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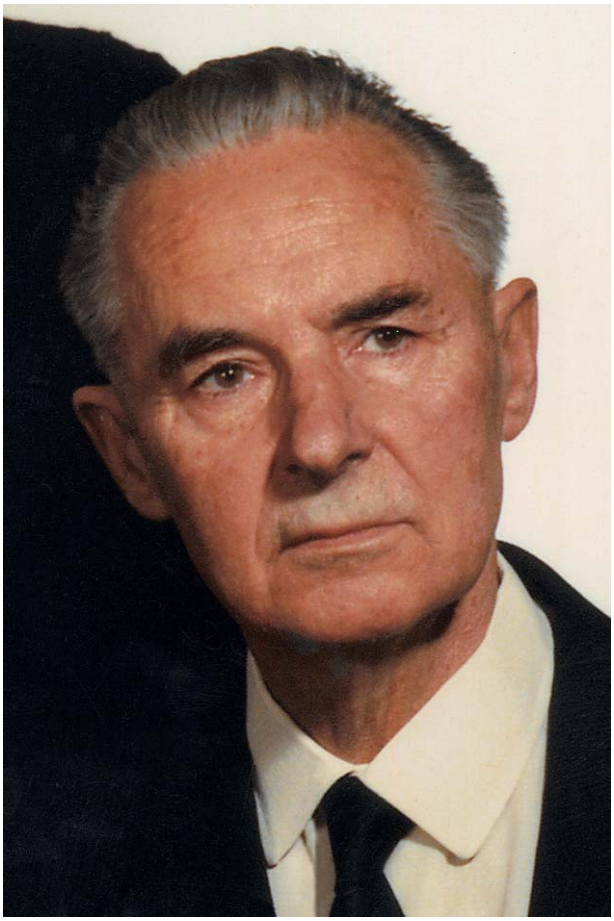
OBITUARY
Želimir Procházka
(1921–2003)



The distinguished Czech chemist and the graduate of the University of Zagreb (Croatia) Želimir Procházka died in Prague on April 19, 2003. He was born in Dubrovnik on May 7, 1921. His mother Viktorija née Jurković was Croatian and his father, Jindřich Procházka was Czech (born in Prostějov in Bohemia and educated in Brno and Graz). The father was manager of the Czech bank in Dubrovnik. They did not stay long in Dubrovnik. After moving around in Croatia (Osijek, Đakovo, Mikanovci), they finally settled down in 1927 in Zagreb, where his father became co-owner of the soap-making factory *Zora* in Zagorska Street at Trešnjevka. Its flourishing business enabled a comfortable life to the family.

Želimir Procházka finished elementary school (1926–1930) and grammar school (1930–1937) in Zagreb. Throughout his school years he also attended the Czech supplementary school and was thus learning the Czech language and culture from an early age.

It was not easy to decide what to study – whether to choose law and a diplomatic career or study chemistry or medicine. He enrolled in the Department of Chemical Technology of the Technical Faculty, University of Zagreb, because he concluded that he had no talent for diplomatic service and that he was not self-denying enough for medicine. Thus, in the autumn of 1938 he submitted his enrollment application to the Technical Faculty. However, the Department of Chemical Technology of the Technical Faculty accepted only 55 students and there were 90 applicants. The selection was made by lottery. Procházka had no luck and remained outside the enrollment quota. Nevertheless, it so happened that many winners opted out and Procházka was enrolled with some delay.

Želimir Procházka and his generation were taught by prominent Croatian chemists Vladimir Njegovan (1884–1971), Vladimir Prelog (1906–1998; Nobel co-laureate for chemistry in 1975), Ivan Plotnikov (1879–1955), Rikard Podhorsky (1902–1994), Miroslav Karšulin (1904–1984), Matija Krajčinović (1882–1975), and Vjera Marjanović-Krajovan (1898–1988). Knowing that Prelog had studied in Prague and could speak Czech, Procházka hoped that he would write his degree-thesis under his supervision. For this reason, he most thoroughly studied organic chemistry from the book of Paul Karrer (1889–1971; Nobel co-laureate for chemistry in 1937) *Lehrbuch der organischen Chemie*. Since he had studied organic chemistry in such detail, Procházka was among the first students to take the exam in organic chemistry with Professor Prelog. Professor Prelog was satisfied with Procházka's knowledge but he gave him grade 9 (ten being the highest possible grade) saying that his knowledge had not settled down yet. He looked forward to doing his degree-thesis under Professor Prelog's supervision, however his hope was dashed because only a few months later (in December 1941) Prelog left for Switzerland upon invitation of the first Croatian Nobel laureate in chemistry Professor Leopold Ružička (1887–1976).

Procházka did his degree-thesis with Professor Karl Weber (1902–1978), who succeeded Professor Plotnikov as the head of the Laboratory of Physical Chemistry (1943). His degree-thesis was a study of the catalysis and inhibition of chemiluminescence of 4-aminophthalhydrazide, the so-called luminol. A number of later prominent Croatian chemists and chemical engineers graduated from the Department of Chemical Technology in 1943. Besides Procházka, 46 engineers (the highest number of chemical engineers who graduated in one year until that time) took their degrees; among them were Smiljko Ašperger, Viktorija Dörner, Mladen Krajčinović (Professor Krajčinović's son), Ivan Lovreček, Branko Lovreček, Milan Pećar, Ivan Scarpa, Viktor Thaller, Teodor Vrbaški, Zdeslav Žilić.

As soon as he graduated, Procházka was mobilized into the Educational Battalion of the Croatian Army and, except for some official trips to Križevci, Koprivnica and Daruvar, remained in Zagreb to the end of World War II. He was transferred to the Home-Guard driving school in the last months of the war. During the whole period of his military service he worked with Professor Weber as a volunteer in the Laboratory of Physical Chemistry. Jointly with Dr Karl Schulz, assistant lecturer, he worked on corrosion inhibitors, catalysis of soap decay, study of the photodynamic effect, catalysis of luminol chemiluminescence not only with iron compounds but also with compounds of other metals (cobalt, nickel, gold, copper, *etc*.).

After the war, he spent three months in the Yugoslav army and upon his return to Zagreb decided to emigrate to Czechoslovakia. In October 1945 he found a job in the organic chemistry laboratory of pharmaceutical works *Interpharma* near Prague. Owing to his experience in physical chemistry, his first task was to investigate the electroreductive properties of some compounds. He tried to electroreduce diethyl ester of oxalic acid and then oxalic acid itself, because the laboratory manager Dr Karel Fučik was attempting to synthesize Pelentan, an important anticoagulant (inhibits the synthesis of protrombine and other factors important for blood coagulation by extruding vitamin K_1 from enzyme systems participating in the synthesis of coagulation factors), which was invented by the co-owner and director of the factory, graduate engineer Jan Rosicky. Pelentan, ethyl ester of di(4-hydroxycumarinil-3)acetic acid was obtained by condensation of glyoxil acid ethyl ester with 4-hydroxycumarin. Preparation of glyoxil acid ester was unpleasant because it involved working with benzene solution of tetraacetate lead, which is highly toxic in addition to benzene being a highly flammable and cancerogenic compound. This is why Dr Fučik asked Procházka to try to condense 4-hydroxycumarin with glyoxil acid and then to esterify the thus obtained pelentan acid, di(4-hydroxycumarinil-3)acetic acid. He found it easy to prepare glyoxil acid from oxalic acid by electroreduction in aqueous solution with very low recovery, but this solution could be easily condensed with an aqueous solution of 4-hydroxycumarin into pelentan acid, which in turn could be readily esterified in acidic ethanol. Thus, they finally obtained sufficient amounts of Pelentan, the most efficient anticoagulant of that time, which is still in use.

As Procházka had achieved a good command of English and Russian in Zagreb, had a passive knowledge of Italian, and spoke also Czech and Croatian, he offered the Dutch company *Excerpta medica* to write summaries of articles from various chemical and medical journals. The underlying motivation was to get access to papers from the forefront of the development of chemical and medical sciences. Once he had to make a summary of the review article of the Russian chemist B. M. Sumcov from the journal *Biohimija* in which the author discussed the bound form of ascorbic acid in cabbage. It was evident from the article that the presence of ascorbigene had not been sufficiently proven and that its existence was a topic of discussion in literature. It was just at that time that Procházka learned to use the new analytical method – paper chromatography, which was transferred from England to Czechoslovakia directly from its inventor Dr Archer J. P. Martin (shared the 1952 Nobel Prize for chemistry with R. L. M. Synge) by Dr Ivo Hais, who worked in the same research institute as Procházka. They succeeded in proving the presence of L-ascorbic acid in bound form in cabbage and in its extracts. Paper chromatography also enabled them to follow ascorbigene isolation, which they isolated (jointly with V. Šand) in pure state and showed that its UV spectrum corresponded to the UV spectra of 3-substituted indoles.

Once this research was completed, Procházka entered the chemistry of steroids. Owing to his experience of working with paper chromatography, he was invited to the Laboratory for Steroid Chemistry at the Department of Organic Chemistry of the Czechoslovak Academy of Sciences in Prague. There he worked on the microbiological transformations of steroids, particularly on transformations of certain steroids from fungi. He also studied isolation of natural organic compounds from various plants. The most valuable result of this research was the isolation of methylsulfoxypropylisothiocyanate from natural sources (weeds, cabbage) and its structure determination. This compound was prepared before World War II by Karrer by hydrogenation of methylsulfoxypropenylisothiocyanate, which he named sulforafen, isolated from black radish. In the paper in which he published this result, Karrer also foreseen the discovery of a hydrogenated compound in nature, for which he proposed the name sulforafan. Procházka found it but he did not succeed in exploring the pharmacological action of sulforafan. Later on, in mid-1990s, American researchers established that broccoli contained a compound with strong anticancerogenic action. It was found that this compound was sulforafan and that it was also present in cabbage, cauliflower, Brussels sprouts, radish – vegetables

of the family *Brassica olearacea* L., which also contain ascorbic acid.

Procházka retired at the age of 60 but he worked for another five years as a pensioner-consultant. After these five years he returned to active service to work for two more years on yeasts. Then he definitely retired and discontinued all further research in chemistry. Since then he fully devoted his time to the *Association for Helping Mentally Retarded Persons*. Procházka had five children and his second son was slightly mentally retarded due to a birth injury. Through his son's rehabilitation he became familiar with the activities of the said association and started actively working for it. Among other functions, he was president of the local, municipal and central board of the Association.

At the time of Serbian aggression on Croatia (1991–1995), Procházka was among those who spread the truth about the Croatian Homeland War and he wrote about it to the Prime Minister and the Foreign Minister of the Czech Republic as well as to the ambassadors of foreign countries located in Prague.

He used every opportunity to come to Croatia. His significant contribution to the development of chromatography in this country deserves special mention. He delivered a number of lectures, organized by the Analytical Chemistry Section of the Croatian Chemical Society, whose member he was and many lectures in the Department of Chemistry and Biochemistry of School of Medicine in Rijeka. He gave his last lecture in Croatia, entitled *A Chemical Autobiography*, at the School of Medicine in Rijeka in 1996.

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