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IN MEMORIAM
ÜLO LILLE
1931–2023

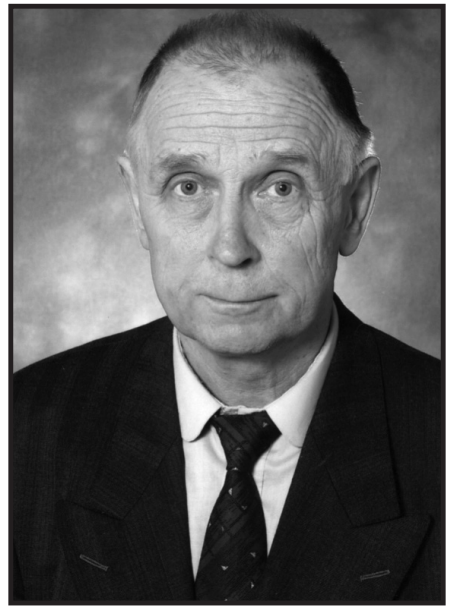

Photo: Estonian Academy of Sciences.

We announce with deep sadness that on 2 January 2023, Academician Ülo Lille, a Grand Estonian Chemist, passed away. His death is a great loss to the Estonian scientific community. His outstanding scientific results substantially contributed to the field of active bioregulators, such as prostaglandins, and even more fundamentally, to the chemical nature and structure of the Estonian oil shale kukersite.

Ülo Lille was born on 16 September 1931 in Pärnu County, to a farmer family. In 1950 he graduated *cum laude* from Rapla Secondary School and in 1955, also *cum laude*, from the Department of Chemistry and Mining, Tallinn Polytechnic Institute (now Tallinn University of Technology). Thereafter he worked two years as foreman and technologist at Kiviõli Oil Shale Chemical Integrated Plant. In 1957–1959 Ülo Lille was enrolled on a postgraduate programme of Tallinn Polytechnic Institute and then got a position of senior researcher in the newly established Oil Shale Institute in Kohtla-Järve.

In 1960 Ülo Lille defended the Candidate degree (now PhD) in pyrolysis of oil shale. He pioneered the application of spectral methods and gas chromatography in research of the composition and genesis of oil shale.

In 1973 Ülo Lille defended the Doctor degree in Chemistry (Doctor of Sciences) on alkyl resorcinols. In 1975 he started to work at the Institute of

Chemistry of the Estonian Academy of Sciences as a Head of Laboratory and later a Head of Department of Prostanoid Chemistry. He is a pioneer of a new topic – chemistry, biochemistry and technology of prostaglandins in Estonia. Under his supervision the biotechnology of producing prostaglandins was developed and introduced at the Pilot Plant of the Institute, and also the asymmetric total chemical synthesis of prostaglandins was initiated.

In 1983 Ülo Lille was elected a member of the Estonian Academy of Sciences, and in 1984 he got a professorship at the Academy.

Ülo Lille has published more than 200 scientific publications. His last article "From the molecules of resorcinolic lipids to alga *G. Prisca* globular colonies in kukersite microfossils: a multiscale simulation study" appeared in Oil Shale in 2020 (Vol. 37, No. 4, pp. 281–287). In this article, he is describing the oil shale kerogen as follows: "The term "kukersite" was first used by Prof. M. Zalessky from St. Petersburg in 1917. This term is currently used for all Ordovician (formed 500 million years ago) kerogens. Prof. M. Zalessky interpreted the micro particles found in kerogen from Kukruse as a remnant from the organism *Gloeocapsamorpha Prisca'ks.* … The image of a microorganism *Graptolit* from the Ordovician period is on the front cover of our Oil Shale journal. … It was essential to study together the products of thermal destruction of kerogen and the formed phenols with all contemporary methods".

On the basis of his work, and also of Prof. Blokker from the Netherlands a model of the primary structure of kerogen – the Lille-Blokker model – has been developed. Ülo Lille studied also the 3D structure of kerogen particles for a particle $C_{421}H_{638}O_{44}S_4NCl$ with MW 6581 optimizing the structure by MM+ computational modelling. He got a good coincidence of the model with ^{13}C NMR spectral data.

For his outstanding work Ülo Lille has been honoured with many awards. The following is to name some of these. In 1987 he and his research group was awarded the Estonian State Award on Science for the developments in prostaglandin research and production; in 1991 the Estonian Academy of Sciences honoured him with the Academy Medal; in 2001 he was honoured with the Order of the White Star from Estonian President; in 2011 he was given the Lifetime Achievement Award for Science and Development from the Estonian State.

The Oil Shale journal joins in grief with the family of Academician Ülo Lille and will remember him as a heartfelt colleague, who was always happy for the achievements and progress of younger colleagues, understanding well that science is driven by ideas rather than by administrative bureaucracy.