Every practical advantage gained in utilizing natural forces for the benefit of mankind can be traced back to a necessary basis established through fundamental research in pure science by men who had no other object than to ascertain the truth. If that kind of research ends progress in applied science must presently also end. Fundamental research requires systematic support because it does not present the manifest promise of immediate profits. I think the proposed organization for the purpose of securing such support is very important and will be of the greatest value. I am much gratified that Mr. Hoover is willing to give his great ability and prestige to making the new undertaking a success.

Judging from our progress in other fields, we do not lack competent men for research, officials of the academy explain. Too often, with the comfort of their families at heart, such men reluctantly accept well-paid industrial positions instead of poorly paid academic posts. The problem is to make these posts so attractive that the ablest men will seek and hold them permanently because of the opportunities they offer to advance knowledge by fundamental research. This can be done by providing adequate salaries, freedom from too much teaching or administration, necessary instruments and apparatus and skilled assistants to perform the extensive routine operations that scientific research involves. In short, able investigators should be given some such comfort in life, freedom of action and opportunity for constructive thought that industrial and administrative officers in this country, certainly of no larger calibre, habitually enjoy. One way to accomplish this is by establishing National Research Professorships, or similar positions, in cooperation with universities vitally interested in the advancement of science. One hundred National Research Fellowships, financed by the Rockefeller Foundation and the General Education Board, are bringing the best advanced students in the physical and biological sciences and in medicine into research. The next important step is to improve the academic conditions under which such men, and more especially the mature investigators of demonstrated success, conduct their work.

President Michelson, of the National Academy, in writing to Mr. Hoover to express his great satisfaction that he had undertaken to act as chairman of the trustees of the National Research Endowment, says:

I regard this as one of the most important and significant movements in the direction of helping to make the contributions to science worthy of the enterprise of America.

We can no longer plead youth and the pressure of building up the industries as an excuse for the unfavorable comparison of our own meager contributions with those of England, France and Germany. There can be no doubt that the situation would be immensely improved if the prospects of the more promising men who have the talent and ability and the taste for the pursuit of scientific investigation could be made comparable with those of say a successful physician or lawyer.

There is not the slightest conflict between the purposes of the National Academy of Sciences and those of the Smithsonian Institution, which is seeking a large endowment fund to provide adequately for the important investigations of its large staff. These two scientific organizations enjoy most cordial relations, as Mr. Hoover indicated in his recent New York address when he strongly commended the efforts of the Smithsonian to obtain an endowment and referred to it as the great pioneer of all American research, which has inspired much of the work in progress to-day.

Dr. Robert A. Millikan writes as follows:

In the application of science to industry the United States has always taken a leading place among the nations, and our industries may be counted upon to see that she continues to do so. But no such claim to leadership in the field of fundamental science can as yet be made for her. For the sake of our own intellectual development, for the sake of the diffusion of the spirit and the method of science among her people, and for the sake of the future of her material progress as well—fundamental science of to-day being but the applied science of to-morrow—her supreme need just now is for the stimulation of research in the fundamental sciences throughout the length and breadth of the land. This is why I regard the attempt to establish a National Research Endowment for the above purpose as one of the most important national movements ever launched in the United States.

SCIENTIFIC EVENTS

PRESENTATION OF THE COPLEY MEDAL OF THE ROYAL SOCIETY TO PROFESSOR EINSTEIN

PRESENTATION of the Royal Society medals was made at the anniversary meeting of the society on November 30, by the retiring president, Sir Charles Sherrington. The following citation was made with the award of the Copley Medal to Professor Albert Einstein:

The name of Einstein is known to every one through the theory of relativity which he originated in 1905 and extended by a notable generalization in 1915. Einstein realized that the time and space with which we are so directly acquainted by experience can be no other than the fictitious *local* time and space of the moving system—the motion in this case being that of the earth; we have no means of determining, nor can physical science be concerned with, any absolute reckoning of space and time. After this Einstein was led to the identification of mass with energy—another result of far-reaching importance,

which allows us to know the exact amount of the store of energy so tantalizingly hidden within the atom.

There was a feeling that this theory of relativity for uniform motion must be a particular case of something more general; but observational knowledge seemed to oppose a decisive negative to any extension. It was Einstein again who found the way to the generalization by bringing gravitation into his scheme.

Einstein's general theory of relativity is remarkable alike for the brilliance of conception and the mastery of the mathematical implement required to develop it. The new law of gravitation must be reckoned the first fundamental advance in the subject since the time of Newton. It involves an interaction between gravitation and light, which had indeed been suspected by Newton and almost taken for granted by Laplace, though it dropped out of scientific speculation when the corpuscular theory of light gave way to the undulatory theory. The three crucial astronomical tests of Einstein's theory have all been verified—the motion of perihelion of Mercury, the deflection of light, and the red-shift of the spectral lines. The last-named proved the most difficult to test, but there is now general agreement that it is present in the solar spectrum. More recently Einstein's theory of gravitation has appealed to astronomers not merely as something which they are asked to test, but as a direct aid to the advancement of astronomical research. Invoked to decide the truth of a suspicion of transcendently high density in the "white dwarf" stars, it has decided that in the companion of Sirius matter is compressed to the almost incredible density of a ton to the cubic inch.

The other direction in which modern physical theory has broken away altogether from the ideas of the nineteenth century is in the quantum theory. Probably no one would claim that he really understands the quantum theory. For such illumination as we do possess we are in great measure indebted to Professor Einstein. In 1905, almost at the same time as he published his first work on relativity, he put forward the famous law of the photo-electric effect, according to which the energy of a single quantum is employed in separating an electron from an atom and endowing it with kinetic energy. This was, perhaps, the first recognition that the development of the new quantum mechanics was not to be tied to classical mechanics by pictures of quasi-mechanical oscillators or other intermediate conceptions, but was to proceed independently on radically different principles. Noteworthy contributions followed on the theory of ionization of material, and on the problem of the specific heats of solids. In 1917 Einstein reached another fundamental result—namely, the general equation connecting absorption and emission coefficients of all kinds. This gives deep insight into the origin of Planck's law of radiation, besides providing new formulae with the widest practical applications.

THE AWARD OF GOLD MEDALS BY THE AMERICAN GEOGRAPHICAL SOCIETY

THE American Geographical Society has awarded the David Livingstone Centenary Medal for 1925 for "scientific achievement in the field of geography of the southern hemisphere" to Luis Riso Patrón, director of the Oficina de Límites of Chile in recognition of his contributions to Chilean cartography. Senor Patrón headed the first Chilean Commission to make a precise survey of the Cordillera of the Andes. He represented Chile in the Argentine-Chilean boundary arbitration (1902) and edited the maps of the Chilean boundary surveys. As director of the Oficina de Mensura de Tierras he was responsible for the great map of Chile on a scale of 1: 500,000. His intimate knowledge of the geography of his country is revealed in the recently published "Diccionario Jeográfico de Chile" (1924).

Award of the David Livingstone Centenary Medal for 1926 is made to Erich von Drygalski, of the University of Munich, for his work in the South Polar regions. Dr. von Drygalski had already carried out notable glaciological investigations in the Arctic as leader of the Greenland Expedition of the Berlin Geographical Society (1891–1893) when he undertook the German Antarctic Expedition of 1900–1903. The latter expedition, which discovered a part of the Antarctic continent about the 90th meridian east, was characterized by an intensive study of all branches of natural science in the field of exploration. The important scientific results in 18 folio volumes appeared between 1905 and 1921.

The Charles P. Daly Medal for 1925 is awarded to Brigadier-General David L. Brainard in recognition of his notable achievements on the Lady Franklin Bay Expedition under Greely in 1881–1884. General (then Sergeant) Brainard took a leading part in the exploratory work of the expedition. In particular his name is associated with Lieutenant Lockwood's in the discoveries along the north coast of Greenland when the farthest north of the time, 83° 24′, was reached, a position only a few minutes of latitude from the northernmost point of Greenland.

The Charles P. Daly Medal for 1925 is awarded to Captain Robert A. Bartlett for his services to Arctic exploration. As commander of the *Roosevelt* (1905–1909) he took a leading part in Peary's expedition to the Pole. With a sledge party he himself reached a latitude of 87° 47′ N.—the highest latitude attained in the Arctic next to that of Peary himself. On the Canadian Arctic Expedition of 1913–1918 he commanded the *Karluk* and in the face of grave difficulties accomplished the rescue of the survivors from Wrangel Island, whither they had proceeded after the *Karluk* was crushed by ice. In 1917 under his able seamanship the Third Crocker Land Relief Expedition achieved success in the face of serious and exceptional ice conditions.

The Cullum Geographical Medal for 1925 is