structure determinations. The outstanding one among these is the analysis of the urea adducts. This work was done during his prison term in Halle from where he was, on the representation of the I. G. Farben, daily escorted by a guard to their Leuna works for 'work of national importance'. In these urea adducts long-chain molecules like paraffins are imbedded in cylindrical tubes formed by spiralling polyurea chains—an entirely unforeseen type of structure at the time.

Hermann's lectures on crystallography are said to have been very stimulating. They contained some of the material he could not bring himself to publish, and parts of his course were worked out by his students and checked by him. Perhaps, some day, they can be published, but they will now always remain a fragment.—Max Born, in a short obituary notice on his friend and pupil mentions his profound and expressive addresses at the Friends meetings which testified to his sincere search of truth, clarity of mind and moral fortitude. The longer the more, matters spiritual took precedence in Hermann's unfinished work and brought him nearer to the peace for which he always strove.

P. P. Ewald

Dr. Gösta Phragmén, who died on 21 August 1944, was born on 29 April 1898. He took his first degree in chemistry, physics and mathematics at the University of Stockholm in 1921. By this time he was already associated with the newly established Institute of Metallography where he acted as assistant first to Professor C. Benedicks and subsequently to Professor A. Westgren. In 1927 he succeeded Westgren as principal metallographer at the Institute, and when the Institute was reorganized in 1933 he was appointed head of its technical department. In 1934 he was awarded the degree of Licentiate of Philosophy in physics by the University of Stockholm. From 1939 he was assistant professor in metallography at the Royal Technical University of Stockholm, where from 1942 he lectured in physical metallurgy. When the Institute of Metallography was reorganized as a result of its expansion, he was appointed its head in 1943.

Even in his youth Phragmén showed unique qualities. In spite of
remarkable personal modesty he had marked confidence in his knowledge and judgement and in consequence he was highly critical of the concept of authority. These characteristics were evidently inherited from his father, the distinguished mathematician Edvard Phragmén, and they were strengthened by an education free of all constraint. In addition to his critical scientific disposition, he soon showed a strong technical interest, and this probably influenced his choice of the new Institute in spite of all his prospects for a successful academic career. It is probable that his dislike of academic formality also contributed to this choice.

Phragmén's first efforts as an X-ray crystallographer were made in 1920, when G. Aminoff, then assistant professor at the University of Stockholm, and he investigated the structure of the mineral alloy osmiridium. The new techniques captured his interest, and when they were later used for alloy investigations at the Institute of Metallography, where Phragmén entered as a pupil, he very soon contributed to their development and application. His efforts in this field assured the success of the X-ray structure research carried out at the new Institute.

Phragmén used his considerable experimental skill to construct a reliable and simply operated apparatus for obtaining powder photographs. He constructed a rotation camera which was primitive but adequate for the first investigations of relatively simple crystal structures. During his experiments with different types of powder camera he also gradually improved the technique of powder photography, and finally he built a series of focussing cameras which, with their high resolution and very good line definition, proved particularly well suited for alloy investigations.

Studies of the crystal structures of the iron modifications and of steel, which were begun by Westgren in Professor Siegbahn's laboratory in Lund, were continued by Westgren and Phragmén together. They found that δ-iron is isostructural with α-iron, and they determined the crystal symmetry of cementite and also the unit-cell dimensions of martensite and austenite.

In 1923 Phragmén reported an X-ray investigation of the iron-silicon system which had led to the determination of the structures of FeSi and FeSi₂. In the course of further investigations of the same alloy system Phragmén found that silicon atoms substituting for iron atoms in the solid solution of silicon in α-iron tend to arrange themselves in a regular way when the silicon content exceeds about 7%. In this way a superstructure is formed which is fully established at a com-