the idea of the possibility of progress, of continuous development; and the other the idea of man's ability to control and in the Providence of God (and I say it in all reverence) to determine to a large extent his own destiny, the idea of his own responsibility for the kind of an external world in which he lives. And if you wish to see the practical result of this changing of "the way men think," look at the difference between our own civilization and the static civilizations of Asia, where Nirvana is the goal of human life and a large fraction of the population reaches it quickly through starvation. Why is it that "fifty years of Europe is better than a cycle of Cathay"? Is it not simply because in certain sections of the world, primarily those inhabited by the Nordic race, a certain set of ideas have got a start in men's minds, the ideas of progress and of responsibility.

And these ideas have come about, I think, because in a few sections of the earth men have been led to follow simply the urge to know. First, to know this earth geographically, to explore it clear to the north pole and to the south pole, even when they knew there was not the remotest prospect of growing wheat or potatoes there. But now the days of geographical exploration are gone, and yet it is the same urge which leads on the descendants of these voyagers into the unknown—the astronomer to explore the heavens, however useless that may be, the physicist to study the properties of matter and radiant energy whether he sees any immediate use for his results or not, the biologist to delve as far as he can into the secrets of life and of organic growth.

On behalf of all those who are working in the field of pure science, all those pioneers who are pushing out beyond the present frontiers of human knowledge —where a few years hence the engineer and the other builders of a future more perfect civilization than our own will follow them—on behalf of all those who are struggling on in this field, which does not often meet with large public appreciation, I extend my heartfelt thanks to the American Institute of Electrical Engineers for helping to educate the public up to its values by recognizing it with an occasional Edison award.

ROBERT ANDREWS MILLIKAN

NORMAN BRIDGE LABORATORY OF PHYSICS, CALIFORNIA INSTITUTE OF TECHNOLOGY, PASADENA, CALIFORNIA

GUSTAF ENESTRÖM

THE recent death of Gustaf Eneström, of Stockholm, removes a most distinguished investigator from the field of the history of mathematics. For eighteen years editor of the *Bibliotheca mathematica,* a journal founded by him and devoted to the history of mathematics, he wielded a most powerful influence for greater thoroughness in historical research.

Eneström was born at Nora, in Sweden, on September 5, 1852. Trained mainly in mathematics and languages, he became connected in 1875 with the library of the University of Upsala and in 1879 with the royal library of Stockholm. Through his work as librarian he acquired extraordinary ability in matters of bibliography. Before 1899 he had comparatively little time for historical investigation. Later he came to enjoy greater leisure for research and he also acquired possession of large collections of mathematical books which afforded facilities for consulting original sources, such as perhaps few historians of mathematics have enjoyed.

Trained as a bibliographer, he possessed to a degree probably never before equalled, the art of bringing all the resources of a library to bear upon a particular problem. He had the patience for working out the details of an inquiry with extreme precision. As a result, his conclusions have been found to be almost invariably correct. He is the author of numerous short papers on mathematical history, but much of his work consisted in correcting errors of others, particularly of Moritz Cantor, the author of the well-known "Vorlesungen über Geschichte der Mathematik." Unlike the performances of certain other modern critics of historical works, Eneström's findings almost without exception constituted the final word on the subject.

Cantor and Eneström were wholly different minds. Cantor possessed the faculty of portraying in bold relief the history of his science extending over long periods of time. Unaided, he prepared three massive volumes carrying the history of mathematics from the earliest historic times to the year 1759. In this general survey some of the minute details received inaccurate statement. Eneström, on the other hand, never wrote a general history, nor even the history of a particular period. He devoted fifteen years to the microscopic examination of the ponderous volumes of Cantor. His notes are a store-house of information which no historian of mathematics can afford to ignore. Eneström's influence upon the younger generation of writers has been great. The historical notes in the French "Encyclopédie des sciences mathématiques" carry the marks of his thoroughness.

At the outbreak of the great war, the printing of the "Bibliotheca mathematica" was permanently suspended by Teubner in Leipzig. It was a great disappointment to Eneström that after the war no one in America seemed willing to finance the journal as an American publication.

FLORIAN CAJORI

UNIVERSITY OF CALIFORNIA