

2003 Leonard Medal for Herbert Palme

I first met Herbert Palme in 1971 while spending a sabbatical year at the Max-Planck Institut für Chemie in Mainz; he had just arrived from Vienna with a fresh Ph.D. His thesis (in Physics) had involved the use of fast neutrons for the activation analysis of meteorites, including Zr in CI chondrites. He remained in Mainz until 1995, when he was called to his present position as Professor of Mineralogy at the Universität zu Köln.

Herbert's background is similar to mine and, during much of our subsequent careers, we have studied similar cosmochemical problems but from our perspectives. Still today, I doubt many of his conclusions even as he does mine, but there is no doubt about the importance of the problems he attacks, the breadth of his knowledge, the quality of his data, or the intellectual vigor of the scientific debates in which he participates.

Herbert's research interests are so broad, it is difficult to put them into a limited set of categories. After struggling with this dilemma, I finally compiled six categories of Herbert's first major contributions that are listed in chronological order: 1) the origin of the lunar crust; 2) the nebular record of refractory inclusions in chondrites; 3) the formation of meteorites (such as Acapulco) that are almost chondritic; 4) the siderophile signatures of large terrestrial impactors; 5) the composition and formation of the Earth's mantle and core; and 6) the laboratory study of equilibrium processes that aid in understanding the formation processes of meteorites, planets, and the Moon.

In each of these areas, Herbert has made telling observations. Here is an abbreviated list colored by my own interests. I apologize to Herbert for undoubtedly omitting some of his favorite achievements.

Herbert demonstrated an ability to think broadly when in 1975 he and Heinrich Wänke called attention to the complementarity of incompatible-element patterns in the lunar crust and mantle. Today, I still consider this to be one of the strongest arguments for a lunar magma ocean. This approach helped convince Paul Warren and me that the incompatible-rich component KREEP formed as the last dregs of the magma ocean.

Herbert and his Mainz colleagues including Frank Wlotzka were among the first to study the refractory inclusions abundant in the Allende CV chondrite. A major contribution of Herbert was the discovery of the first super-refractory metal; his innovation was to repeatedly subdivide a neutron-activated sample, each time using the radioactivity of 74-day ^{192}Ir to follow the highly refractory siderophile Ir. This metal condensed at temperatures much higher than most of the phases in the refractory inclusions. Herbert and Bruce Fegley used equilibrium calculations to model the formation of such exotic inclusions and recognized that increasing the oxygen fugacity greatly increased the volatility of W and Mo.

Another early study was Herbert's collaboration with Emil Jagoutz and other Mainz colleagues to devise a way to establish which mantle rocks are the most primitive and to use data on these to infer the siderophile-element composition of the Earth's mantle. This approach has found wide resonance within the geochemical community, and led to the major effort in various laboratories, including Herbert's, to understand the partitioning of elements between molten silicates and metal and, through these relationships, to an improved understanding of the composition and origin of the Earth's core.

Herbert has a great memory for details, has strongly held opinions, and is not always diplomatic when commenting on the work of others. I am a member of a large club who has heard him use the German word "Unsinn," or its English equivalent, after my talks. Sometimes he isn't right, but the vigor of the later discussion always leads to new insights and, often, more detailed future research.

For all his scientific achievements, for all his stimulating discussions, for all his ability to lead us in new cosmochemical directions, our Society has chosen Herbert Palme as the recipient of the 2003 Leonard Medal.

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