The AAAS and Organized American Science

F. R. Moulton, *Administrative Secretary*

FROM SEPTEMBER 13 TO 17, INCLUSIVE, the American Association for the Advancement of Science held a meeting in Washington in celebration of the 100th anniversary of its founding. Very little attention was given, however, to the origin or history of the Association. Emphasis was naturally placed, instead, on the rapidity and diversity of scientific progress, the great contributions science has made to human welfare, and the hopes and fears it arouses for the future of mankind. Those who attended the meeting were thrilled by the glorious vistas science opens before them, and awed by the terrible destruction of which it is capable.

Like everything else, the Association had antecedents out of which it evolved. In the immediately preceding centuries universities and academies of science had been organized in various European countries—universities in Bologna (1156), Oxford (1167), Paris (1200), Cambridge (1284), Vienna (1364), and, in America, Harvard College (1636); an academy of science in Florence (1657), the Royal Society of London (1662), the Paris Academy (1666), the Prussian Academy (1700), the Russian Academy (1725), and the Swedish Academy (1741). The American Philosophical Society had its beginnings in 1743 and received its first charter from the Commonwealth of Pennsylvania in 1780.

The universities and scientific societies, in turn, were inspired by the achievements of their predecessors—by the literature from the Psalms and Homer down to Shakespeare; by the science from Archimedes and Euclid to Galileo, Kepler, and Newton. The Crusades had intermingled the peoples of Europe; the invention of printing had made it relatively easy for them to communicate with one another. The voyages of Columbus and his successors had revealed new continents and encompassed the earth; the telescopes of Galileo, Newton, and Herchel had surveyed the Solar System and reached out toward the stars. At this stage in human progress Europeans of the same race and having generally similar cultures began to explore and occupy this Western World.

After the American colonists had won their political freedom they set up a permanent, united government for the 13 contentious colonies which had previously existed. Then they began to survey the limitless resources of the vast areas under their control. Their attention soon turned to the mineral riches that might be brought to light by geological explorations of this new continent. Between 1823 and 1839, 17 states made provisions for geological surveys within their respective borders. This rapidly increasing interest in geology led to attempts at establishing national geological societies. The first one was incorporated in Connecticut in 1819. This society died in 1826, but its spirit reappeared in another society organized in 1840. Similar interests were aroused in the fields of botany and zoology. In 1836 New York began a natural history survey, and the following year Massachusetts provided for a zoological and botanical survey. Finally, in 1840 a society known as the National Institution for the Promotion of Science was incorporated by an Act of Congress. The opening address of a pretentious meeting of this society, held in Washington in 1844, was delivered by John Tyler, then President of the United States. A former President of the United States and several members of Congress served as chairmen of its various sessions. The society never met again.

Four years later, on September 20, 1848, the Association of American Geologists and Naturalists (organized in 1842) was transformed and expanded, by vote of its members, into the American Association for the Advancement of Science, with an initial membership of 461. In purposes and operations the AAAS followed the general pattern of the British Association for the Advancement of Science, which had been organized in 1831.

In contrast with earlier American scientific societies, the interests of the AAAS extended into all fields of science, and its geographic territory included a continent It welcomed into membership those who had become famous as scientists and those who were entering on the pleasant pathways of science. The first session of the first meeting, September 20, 1848, was held with democratic simplicity and sincerity, in contrast with the pomp and ceremony of the politically sponsored meeting held only four years earlier. At a "general session" of the meeting Benjamin Peirce, the foremost of American mathematicians at that time, presented a paper, "On the General Principles of Analytical Mechanics." He was followed by the famous Swiss naturalist, Louis Agassiz, who presented a paper entitled "On the Classification of the Animal Kingdom." The pattern of these general sessions, open to all scientists, has been consistently followed as a part of the meetings of the Association for 100 years. These sessions have done much to keep always in the minds of specialists that fundamentally there is only *One World of Science,* a phrase weighted with

deep meaning which was adopted as the theme of the Centennial Celebration held last September.

Diversity in the programs of the Association and opportunities for discussing details of current scientific problems were attained from the beginning by establishing sections for special fields. At the first meeting of the Association there were only two sections, one including, roughly, the physical sciences and the other the biological sciences. From time to time new sections were organized, partly because increasing numbers of papers to be presented made subdividing necessary and partly because it was advantageous to have detailed discussions among specialists. The Association now has 15 sections, together covering largely the fields of the natural and the social sciences.

In the first 30 years (1848–78) after the Association was founded there were few changes in the character of its meetings. In that interval the membership increased from 461 to only 962. The largest number of papers presented at any meeting was 165, in 1874, when there was also the largest registration, 224. During the Civil War, which was fought in this period (1861–65), no meetings were held nor were officers elected. Yet the pleasant memories of 14 earlier meetings led promptly to their resumption after the termination of the war, the first postwar meeting being held in Buffalo in 1866. Although it was a crippled meeting, the Association was again on the march. Despite a severe financial and industrial depression, its membership more than doubled between 1870 and 1880—from 536 to 1,555.

In the second 30 years (1878–1908) after the founding of the Association there were rapid and important changes in organized science in the United States. These developments were due to many causes, the most important of which was an increasing understanding and appreciation of the fundamental scientific achievements in the preceding decades. To realize their importance and influence one has only to recall Dalton's atomic theory (1808), the electromagnetic experiments of Michael Faraday and Joseph Henry (1820, . . .), the revolutionary theories of Lyell (1830, . . .) about the geologic processes that transform the earth's exterior, the thermodynamics of Mayer and Joule (1842, . . .), and the theories of organic evolution of Darwin and Wallace (1855, . . .).

In this second 30 year period the membership of the Association increased from 962 to 6,136. The memberships of its sections increased correspondingly, and as a result of progressive specialization many new scientific societies grew out of them. For example, the American Chemical Society was founded in 1876, the American Institute of Electrical Engineers in 1884, the Botanical Society of America in 1894, the American Physical Society in 1899, the American Society of Zoologists in 1902, and the Entomological Society of America in 1906. Several of these affiliated societies attained such large memberships that it became necessary for them to hold meetings separately from the Association.

In the first 6 years (1908–14) of the third 30 year period (1908–38) of the Association's existence its membership increased slowly from 6,136 to 8,325, and its meetings followed earlier patterns. Then, in 1914, World War I suddenly broke out and threw western Europe and North America into confusion until its termination in 1918. A peaceful and prosperous decade followed in which the membership of the Association increased from 11,442, in 1919, to 18,462 in 1929. Then the membership varied little for nearly a decade of economic depression, being only 19,059 in 1938.

When World War II blazed forth it was feared that so many scientists would be drawn into full-time military service that the progress of science would be retarded and that scientific societies would suffer great losses in membership. Although demands on scientists were far beyond all expectations, specialists from every field not only responded fully but initiated and carried to completion methods and weapons of attack and defense of the highest order of importance. They rendered great services, often at sacrifices, not for financial compensation or glory but in obedience to feelings of responsibility to society. Even though many had to allow their memberships in the Association to lapse while they were in government service, the Association's membership increased steadily throughout the war period—from 22,000 at its beginning to 28,000 at its close. In the past three years the increase in membership of the Association has been still more rapid and now exceeds 42,000. The following table gives the Association's membership, by decades, during the 100 years since its founding:

Year	*Membership*
1848	461
1858	962
1868	686
1878	962
1888	1,964
1898	1,729
1908	6,136
1918	9,000±
1928	16,328
1938	19,059
1948 (Nov. 1)	42,000

Records of achievements in any field are pleasant and somewhat important as a foundation for antici-

pating what may be accomplished in the future. Consequently, the history of the Association should serve primarily as a prophecy of its future service to mankind rather than its growth in membership. In one of his many inspired moments Edgar Allen Poe caught the subtle distinction between the lofty spirit and the aggressive mind in his "To the *glory* that was Greece and the *grandeur* that was Rome."

The program of the Centennial Celebration of the Association emphasized the glories of science as well as the grandeur of its technological applications. The theme of the meeting—*One World of Science*—carries no thought of speed or power, no threat of destruction or promise of a paradise. On the contrary, it implies that science is the same everywhere throughout the world, and this implies, in turn, that the universe is orderly. There is no other satisfying foundation for science and philosophy.

Since science is the same throughout the world, there are broad areas of human interests in which all men agree, irrespective of race, religion, or political theories. If there are differences of opinion in limited sectors of scientific beliefs, they can be removed by observations and experiments, as they have been in the theories of the rotation and revolution of the earth and in hundreds of other controversial subjects. Consequently, the easiest approach to achieving international understanding and cooperation is through science and scientists. As Dr. Shapley stated in his presidential address, astronomers throughout the world exchanged information during the whole period of the war. For many years scientists have held international congresses of specialists in various fields. In no other international meetings has there been so much cordial cooperation and so little friction. The Association adopted with pride *One World of Science* as the theme of its 100th anniversary, because it expresses the unique characteristic of science and holds hopes for the future.

The program of the Centenary was not limited to boasting of the scientific achievements of the past and expressing confidence in the future. The relevant factors on which the anticipated future must rest were subjected to critical examination. For example, the mineral resources of the earth were critically explored. Many of those that certainly appear to be exhaustible, as petroleum and coal, were examined. The Town Meeting of the Air program was "What Hope for Man," again an exploration of the factors on which the future of human beings will depend. Another session explored various sources of energy, the most obvious ones beyond the ordinary fuels and waterfalls being direct solar energy and possible atomic energy. In all these discussions there were dark forebodings but hopes that ultimate disaster might be avoided.

As to the possible future existence of man on this earth, the paleontologists and geologists could present relevant facts for consideration. They have convincing evidence of the existence of life on the earth for something like a billion years. Perhaps a million species of plant and animal life have appeared, flourished, evolved, and finally become extinct; others have survived the vicissitudes of the geological ages. Among those that perished completely were many of the great beasts, such as dinosaurs. On the other hand, certain lower forms of animal life have persisted almost without change for several hundred million years.

Is there anything in the abundant biological record that assures man of a long existence, geologically and biologically speaking, on this earth? Man apparently has no great advantages over lower animals except his brains. But his brains have not saved the great civilizations that for several centuries have flourished in various parts of the world and then crumbled. It is sufficient to recall Babylon, Egypt, and Greece among the many examples known to history. But more fundamental are the geological processes that have transformed and are continuing to transform the surface of the earth. For example, there are large petrified trees in abundance in what is now the treeless Southwest, and the central part of the United States has been covered repeatedly by water. No permanent home for human beings is assured in any part of the earth.

Even if the surface conditions of the earth were stable and enduring, the earth itself might be destroyed in the excursions of the sun and its retinue of planets among the billions of suns and nebulae of our galaxy. The sun itself might be torn to fragments and scattered by even a minute fraction of the incomprehensibly great energy stored in its atoms. In fact, there are frequently great explosions on the sun in which enormous volumes of flaming gases are shot out from its surface farther than the distance from the earth to the moon. Even these astounding manifestations of energy are not a billionth of those that are occasionally seen when the light from an exploding star a million or more light-years distant finally enters the telescopes of astronomers.

As is often emphasized in popular magazines and in a few of the addresses delivered at the Centennial meeting of the Association, science promises in many respects a better future for humans—better food and housing, better education, more leisure, more amusements, better health, longer lives, fewer personal responsibilities, higher flying, faster transportation, faster everything, even to transmitting the text of a book of a thousand pages a thousand miles while the sender is smoking a cigarette. Science also promises

better means of defense—more devastating methods of destroying property and more terrible ways of terminating the lives of human beings who are temporarily regarded as enemies. The result appears to be that in the minds of the general public technology is the wonder of the world today, displacing the circus, the magician, and Santa Claus.

The program of the Association's Centenary was a survey of various important fields of science rather than a record of the Association's growth and importance. Although the Centenary was held at a time when university professors were hastening to their laboratories and lecture rooms, 2,734 scientists registered for the meeting. Every one of the United States and 18 foreign countries were represented. The field from which there came the largest registration, 508, was the medical sciences, and chemistry was second with 342. The registrants from the fields of the zoological and botanical sciences numbered 718. The field of every one of the 15 sections of the Association was represented. Of the registrants from foreign countries, 35 were from Canada and 13 from India. The subjects of the programs and the geographical distribution of those who attended them illustrated the theme of the meeting, *One World of Science*—one world in substance and one world in ambitions for the future.

To some extent the Centenary of the Association was a proud review of its contributions to the advancement of American science. At the same time there were deep anxieties among those who had been chosen to direct its established policies and to plan for better ones in a rapidly changing world. The character of the program was quite different from those of its regular annual meetings, as was appropriate. Clearly something can be learned from them, but wider fields should be explored. Perhaps it would be advantageous to set up some high objective to be attained by the Association, in spite of the fact that the distant future cannot be foreseen, as the whole history of science verifies. Perhaps plans for the future of the Association should rest on the philosophies, the great literatures, and the religions (not theologies) which record in general terms the wisdom of the ages distilled from successes and failures, from high hopes and disappointments, from all the traditions and superstitions preserved in folklores.

Such a program would be far beyond the powers of any individual, and must be deferred, therefore, until general plans can be developed, if ever, for carrying out such an important undertaking. Perhaps some idea of what has been of greatest importance in human history can be inferred from the principles and persons held in highest esteem by peoples of various nationalities and cultures.

As an experiment, consider what precept or principle is generally regarded as the highest moral level ever attained by man. The prompt answer is *The Golden Rule,* a few words that lay a universal foundation for all the varied aspects of human relations. Although it came to European and American civilizations through the Christian religion, its essentials are found in all the great religions. There are so many fundamental similarities among the basic dogmas and precepts of all the principal sects and religions that it is difficult to understand why their votaries have waged against one another many of the most devastating wars of history.

There is, of course, a possible explanation of these tragic human struggles. Perhaps they are expressions of fundamental characteristics of our ancient ancestors which enabled them, in the great biological struggle for existence, to become masters of the world. There are other human characteristics, many in common with higher animals, that were necessary for their survival and evolution during the long periods of the geological ages. As an illustration, among all higher animals the mothers, however docile ordinarily, become raging beasts in defense of their young. Apparently the survivals of man and animals have been due to both cooperative and destructive characteristics.

It would be instructive, and perhaps surprising, if one should undertake to formulate goals for civilization, or even for science. Who are the heroes whose examples should be followed? Not Genghis Khan or Alexander the Great. When the 300 Spartans were slain at Thermopylae by the Persians, they left behind them the message: "Go tell the Lacedaemonians that we lie here in obedience to their command." The story of that fidelity to duty has been a bright spot in human history for more than 2,000 years. The spirit of it has been paralleled, earlier and later, by peoples of every race and culture. It is paralleled in all the history of science. Archimedes, Galileo, Kepler, Copernicus, Darwin, and a host of others are examples of those who have placed truth above approval of their contemporaries and who have drunk the hemlock of criticism and persecution. Whatever general plans may sometime be formulated for the advancement of science and civilization, it is certainly in order now to give as much attention in education and current literature to the heroes of science as to the marvels of technology.

In an earlier paragraph it was stated that the general theme of the Association's Centenary means that science is the same throughout the world, irrespective of race, religion, and political theories. It means also that mutual respect, friendship, and international cooperation of human beings can be established and maintained most easily among scientists.

There is another meaning of the theme which is at least as important as those that have been mentioned. It is that the world is its garden, not in the sense that it extends all over this little planet, or that it gives a common meeting ground for scientists, however much they may differ, or that it provides an abundance of necessaries and luxuries; but in a deeper sense that interest in science is a way of living, of being a conscious part of the Universal Order, awed by the wonders of the past and thrilled with the possibilities of the future. It would be difficult to express more clearly and beautifully the elation the scientist feels in the presence of Nature than is found in *The Chambered Nautilus* of Oliver Wendell Holmes:

> Build thee more stately mansions, O my soul,
> As the swift seasons roll!
> Leave thy low-vaulted past!
> Let each new temple, nobler than the last,
> Shut thee from heaven with a dome more vast, ...

Interest in science is an expression of aesthetic appreciation, not only by professional scientists but also by hundreds of thousands, and possibly millions, of amateurs from nearly every walk of life. Every city and town has its amateur science clubs and societies whose members are school boys and girls, artisans, office employees, teachers and preachers, professional men and scientists. They observe meteors, make telescopes, construct radios and talk with one another around the world; they catch butterflies, collect fossils and plants, take photographs, experiment with chemicals, and construct flying machines. They do not believe in magic or the performance of miracles. In their minds and hearts are the stately mansions to which the poet Holmes referred. They are the ones who can bridge the chasms between professional scientists and the millions who regard science as magic.

In the interest of the advancement and appreciation of science, and for the progress of civilization, these hundreds of thousands of organized amateur scientists should be encouraged and assisted by professional scientists and scientific organizations. The obligation of aiding them falls most heavily on the AAAS, because no other society covers all the various fields in which the amateurs are interested or has members in every community in which their organizations exist. They would be greatly stimulated, for example, by a special publication for such organizations and by speakers at joint annual meetings of the various amateur and local professional groups that exist in every American city.

The foregoing suggestion does not imply that the meetings of the Association should be discontinued. They will be continued, perhaps undergoing evolutions to meet changing conditions, as they have in the past. The suggestion is for the purpose of more effectively making this world *one world of science* in all its hopeful implications. There are promising possibilities. Conditions are favorable for new and important undertakings by the Association. It owns an ideal site for a permanent home that probably can be obtained almost for the asking. The difficult task is to formulate sound plans, and by crusading zeal to put them into effect. Noble aspirations and altruistic zeal have dotted this land with colleges, libraries, and other cultural institutions. They are its *glory*; its *grandeur* is in the stone and steel of its towering factories.

Howard A. Meyerhoff—Administrative Secretary

At a meeting of the Executive Committee of the AAAS held on September 13, 1948, Dr. Howard A. Meyerhoff, professor of geology and geography in Smith College, Northampton, Massachusetts, was unanimously elected administrative secretary of the Association for a term of four years, beginning January 15, 1949. He will be the tenth secretary to administer the operations and finances of the Association.

Dr. Meyerhoff, now 49 years of age, is in the prime of life—robust physically, experienced in teaching and academic administration, author of various geological researches, and consultant on the mineral resources of the Dominican Republic, Puerto Rico, the Virgin Islands, and Argentina. His contacts with contentious humans while serving on the War Labor Board and his financial experience in participating in the reorganization of a local industrial company have been valuable training for meeting the human and financial problems of a scientific society having 42,000 members and income and expenditures of about $500,000 per year.

The activities and interests of the Association extend into every field of science, directly through its 15 sections and indirectly through its 208 affiliated and associated societies and academies of science. In a real sense the Association is a unifying influence in the rapidly increasing expansion and diversification of science. Its great programs provide a common meeting ground for all the various scientific disciplines that together constitute the world of science. A leader of Dr. Meyerhoff's experience and qualities is required in order to carry the responsibilities now placed on him.—F.R.M.