are too blamed sluggish. We must make them lighter." He so devised this scheme: First he got a large supply of hog's bristles from a local brush factory; then he plated these hog bristles with a great variety of different metals. Some of them were plated by the electrolytic process, which he used in manufacturing his phonograph records; others were plated by cathode sputtering in a vacuum; and still others by the condensation of evaporated metals. When each of these hog bristles had plated on to it a thin coat of metal, the bristles were cut up into tiny lengths, each about a hundredth of an inch long, by a microtome such as is used in cutting specimens for microscope slides. These tiny little cylinders were then placed in a bath of caustic potash, "the stuff men dissolved their murdered wives in," said Mr. Edison, which dissolved out the hog bristle and left a tiny hollow cylinder of metal, shaped like a napkin ring, and these were the metal granules which were used in place of carbon for the experimental microphones. How well they worked I do not know, since I did not see the conclusions of the test. My guess would be that they did not work as well as carbon, since scientists think that there is a peculiarity in the structure of carbon which makes it particularly effective for microphonic purposes. It was one of Mr. Edison's characteristics, however, that he would not let his own, or any one else's preconceived ideas stand in the way of making a test. This practice certainly led to many futile experiments, but it is equally true that it led to some successful discoveries which caused the scientists to revise their earlier ideas. Edison was not ignorant of what others had done, even though he often appeared to pay little attention to it. A great reader, frequently, before starting, he read everything which had been published on the subject.

Typical of another method of Mr. Edison's work were experiments on flame throwers and on submarine periscopes. The flame thrower was desired to throw a stream of liquid as far as possible. In order to get the right design of nozzle Mr. Edison instructed one of his helpers to build in his shop a whole series of nozzles with every gradation of angle, length and shape within wide limits, and to pick out the one which threw the stream the farthest.

In the case of the submarine periscope the problem was to prevent the deposit from evaporated salt water spray from rendering the periscope mirror non-reflecting. To prevent this several things were tried, one being to bathe the mirror periodically with materials of very low surface tension, which would prevent the accumulation of water in drops. For this purpose a whole series of liquids was tried and the most satisfactory one selected.

These last two war problems illustrate the method of continual search and trial which underlay much of Edison's work. Notable examples are found in his selection of elements for the Edison storage battery and in his preparation of more than 10,000 double chemical salts in the endeavor to find the most satisfactory fluorescent screen for use with x-rays.

It is a mistake, however, to think that all Edison's work was carried on by this search and trial method. Back of everything which he did or tried there was always an idea. The starting point was always the need of accomplishing some purpose, the second stage seemed to be the suggestion of various ways of accomplishing that purpose, and the final stage consisted in trying out these suggested solutions in as thorough and systematic a manner as possible in order to find the best.

Edison's success lay, I believe, equally in his handling of all three of these stages. He was uncommonly alert to opportunities for supplying a need or presenting an improvement. He was uncommonly ingenious in figuring out ways of designing apparatus to do what he wanted it to do, and he was one of the most patient and persevering men who ever lived in carrying through his ideas to the last stage of comprehensive test.

There are some who think that the day of the inventor of Mr. Edison's type has passed because of the continually greater and greater degree of specialization and scientific background which is demanded. Whether or not this is true, it is certainly true that the talents which Mr. Edison possessed are talents which will always find their outlet in creative service.

Quoting from the inscription under an Edison portrait that appeared in the *General Electric Review*:

He had the boyish fancy to create,
Invent, devise, design, and fabricate.
Sanguine and ardent, bold and fertile too,
He dreamt. Then worked—and made his dreams come true.

J. R. H.

OBITUARY

SAMUEL MATHER

SAMUEL MATHER died in Cleveland, on October 18, 1931, at the age of eighty years. Through this long span of life, Mr. Mather had devoted a large part of his energies and of his fortune to bettering the condition of mankind. In this he blended warm-hearted

sympathy with sound judgment and clear vision. His innumerable benefactions extended to many humanitarian enterprises over the face of the globe. He gave freely to relieve immediate needs, but his wise understanding inclined him particularly toward the fundamental things that make for lasting results. His long service as trustee of Western Reserve University and of the Lakeside Hospital gave him the opportunity of personal insight into the benefits that mankind derives spiritually from higher education, and physically from medical science. These occupied an ever-enlarging place in his interest and to them he gave buildings, endowments and annual subscriptions with great liberality, without diminishing his helpfulness to other humanitarian activities.

As vice-president of the trustees of the university, president of the board of trustees of Lakeside Hospital and chairman of the board of trustees of the University Hospitals, he came to appreciate the benefits of the intimate cooperation of these institutions. He was a prime mover for securing the site of a medical center in the heart of the university; his personal munificence supplied the funds for the new Medical School Building; his influence determined the university policy of the Lakeside, Babies and Maternity Hospitals, and promoted their federation, together with the Rainbow Hospital, into the "University Hospitals"; his example inspired the public to the subscription of funds for the construction of the hospitals on the university site; his wise counsel guided their policy of harmonious cooperation to the day of his death. The weight of his influence was always on the side of humanity and enlightenment, and his judgment was confirmed by the results. Notwithstanding his modest, rather shy self-effacement, his power in the community of Cleveland was supreme; for he led by force of a generous example that lighted a kindred enthusiasm in others. He did not choose to guard his gifts by conditions; he investigated and gave, and the conditions took care of themselves. He trusted people, and they responded to his trust. The generous civic spirit of which Cleveland is proud is the spirit of Samuel Mather.

TORALD SOLLMANN

MEMORIALS

THE Pan-Pacific Research Institution has passed the following minute in memory of Dr. David Starr Jordan:

It is with deepest sorrow that we, the members of the Pan-Pacific Research Institution, learn of the death at Palo Alto, on September 19, 1931, of our beloved friend and coworker, David Starr Jordan, ex-president and chancellor-emeritus of Stanford University.

Dr. Jordan was one of the founders of the Pan-Pacific Research Institution, and its first president as well as the most earnest supporter of its aims and ideals. He, with the members of the Pan-Pacific Science Council, in 1925 drew up the outline of purpose of the institution and aided greatly in getting the work well under way. He believed that here in the mid-Pacific might be developed a great democracy of scientists whose influence in every field of human welfare, including both science and statecraft, as they affected not only the Pacific, but world relations, could be founded. Many of the notable inter-Pacific, if not international, conferences that have been held in Hawaii in recent years are the outgrowth of Dr. Jordan's genius and vision, by which he inspired others to take hold where he left off.

While honorable chairman of the Pan-Pacific Research Institution to the time of his death, he assumed active chairmanship of the Council on Aquatic Resources when he gave invaluable service to the Council and its workers during the Pan-Pacific Fisheries Conference, the beneficial results of which compass the whole Pacific Region.

In the death of David Starr Jordan our institution, as well as the entire American Commonwealth, sustains one of its greatest losses. Dr. Jordan was one of the foremost educators and scientists, as well as publicists, that America has claimed in the past generation. A leader who mingled with all the people and gave the best he had to give for more than half a century.

THEO. C. ZSCHOKKE,
E. H. BRYAN, JR.,
F. G. KRAUSS

IN honor of the late Dr. Stephen M. Babcock, hollyhock gardens will be planted in at least forty-four different states on the grounds of the colleges of agriculture and agricultural experiment stations. The seed for these gardens was gathered this fall from Dr. Babcock's garden. Officials of the University of Göttingen, where Dr. Babcock completed his training, are planting a Babcock garden in his memory, as are the directors of Tufts College at which he spent his undergraduate days.

A PORTRAIT of the late Dr. Hiram Woods, Baltimore, was presented to the Medical and Chirurgical Faculty of Maryland, where he was for many years professor of diseases of the eye and ear, on November 17, at a meeting of the Osler Historical Society. Dr. Lewellys F. Barker made the presentation, and Dr. James M. H. Rowland, president, accepted the portrait on behalf of the medical faculty. Dr. Henry E. Sigerist, professor of the history of medicine, University of Leipzig, gave an address.

A MARBLE bust of the late Dr. Giovanni Di Cristina, professor of children's diseases at Palermo, who died in 1928, has been unveiled in the grounds of the Palermo Children's Hospital.

Nature reports that a tablet has been placed on the house in Egerton Road, Bristol, where he lived for the last twenty-six years of his life, in memory of the late Mr. W. F. Denning, the veteran amateur astronomer