Carl H. Hermann

1898-1961

Those of us who knew Carl Hermann deeply appreciate the loss they personally and Crystallographers in general have suffered through his untimely death from a heart attack at the age of 63. Hermann belonged to the small number of fortunate people to whom the intricate geometry of space groups comes, at it were, naturally and without effort. If coordinates of equivalent points were needed, he rarely took the trouble of looking them up in tables because he wrote them down just as quickly 'by inspection', deriving them from the symmetry elements which he saw in his mind. This insight made him the unquestioned editor of the *Internationale Tabellen* when these were first proposed, and was of great value also in the critical attitude which was to be carried through in the first volumes of *Strukturbericht*.

Of Hermann's scientific work his doctoral thesis under Max Born should be named first; in it, he calculated for the first time, in 1923, the optical rotatory power of a crystal. Sodium chlorate was chosen as a solid which owes its optical activity entirely to the crystal structure, since in solution it is non-active. The gyration vector had been introduced by Born in his general theory, but its actual determination for a given structure of such complexity as sodium chlorate presented difficulties of calculation which at the time appeared very formidable. Unfortunately Hermann went wrong on certain factors π, so that the numerical work had to be repeated later, but his work broke the ice.

Hermann's first salaried job after his graduation in Göttingen was in Hermann Mark's division of the Kaiser-Wilhelm-Institut für Faserstoffe in Dahlem. When this came to an end, Hermann came to me in Stuttgart in September 1925 as my assistant. I had the ambition of keeping the modest list of all known structures up to date which formed a twenty page appendix in my book of 1923, but soon became aware of the rapidly increasing number of yearly structure determinations which made it impossible to keep up with it by myself. So Hermann and I shared the burden of preparing the first volume of the *Strukturbericht*, his share of the work gradually increasing as my growing academic duties kept me otherwise engaged. For the next volumes Hermann took over the editorial responsibility.

Contents

I remember vividly how on one of the first days after Hermann's arrival in Stuttgart I showed him how, by forming $|F_h|^2$, the series to which it is equal is the structure factor of a mass distribution containing the relative distances between the atoms—what is nowadays called the Patterson function or the 'folded' mass distribution of the crystal. The problem presented to Hermann was that of unfolding. Whereas my attempts at unfolding had been in general terms, Hermann at once became interested in the folding operation with symmetry elements present. Neither of us found a solution to the unfolding problem and therefore nothing of our work was published. But it had started Hermann on the introduction of 'Kennvektoren'—characteristic vectors for the symmetry elements—and 'Kennstellen'—characteristic components of these vectors—which he then made the foundation for his derivation of the 230 space groups and the main feature of his nomenclature which grew out of it (*Zeitschrift für Kristallographie* 1928, Vols. 68 and 69). The same derivation which, assuming three independent translations led to 230 space groups, gave 75 groups of a single translation (chain groups) and 80 groups of two translations (net groups), all of them in three-dimensional space. Except for slight changes, especially with a view of adapting the symbols to the use of a typewriter, Hermann's nomenclature, which came very close to one devised by Mauguin for his lectures, was adopted at the conference in Zürich in July 1930 where the plans for the *International Tables for the Determination of Crystal Structures* were worked out. (See also the papers by Mauguin and by Hermann in *Zs. Krist.* 1931, *76*, 542 and 559.)

Hermann's main interest at this time were the symmetry properties of matter. Thus he presented a new way of recognizing the influence of space-group symmetry on tensors of any order in *Zs. Krist.* 1934, *89*, 32–48 and tackled the systematic derivation of all possible symmetry cases for the arrangement of like molecules in a statistically symmetrical way in a paper written for a special issue of *Zs. Krist.* on liquid crystals (1931, *79*, 186–221). Including the amorphous and the periodical (crystalline) state, Hermann finds 20 types of arrangements with different statistical symmetries. This paper was used by Hermann as thesis for a Lecturership at the Technische Hochschule Stuttgart in 1931.

Hermann came from a protestant family from near Bremen in which matters of conscience were not taken easy. His father, captain of a freighter, asked his employers after years of service to relieve him of the responsibility and let him continue as a simple seaman. Of his brothers, two were in the church; one of his sisters became a very

active philosopher and had to leave Germany under Hitler. Carl's wife Eva came from protestant theologians. Carl himself, after an early period of agnosticism (and of other 'isms') became devoutly religious, though not church-going, some time before the Second War. His wife and he joined the Friends and after the war became leading in the small group of such that had survived Hitler's enmity.

It was not astonishing that a man of such conviction and as fearless as Hermann had to give way to the mounting political interference in academic life two years after the Nazi had taken over. After abortive attempts at finding an academic position abroad Hermann accepted an offer from R. Brill to join his group of crystallographers at the I. G. Farbenindustrie laboratories in Oppau. Here Hermann became co-author of the well-known paper on the electron density distribution in rocksalt, diamond and other crystals (Brill, Grimm, Hermann, Peters, *Ann. d. Phys.* Lpz. 1939, *34*, 393). Although after having been called up for active duty at the outbreak of war, Hermann managed to convince the Commanding General personally that he would better be deferred since under no circumstances would he become a combatant; he and his wife were later imprisoned for having been found listening to the BBC radio news.* They were saved the death penalty only because it could be established that it was the news in English on which death penalty was not compulsory (Hitler did not count for much the 'ten thousand intellectuals' who knew English). They were separated for years from one another and their two adopted children, and found their adventurous way together—their home having been destroyed in the air raids on Mannheim—only after the liberation.

In 1946/47 Hermann was lecturer at the Technical University in Darmstadt until, in 1947, a special chair and institute for crystallography was created for him at the University of Marburg.

Hermann was one of the Germans attending the First Assembly of the International Union for Crystallography at Harvard in 1948 and he gave, on that occasion, a very brilliant and original paper on space groups in higher dimensions. It appears from the published part (*Acta Cryst.* 1949, *2*, 139–145) that Hermann had considerably more material on hand; the further progress hinged on the proof of some very simple assumptions, likely to be true and provisionally made. As it sometimes happens, this proof could not be found, and all the material Hermann had elaborated remains unpublished.

Hermann hardly ever felt the urge to apply his talents to actual

* This may have been a pretext only; the real but not legally punishable crime was that they had fed and hidden Jews in their plight.

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.

Gösta Phragmén
1898-1944

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