inferior quality. The more the situation is considered, the more imperative appears the need to cultivate every rod of fertile ground. Unless the omens are false, and whether peace come soon or no, all the vegetable produce that can be raised will be sorely needed. F. K.

PROF. GASTON DARBOUX, For. Mem. R.S.

BY the recent death of the permanent secretary of the Academy of Sciences of the Institute of France, mathematical science, and all that it stands for in the evolution of human progress, has suffered a grievous loss. Of dark complexion and large build, which were a continual reminder of his southern Provencal origin, and of the exquisite courtesy which marks the French man of learning at his best, Prof. Darboux was no stranger in this country. Those who were present in December, 1907, at the great concourse which followed the remains of Lord Kelvin to his tomb adjacent to that of Sir Isaac Newton in Westminster Abbey will remember the striking figure who, in the uniform of the Institute of France, represented the sister nation among the bearers of the pall. Already in those early days of the Entente France made a point to send of her best—Becquerel, Darboux, Lippmann—to represent her in our national mourning for a man of science whose work had united so happily the genius of the two nations. Later, at the London meeting of the International Association of Academies in 1912, Darboux was naturally prominent as one of the French representatives; and, though even then showing signs of failing health, he contributed notably as usual, by his tact and moderation and sympathy, to the successful issue of business not always easy to negotiate.

Jean Gaston Darboux[1] was born at Nîmes on August 13, 1842, in a house which had once been a chapel of the cathedral. He lost his father at seven years of age; and he and his only brother were educated under the anxious care of their mother at the local lycée, attending as demi-pensionnaires, as was not unusual in those days, from six o'clock in the morning until eight in the evening. He passed on to the more special classes of the lycée of Montpelier in 1859, and in 1861 he headed the lists for admission both to the Ecole Polytechnique and to the Ecole Normale. Of these, true to his desire to devote himself to the profession of teaching, he chose the latter, thereby setting a fashion followed in later years by other illustrious men who came out high on both lists. His mother went specially to Paris in order to introduce him to Pasteur, then the scientific director of the school.

At the Ecole Normale his bent was towards geometry, and he found time for minute study of the classical works of Monge, Gauss, Poncelet, Dupin, Lamé, and Jacobi. In 1864 his own studies on orthogonal surfaces had already borne fruit in the *Comptes rendus,* and in 1866 he sustained a memoir "Sur les surfaces orthogonales" as a thesis at the Sorbonne for the doctorate in mathematical science. He then plunged into teaching, to which he had been looking forward, collaborating with Joseph Bertrand in mathematical physics at the Collège de France, and with Bouquet at the Lycée Louis le Grand; but he also found time to elaborate two of his principal memoirs, both published in 1870, one on partial differential equations of the second order, the other the famous treatise, "Sur une classe remarquable des courbes et des surfaces algébriques." In the latter work was developed the theory of cyclides, so named after the special cyclide surface of Dupin, a study which had been initiated by Moutard and envisaged under more general forms by Kummer. The Irish mathematician Casey published about the same time, and in the main independently, several very elegant and elaborate memoirs on the same topic, developed by more purely geometrical methods; and the fascination of their results and the beauty of the processes attracted great attention to the subject in this country during the succeeding years. It was another instance of the affinity of the Irish school of mathematics to the French school, on which it had for long been consciously modelled. Near the end of his life Darboux returned to this subject and prepared an extended edition of his earlier work.

From 1873 to 1878 he assisted Liouville, then of advanced years and in bad health, in the chair of rational mechanics at the Sorbonne; and some of the fruits of this course are preserved in the elegant and valuable notes, in his best geometrical vein, that he appended to an edition of Despeyrous's "Cours de Mécanique."

Darboux finally entered upon his life-work in 1880 in the professorship of Géométrie supérieure which had been founded at the Sorbonne for Chasles in 1846. As part of the activities of this chair he elaborated the great treatise on infinitesimal geometry, the "Théorie générale des Surfaces," which came out in four volumes between 1887 and 1896. This constitutes his chief expository work; into it much of his own previous researches is condensed; and, as usual with the French treatises on analysis, it ramifies into adjoining domains, such as general dynamics, whenever the methods of his exposition are adapted to illuminate such cognate theories.

He was elected a member of the Académie des Sciences in 1884, and there he gained the highest mark of the esteem and appreciation of his colleagues in being chosen as Secrétaire perpétuel in 1900. The efficiency and charm with which he executed the delicate duties of that office have been universally recognised. He held honorary rank in the Universities, amongst others, of Cambridge and Christiania and Kasan. He was elected a foreign honorary member of the Royal Society in 1900, and last autumn, just in time, he received the award of its Sylvester medal.

JOSEPH LARMOR.

[1] Use has been made for these facts of a monograph on M. Darboux published by M. E. Lebon in 1910.