PHYSICISTS

By HENRY A. BARTON and GEORGE H. BURNHAM

THE American Institute of Physics has completed more than ten years of ever-increasing activity in behalf of its members, the five founder societies and, in turn, all physicists and the science of physics itself. Because of the increasing scope and importance of its activities, it is desirable that not only the physicists of the nation but all those interested in the advancement of science become better acquainted with the background, organization, and activities of the institute.

Briefly, the institute is a union of independent societies—the American Physical Society, the Optical

Society of America, the Acoustical Society of America, the Society of Rheology and the American Association of Physics Teachers—operated by them, through a governing board, to carry out certain functions better performed with the combined strength of such a joint organization than by the individual societies acting separately. It represents all of physics and all physicists in many matters of greatest importance to the progress and advancement of science. The majority of physicists, as members of one of the founder societies, "own shares" in the institute.

The detailed legal structure of the institute may be ascertained by any one who wants to look it up in the "By-laws of the American Institute of Physics Incorporated." It is a non-profit, educational corporation whose only members are the five founder societies, each as an entity. It has no individual members and collects no dues in the usual sense. It is controlled by a governing board of fifteen men—three named by each society.

Its Background

The institute had its origin in the pressing need for cooperation between the several American societies of physics, which need became apparent in 1930 and 1931 and was increasingly realized in the course of discussions held at that time between officers and committees of these societies. There were then operating these trends:

1. A notable and gratifying increase in American research activity calling for an increased number of pages in research journals without adequately increased income becoming available to pay the increased costs entailed. The publishing machinery of physics was no longer adequate for its task.

2. A growing tendency for physics to "split up." The Optical Society had been founded in 1916, the Acoustical Society in 1929. The Society of Rheology, partly concerned with physics, was founded in 1929. The American Association of Physics Teachers was in process of formation. Groups interested in other special fields of physics were seriously considering the establishment of still more societies.

No responsible person could contemplate these trends without grave concern. Must the results of research be inadequately reported or be suppressed through lack of funds? Must there be an increasing number of overlapping but unconnected societies for physicists to pay dues to? Would all the profitable applications of physics appear under some other name, rendering no recognition and no financial support back to the parent science? Did these many groups have no common interests and objectives which they could attain better together than separately?

Its Founding

A joint committee of four of the societies was finally formed to consider these challenging questions. The thought of a community or association of cooperating societies emerged from their discussions. With the financial support of the Chemical Foundation, and under the leadership of Dr. Karl T. Compton, Dr. George B. Pegram, Dr. John T. Tate, Dr. Paul D. Foote, Dr. Loyd A. Jones, Mr. William W. Buffum and a number of other well-known physicists, the first meeting of the joint committee laid the foundation for constructive action. The societies adopted the committee's recommendation that an "American Institute of Physics" be founded by them to provide a mechanism to combine their strength for common objectives, to study the publication problem, to obtain financial support, and to halt the dispersive trend of physics.

By formal action of the four societies represented on the joint committee, namely, American Physical Society, Optical Society of America; Acoustical Society of America, and Society of Rheology, the institute was founded in 1931. The newly organized American Association of Physics Teachers joined this group soon thereafter, and these five societies constitute the founder or member societies of the institute. With the help of Dr. John T. Tate, editor of *The Physical Review,* an immediate study of a joint publication program was begun.

Among the changes introduced in the journals as a result of Dr. Tate's study were (1) the adoption of a more economical, more easily read and generally more effective page size and layout for all the journals; (2) the unification and standardization of much of the work of handling manuscripts, proofs, non-member subscriptions, etc.; (3) the handling of all the journals by one printer and (4) the establishment, with the support of the Rockefeller Foundation, of the American Physical Society's plan of publication charges for all the journals.

These changes have resulted in very appreciable savings in publication costs because of the advantageous printing rates obtainable as a result of the combined publication program, and because of the elimination of duplicated effort through the unified publications procedures. Of even greater importance is the fact that through combination the journals strengthen each other both in quality and in circulation, and that their reputation as a coordinated research-publishing program reflects credit on all of physics.

Its Publication Program

The Publications Department issues eight periodicals, of which five are owned by and are published for several of the founder societies. These eight journals,

undoubtedly familiar to all physicists, are: *The Physical Review* and *Reviews of Modern Physics* (both published for the American Physical Society); *Journal of the Optical Society of America; The Journal of the Acoustical Society of America; American Journal of Physics* (formerly *The American Physics Teacher,* published for the American Association of Physics Teachers); *The Review of Scientific Instruments* (at one time published by the Optical Society of America); *Journal of Applied Physics* (formerly published by the American Physical Society as *Physics*); *The Journal of Chemical Physics* (founded by the institute).

The last three journals are now owned and published by the American Institute of Physics. Two of them, *The Review of Scientific Instruments* and the *Journal of Applied Physics,* carry a limited amount of advertising material of interest to physicists. This advertising, in addition to providing an opportunity for manufacturers and vendors to introduce their products and services to physicists, also provides a certain amount of financial support to the institute and hence to physics as a whole.

For the publication of its journal a society reimburses its agent, the institute, for only the actual net cost of supplying the journal to its members (the latter of course receiving it in partial return for their payment of dues to the society). This net cost means the residual item left after all income received by the institute in connection with the journal has been subtracted from its total publication cost. Such income includes that from non-member subscriptions, publication charges, reprint sales, back-number sales, contributions, etc. Thus the amount paid to the institute for publication purposes varies from year to year as publication costs and outside income vary. It is noteworthy that the societies during the period 1933–1941 paid, out of dues, only 10.8 per cent. of the total publishing cost of their journals, the rest being covered by the items of income mentioned above. This is an unusually favorable, if not unprecedented, instance of the financing of technical journals by scientific societies.

Among the general functions assigned to the American Institute of Physics has been the obtaining of much-needed new funds for publishing and other services important to physicists. That it has succeeded in performing this function is indicated by the fact that items of "new" income made available to physics through the institute, have totaled in the ten-year period 1932 through 1941 approximately $350,000. The significance of this figure may be appraised by comparing it with the total amount collected by the societies from their members in dues during the same period, namely, about $450,000.

It is appropriate at this point to mention the associates of the institute. These are a group of companies and institutions whose interest in physics is demonstrated by their contributions to the institute. Their dues ($175 per year) provide valuable support for the institute's maintenance and general work. The roster of associates in 1942 follows:

Allegheny Steel Company
Aluminum Company of America
American Telephone and Telegraph Company
Bausch and Lomb Optical Company
Bell Telephone Laboratories
Crane Company
Dow Chemical Company
E. I. du Pont de Nemours and Company
Eastman Kodak Company
General Aniline and Film Corporation, Agfa Ansco Division
General Electric Company
General Motors Corporation
Gulf Research and Development Company
Libbey-Owens-Ford Glass Company
Lockheed Aircraft Corporation
Loomis Laboratory
Massachusetts Institute of Technology, Department of Physics
Massachusetts Institute of Technology, Division of Industrial Cooperation
Radio Corporation of America
Research Corporation
Shell Development Company
Sperry Gyroscope Company, Inc.
The Texas Company
Universal Oil Products Company
Waugh Laboratories
Westinghouse Electric and Manufacturing Company

Non-Publishing Activities

The most important duty of the institute, aside from managing the journals, is the "promotion of the common objectives of the Founder Societies." Just as it is difficult to determine and describe briefly practical steps toward gaining these objectives, it is almost impossible to measure in any tangible terms the results of this phase of the institute's work. It may be stated in emphatic though general terms that physics has in the last decade enjoyed considerably increased prestige and support. Funds have been made available by universities and foundations for many large research projects in physics. The applications of physics are becoming increasingly recognized as such and their value is being more and more definitely appreciated in industry, in medicine and in other technical fields. This recognition of physics was no doubt long overdue, but many who are in influential positions credit the American Institute of Physics with an im-

portant share in bringing about, or at least hastening, its achievement.

To meet the cost of the varied non-publishing activities of the institute, the founder societies jointly provide an operating and maintenance fund. As a basis for calculating each society's annual contribution to this fund, the amount expended for the publication of each society's journal is taken as a measure of that society's activity in physics; a sum equal to 15 per cent. of this amount is contributed by each society to the fund. This basis and this percentage were agreed upon by the societies in 1932.

In 1941 some $10,500 was expended by the institute for all its general (non-publishing) activities. It has been estimated that the total annual income received by members of the founder societies is approximately $10,000,000. In other words, about one tenth of one per cent. of the total income of the physicists of America was used to coordinate their work and to serve themselves and society in general by directing attention to the capacities of their services. It should be apparent that this restriction of the outlay for such purposes to so small a fraction of their income severely limits the extent of cooperation which physicists can render to one another, to the press, to the government, and to national agencies in other scientific and technical fields.

Physics is a human activity and, like all others, depends upon the interest with which people in general regard it. In the long run, solid achievement is the best road to general recognition, but even achievement can be overlooked, taken for granted, forgotten through familiarity or credited to the wrong agent. Unless physicists and their friends occasionally take positive steps to demonstrate and call attention to the advances and services of physics, public attention will readily be diverted to fields which are better displayed and more repeatedly praised. Publicity is not 100 per cent. palatable to physicists, but there are forms which come a close second to pure education in acceptability. The institute has used and has encouraged physicists to use such forms.

Several excellent and readable books about physics and its applications have been written and published at the instigation of the institute as a part of its education-publicity program. Among these might be mentioned the highly successful "Atoms in Action," by G. R. Harrison.

A number of successful symposia have been arranged to present the capacities of physics to well-selected audiences. An example was a conference on biophysics held in Philadelphia in November, 1937, which was attended by some 800 biologists, medical men, chemists and physicists, and which stands as a kind of first milestone in this important borderline field. Another example was the Conference on Applied Nuclear Physics held in cooperation with the Massachusetts Institute of Technology in 1940. Here again the influence of physics—the fundamental science—in a number of fields was demonstrated.

The institute sponsored these symposia because the public and its industrial and educational leaders would observe in them typical instances of the advance of physics and its uses. The symposia were widely heralded and well reported. In both instances there have been repeated demands for repetitions. Other institute symposia have dealt with physics in the metal industries, in the automobile industry, and in the manufacture of textiles.

Several years ago the institute organized its Council on Applied Physics, a group of industrial research directors and others, which met several times and by its discussions clarified the relationship between education, fundamental research and industrial physics. These discussions brought about the decision to hold the series of symposia mentioned and also the decision to establish the *Journal of Applied Physics*. This journal has probably been more effective than any other single medium of effort in establishing physicists in industry. Members of the council, as friends of physics, have individually accomplished much in the same direction.

The Institute and the War

The war inevitably brought the institute numerous new and unforeseeable problems and duties. The prominent part taken by physicists in certain phases of the war effort and the demands made on physics and physicists by the war found the institute and its staff prepared to meet the emergency. In order to insure that decisions and recommendations relating to problems growing out of the war would be made wisely as well as speedily, a war policy committee of the institute was appointed with emergency powers of action. The personnel of the committee for which the director of the institute acts as secretary is as follows:

Dr. Oliver E. Buckley, president of Bell Telephone Laboratories.

Dr. Karl T. Compton, president of Massachusetts Institute of Technology.

Dr. Homer L. Dodge, dean of the Graduate College, University of Oklahoma.

Dr. R. C. Gibbs, chairman of the department of physics, Cornell University.

Dr. Paul E. Klopsteg, president of the Central Scientific Company, and chairman.

The committee has met on frequent occasions and has discussed and adopted recommendations touching not only on the immediate phases of the institute's

contribution to the war effort but also on more fundamental, long-range plans for the solution of the present and continuing problems of physics and the war. Its reports have been widely circulated and are worthy of the careful study of all concerned with these problems and the future of physics.

Aside from the larger scale activities of its war policy committee, the institute and its staff are engaged in a variety of projects and activities—each relatively small in itself but all together summing up to a very significant total. A series of bulletins has been issued supplying to heads of college physics departments and to others information which should be disseminated more quickly than is possible through the usual publication channels. These bulletins have reported Selective Service policies and procedures, War Policy Committee actions, educational policies of the Army and Navy Enlisted Reserve programs, War Production Board regulations and other topics of immediate concern to physicists. The institute has become an increasingly important center for information and advice regarding all phases of the interrelationship between physics and the official agencies guiding the war effort.

Much of the institute's effort has been concerned with the problem of obtaining suitable personnel for war-connected research and other work. Partly as a result of this experience, the director of the institute was asked to organize, in the spring of 1941, the Office of Scientific Personnel in the National Research Council at Washington. Dean Homer L. Dodge, of the University of Oklahoma, a former member of the institute's governing board, directs the activities of this office.

The plight of the nation, faced in its hour of greatest need by inadequate manpower trained in physics, demands that steps be taken to help provide against a future shortage of physicists. Some such steps have been taken by the institute, and it is gratifying to acknowledge that other steps—even more effective because of their source—have been taken by the Navy, the Army Air Force and the U. S. Office of Education, to emphasize physics and mathematics in high schools and to acquaint high-school graduates with the practical usefulness of the continued study of physics in college. The institute has been represented in Washington conferences at which the opportunity to encourage and expedite these actions of the government has been grasped. High-school programs can not yield physicists to meet the present shortage but they do more than lay the basis for the future physics strength of the country. They can provide the best pre-induction training for the large number of men the Army and the Navy will need to operate technical devices of warfare.

Physics as a Profession

The increased use of physicists in industry and the importance attached to physics in the present war program have placed new emphasis on physics as a professional field of work. The term "physicist" is becoming more widely known and recognized. This recognition of physics as a profession, and of "physicist" as a professional title, not only carries with it a considerable distinction but brings up numerous important problems concerned with the establishment and safeguarding of professional levels and standards. It is time to shape policies and plans for the protection of the title "physicist" and the maintenance of the high standards now associated with it, to determine methods of recruiting and selecting persons of high ability for the profession, to evaluate present educational standards with a view to insuring continued and improving training, to fight for appropriate rewards for the physicist, and to guide social forces such as labor unions and government regulations to a proper understanding of the profession's character, potentialities and needs.

In the American Institute of Physics physicists have a record of progress and achievement of which they may be proud. It is evident, however, that the problems of its future are fully as difficult and important as those of its past. The very success of the institute in thus far promoting the welfare and development of physics has placed in its hands added responsibilities and new tasks which must now be performed. Only a truly cooperative organization, fully supported by all American physicists, can adequately meet these responsibilities and successfully carry out these tasks.

OBITUARY

DR. HOWARD ATWOOD KELLY

DR. KELLY, the last of the "Big Four" of Sargent's well-known portrait of the early Johns Hopkins Hospital leaders (Osler, Welch, Halsted and Kelly) to survive, died in Baltimore on January 12, 1943. Had he lived five weeks longer he would have been 85 years of age.

Born in Camden, N. J., on February 20, 1858, he received his A.B. degree at the University of Pennsylvania in 1877 at the age of 19. He entered the medical department there as a student in the autumn of the same year, but at the end of the second year because of ill-health (insomnia) was compelled to interrupt his medical studies. He went to Colorado,