

## OBITUARY

**Dragutin Fleš**  
(1921–2005)

Dragutin Fleš was born in Vukovar on August 1, 1921. He finished elementary and secondary school in Zemun and after passing the school-leaving exam in 1941, he enrolled in the Technical Faculty in Belgrade. He graduated from the Chemical Technology Department of the Technical Faculty in Zagreb in 1946. During his student days, from 1943 to 1946, he also worked in the laboratory of the Zagreb power station. After graduating, he got a job in Pliva, Chemicals and Pharmaceuticals Company, where he worked in the chemotherapeutic division on the production of Neoarsphenamine, and preparation of arsenobenzene, organocadmium and organoantimony compounds. In 1950 he worked, within the *Foreign Student Summer Project*, at the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts (USA), on the preparation of  $\beta$ -carotene in the laboratory of Professor Nicholas A. Milas. This research led to the first total preparation of  $\beta$ -carotene. He earned his doctor's degree at the Faculty of Science and Mathematics (Zagreb) in 1952 for his work on the preparation of active  $\beta$ -amino acids containing sulphur- $\beta$ -cystine,  $\beta$ -cystine,  $\beta$ -methionine and  $\beta$ -amino djenkolic acid. His supervisor was Professor Krešimir Balenović (1914–2003). He described his collaboration with Balenović in a memorial booklet entitled *Krešimir Balenović (1914–2003)* (edited by N. Trinajstić, Croatian Academy of Sciences and Arts, Zagreb, 2004, 17–29). This collaboration produced four papers. After getting the PhD, Fleš went back to MIT and spent a year (1952/1953) there as a postdoctoral resident with Milas. He spent the school year 1958/1959 as a fellow of the *Alfred P. Sloane Foundation* working with Professor Roger Adams at the University of Illinois, Urbana (USA). There he worked on the preparation of optically active alcohols from the group of *senecio* alkaloids. He published three papers with Adams.

He left Pliva in 1960 and moved to the Organic-chemical Industry (OKI), Zagreb, where he was appointed director of the OKI Sector (later Institute) for Research and Development of Petrochemicals and held that position until 1971. When, due to reorganization of research work in oil and petrochemical industries, a research and



development institute was established in the petroleum industry (Industrija nafte – INA), the OKI Institute became its component part (INA-OKI). Fleš continued working in that institute as head of laboratory research on polymers (1971–1985), member of the Managing Board and adviser, until he retired in 1985.

Although he spent all his professional life in industrial organizations, he also taught courses in stereochemistry and synthetic organic chemistry at the Faculty of Natural Sciences and Mathematics in Zagreb. He was one of the founders of the postgraduate course in macromolecular sciences at the University of Zagreb and attracted a number of young and gifted chemists to polymer science.

He was visiting professor at the Johannes Gutenberg Universität in Mainz (Germany) in 1977 and at the University of Massachusetts (Amherst, USA) in 1984. He was elected an associate member of the Yugoslav Academy of Sciences and Arts in 1981, in the Academy Division of Mathematical, Physical, Chemical and Technical Sciences. In 1991, he became a full member of the newly called Croatian Academy of Sciences and Arts (the name change happened in 1991). He was among those who initiated the establishment of a separate Academy

division for technical sciences. This division was founded in 1997 and he served as its first secretary. He was a member of the Croatian Chemical Society, Croatian Society of Chemical Engineers and Technologists, Association of Plastics and Rubber Manufacturers, etc.

The scope of his scientific interests was very wide. His research work can be divided into five fields: 1. *Preparation and stereochemistry of compounds with biological action* (e.g., preparation and determination of the absolute configuration of chloramphenicol and pseudonorefedrine, steric course of asymmetric induction in Meerwein-Ponndorf-Verley reduction of  $\alpha$ -phthalimide - $\beta$ -substituted propiophenones, preparation of antihistamines, antitussives, anticoagulants, antihypertensives,  $\beta$ -aletines, amidones); 2. *Preparation and characterization of optically active polymers* (e.g., preparation of polyamides, poly- $\beta$ -thiolactanes and poly- $\beta$ -thiolactones, stereoregulated polymerization with Ziegler-Natta catalysts); 3. *Preparation and characterization of copolymers formed with the aid of electron-donor-acceptor complexes* (e.g., copolymerization of phenyl-vinyl-alkylethers and thioethers with maleic acid anhydride and *N*-phenylmaleimide, copolymerization of  $\alpha$ -methylstyrene and  $\beta$ -methyl-

styrene with maleic acid anhydride, maleimide and *N*-substituted maleimide); 4. *Preparation and characterization of polymers showing crystal properties in liquid state* (e.g., preparation of homopolymers of *N*-(4-phenoxyphenyl)maleimide and copolymers with styrene and substituted  $\alpha$  and  $\beta$  derivatives), and 5. *Miscellaneous topics* (e.g., stabilization and degradation of polyethylene, spin testing). He published more than 250 scientific and technical papers, and had 31 patents protected. Fleš described his own research in his *Autobiographical Account of Research in Chemistry 1946–2002* (HKDI/Kemija u industriji, Zagreb, 2003).

He was awarded the state award for science *Rugjer Bošković* in 1978 and the *Life-achievement Award* in 1989. On the occasion of his 75<sup>th</sup> birthday, two issues (3–4) of *Polymers* (**18** (1997)) were dedicated to his life and work, containing a number of articles by his former students and collaborators from Croatia and abroad.

Dragutin Fleš passed away on June 11, 2005 in Zagreb.

Nenad Trinajstić