

### **Professor Živorad M. Čeković On the occasion of his 70th birthday**



This issue of the Journal of the Serbian Chemical Society is dedicated to Professor Živorad Čeković and his outstanding scientific and professional activities, on the occasion of his 70th birthday. Professor Čeković has given significant contributions to the science and teaching of modern organic chemistry, particularly at the Department of Chemistry, University of Belgrade. Therefore, it is my privilege and great pleasure, as one of his university teachers and afterwards for many years his colleague and close friend, to give a short summary of Professor Čeković's professional life on the occasion of his important and nice life jubilee.

Professor Živorad M. Čeković was born on September 11, 1934, in the village Koštunići (near Gornji Milanovac), Serbia. He received his secondary school education in the City of Čačak. He then studied chemistry at the Faculty of Science of the University of Belgrade, from where he graduated in 1960, receiving the degree of B. Sc. in Chemistry. In 1964 he obtained a Ph. D. in Chemistry from the same Faculty under the mentorship of professor M. Lj. Mihailović. His whole professional career has been connected with the Department of Chemistry, University of Belgrade: as an undergraduate student, since 1957, he was engaged for a couple of years as an instructor in the students laboratories of the Institute of Chemistry, elected as a permanent staff member immediately after graduation, first as a Research Assistant (1961) and subsequently as an Assistant Professor (1970), an Associate Professor (1976), and fi-

nally a Full Professor of Organic Chemistry (1983). During his professorship he taught several courses in the field of Organic Chemistry. He was the first to introduce Organic Syntheses in the curriculum at the undergraduate as well as at post-graduate levels. He wrote an excellent university textbook entitled Principles of Organic Syntheses (three editions so far), as well as a practicum entitled Experimental Organic Chemistry.

At the Department of Chemistry, Faculty of Science, University of Belgrade, where he spent almost 45 years until retirement (by law), becoming Professor Emeritus in 2002, Professor Čeković headed the Chair of Organic Chemistry (1982–86 and 1996–99), was elected Vice-Dean (1975–77) and Dean of the Faculty of Science (1977–79), and Head of the Department of Chemistry and Physical Chemistry (1985–87). Furthermore, he was a member of the Educational Council of Serbia (1989–93), chairman of the University of Belgrade Professional Council for Chemistry, Biochemistry and Physical Chemistry (1988–97), and a member of the Belgrade University Council.

Professor Živorad Čeković spent two years at Columbia University in New York, U.S.A. (1964–66) as postdoctoral fellow, and later, in 1984, two months as visiting professor at the same University. He also spent one year (1973/74) as a Research Associate at the University of Michigan, Ann Arbor, U.S.A.

Since 1981, Professor Čeković has been head of research projects at the Center of Chemistry of the Institute of Chemistry, Technology and Metallurgy in Belgrade, and since 2002 its scientific advisor, heading several important organic synthesis projects financed by the Republican Ministry of Science and Technology or the Serbian Academy of Sciences and Arts.

For a long time Professor Živorad Čeković has been a very active member of the Serbian Chemical Society (since 1986 as honorary member), acting as a member of its Presidium as well as its President in the period of 1989–1993. He has been and continues to be a member of the Editorial Board of the Journal of the Serbian Chemical Society as well as of the Society's journal *Hemijski Pregled*.

For his contributions to chemical science, in October 2000, Professor Živorad Čeković was elected as corresponding member to the Serbian Academy of Sciences and Arts. In 1996 he was elected as member of the Serbian Scientific Society and in 1997 as a member of the New York Academy of Science. Professor Čeković was grantee of the Annual Award of the City of Belgrade for his achievements in science (1984), of the Faculty of Science Plaque (1987), the Institute of Chemistry, Technology and Metallurgy Plaque (1987), and the Serbian Chemical Society Award for outstanding contributions to chemistry (1998). Professor Čeković's curriculum vitae was published in *Who is Who in the World* (14th Ed.) and in the *Dictionary of International Biography* (26th Ed.).

Professor Čeković's main scientific interest is in the field of organic chemistry, more specifically free radical chemistry, new reactions and new reagents, organic syntheses, as well as the syntheses of pharmacologically active compounds.

His research activities covered a wide range of areas and topics which will be reviewed quite briefly, by giving a few examples.

He studied oxidative transformations of alcohols by lead tetraacetate and methods for the insertion of ethereal functional groups to non-activated  $\delta$ -carbon atoms, focusing on the mechanistic and stereochemical aspects of these reactions and their applications in organic synthesis. Thanks to his good understanding of intramolecular free radical reactions, he discovered several new reactions for introducing different functional groups onto non-activated  $\delta$ -carbon atoms. This methodology was applied to the total synthesis of scopolamine.

By investigating acyl radicals, he found them to undergo intramolecular addition yielding cyclic ketones. Thus, for example, he obtained cyclic ketones by reducing unsaturated acyl chlorides with tributyltin chloride.

By studying free radical reactions in more detail, he showed that under specific conditions these intermediate particles may be “disciplined” in such a way as to allow several reactions during the propagation phase to be combined into one sequence. He thus coupled addition reactions of radicals with intramolecular cyclizations, synthesizing cyclopentane derivatives from two fragments. He also found that alkyl radicals, produced in fragmentation reactions or by intramolecular transfer of hydrogen, undergo cyclization giving five-membered rings. Furthermore, he investigated sequences of reactions which involve addition, cyclization and elimination; this type of radical domino reactions was applied to the synthesis of cyclopentane derivatives, for the cyclopropane ring closure, as well as in the synthesis of the triquinane (tricyclic) skeleton starting from acyclic compounds. Based on these results, a new methodology for the annulation of cyclopentane rings was introduced.

Professor Čeković discovered a new method for alkylation of non-activated  $\delta$ -carbon atoms involving 1,5-hydrogen transfer and the addition of carbon radicals to activated olefins. In this way functionalized alkylated products were obtained and these were easily converted into cyclohexane derivatives. This sequence of radical and ionic reactions yielding six-membered rings is complementary with the Robinson annulation of cyclohexane rings.

Dr. Čeković also synthesized several pharmacologically active compounds, using isosorbide as the starting substance. His syntheses of pharmacologically active compounds are realized in several industrial companies, such as “Prva iskra” (Barič), “Galenika” (Belgrade) and “Zdravlje” (Leskovac).

Most of Professor Čeković’s work with his colleagues and coworkers was published in more than a hundred papers in international journals, a few monographs and patents, or presented at scientific meetings in Europe and the USA, as plenary, section or visiting professor lectures. In addition to Science Citation Index citations (*ca.* 1000), his papers were cited in various university textbooks, monographs, annual reviews and monograph series, such as W. Carruthers: *Some Modern Methods of Organic Synthesis* (Cambridge University Press), J. March: *Advanced Organic Chemistry* (Wiley),

M.B. Smith: Organic Synthesis (McGraw-Hill), H.O. House: Modern Synthetic Reactions (W.A. Benjamin), D.H.R. Barton and S.I. Parekh: Half a Century of Free Radical Chemistry (Cambridge), Synthesis and Biology (Kluwer), The Chemistry of Peroxides (Wiley), Free Radicals (Wiley), R.L. Augustin: Oxidation (Marcel Dekker), Comprehensive Organic Chemistry (Pergamon), Comprehensive Heterocyclic Chemistry (Pergamon), Comprehensive Organic Synthesis (Pergamon), Houben-Weil: Methoden der organischen Chemie (G.Thieme Verlag), Reagents for Organic Synthesis (Wiley), Organic Reactions 48 (Wiley), Compendium of Organic Synthesis (Wiley), Encyclopedia of Reagents for Organic Synthesis (EROS) (Wiley), Annual Reports (London), Mechanisms of Organic Reactions (Wiley).

One should not forget the important contributions made by Professor Čeković to the popularization and affirmation of chemical science and its applicability, through a great number of lectures, popular or critical articles (over 50 in daily or weekly journals), books or readings in chemistry, public discussions.

In conclusion, through his teaching and scientific work and other diverse professional activities, Professor Živorad Čeković became one of the leading figures of the Belgrade University school of Organic Chemistry, thus significantly contributing to its traditionally high and internationally recognized level.

*Dragomir Vitorović*