

A Tribute to Marcel Berveiller (1946–2019)

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Marcel Berveiller, who died on January 1, 2019, was born in 1946 in Vaudreching in eastern France, where his father was a farmer. He grew up in this Lorraine village located 10 km from the German border. The hard-working activities of farmers and the bi-cultural influence of France and Germany were the backbones of his life.

After attending high school at Metz, he graduated from the Institut National des Sciences Appliquées of Lyon (INSA Lyon, France) where he earned an engineering degree in Engineering Physics in 1968. In a time when few students were doing study abroad, Marcel Berveiller spent a year at the Technische Universität Karlsruhe from 1966 to 1967. This was twenty years before the opening of the ERASMUS program in Europe (*EuRopean Action Scheme for the Mobility of University Students*).

He began his research career in October 1968, enrolling as assistant professor at the University of Strasbourg. He transferred to the newly established University of Metz where he defended his Docteur-Ingénieur Thesis in 1971. In 1973, grasping that micromechanics could answer

questions he had about plasticity, he joined the University of Paris XIII to work under the supervision of André Zaoui. His State Thesis *Analysis of Plastic Behavior and Deformation Texture in Polycrystals of Metallic Alloys*, defended in 1978, constitutes a seminal work in the field of scale transition modeling. Introducing a scalar elasto-plastic accommodation function from an isotropic elasto-plastic approximation of the R. Hill's constraint tensor, he extended the self-consistent scheme for elasto-plastic polycrystals developed by E. Kröner in 1961. Also during his time at Paris XIII he worked on latent hardening in single crystals with Patrick Franciosi and André Zaoui. He obtained the position of full professor in 1980.

In 1982, he decided to go back to the University of Metz where he established a new research lab, the Laboratory of Physics and Mechanics of Materials (LPMM), in collaboration with Alain Molinari. He was the first director of this lab, and under his guidance it rapidly expanded and reached international fame. In August 1982, he attended the ICOMAT conference held in Leuven, Belgium, and immediately became very excited about shape memory alloys. He saw the potential for engineering applications of these materials and decided to use his micromechanical skills to study the martensitic transformation in his newly established lab.

This research topic became a large part of his scientific activities and produced many achievements, such as the determination of elastic interaction between martensitic variants, the self-consistent modeling of superelastic behavior, and the description of moving inelastic discontinuities. He established at Metz a large research group working on martensitic transformation from

micromechanical modeling to shape memory applications. Nimesis Technology©, which is now a very active company working in shape memory technology, is a spin-off of this research activity.

Marcel Berveiller was part of the Advisory Committee for the Martensitic Transformation in Science and Technology Conference held in Bochum in 1988. This initiated the ESOMAT conference series. In 1995, he organized the first international conference devoted to the mechanical behavior of materials with solid–solid phase transformation: the MECAMAT'95 conference in La Bresse, France. In 1995, in collaboration with Franz Dieter Fischer from Montanuniversität Leoben, Austria, he also organized at Udine, Italy, the CISM courses and Lectures No. 368 on “Mechanics of Solids with Phase Changes.”

Despite his many contributions in martensitic phase transformation, he did not neglect to contribute further on the analysis of plastic flow and micromechanics. He found inspiration in crystal plasticity to study phase transition and new ideas in phase transition for plasticity. Among his numerous achievements were the development of a multiple site self-consistent scheme, the extension of the self-consistent scheme at large strains, the study of the coated inclusion problem, the description of non-local behavior in elastoplasticity, and the use of translated field technique to describe the elasto-viscoplastic behavior in heterogeneous materials. During the last years of his scientific career, he focused on the impact of grain-size distribution and on the influence of discrete intergranular slip events. He succeeded in combining his curiosity about both plasticity and phase transformation with the development of a micromechanical modeling of Transformation Induced plasticity in TRIP steels.

Marcel Berveiller was one of the most accomplished mechanics of his generation. He had an eye for important problems in mechanics of materials. Throughout his career he nurtured a steady flow of PhD students and was an inspiring mentor for his postdocs and many young assistant professors.

Marcel Berveiller paid a great deal of attention to international collaborations. He was responsible for many research programs with Morocco, where he had many

friends and colleagues, like Omar Fassi-Fehri, former Minister of Scientific Research of Morocco. In 1999, he organized the annual conference of the International Association of Applied Mathematics and Mechanics (GAMM – Gesellschaft für angewandte Mathematik und Mechanik) in Metz, France, that gathered 800 participants. It was the first time that the annual meeting of this German scientific society was held outside Germany. He also served as scientific advisor at the French embassy in Germany from 2001 to 2004. He was very active in the development of industrial partnerships. In 1990, he started a long lasting collaboration with the steelmaker USINOR-SOLLAC, which is now a part of ArcelorMittal. The LEM3 (successor of the LPMM and LETAM merger in 2011) still belongs to the network of long-term academic partners of ArcelorMittal.

Among his numerous honors, Marcel Berveiller was awarded the Réaumur Medal by the French Society of Metallurgy and Materials (SF2M) in 1999. He was distinguished as Commander in the French Order of Academic Palms in 1999 and was made Knight in the French National Order of Merit in 2012.

Marcel Berveiller was passionate about the music of Johann Sebastian Bach and he was a skilled organist who often played in churches for celebrations. He loved to ride his bicycle and spent many summer vacations riding along the Danube or the Rhine rivers with family members and friends. He retired in 2008 and became emeritus professor. Unfortunately, for him and his loving family, his health rapidly deteriorated.

Many fondly remember his profound unpretentiousness, his broad smile and his bright eyes. He was genial, generous, and a scientific mentor to many.

Etienne Patoor,

who was lucky enough to have Marcel
as an advisor, scientific mentor,
and colleague for many years

University of Metz

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