Quo vadis chemistry?

From the beginning of science based chemistry about 200 years ago, chemistry made an enormous progress from the standpoint of theoretical aspects as well as practical applications. In the second half of the 20th century we have been witness of an enormous advancement and achievements in this field.

A special field of research has been developed in the last decade of the past century involving syntheses and tests of an alternate artificially expanded genetic information system. Polynucleotides were synthesized by increasing the natural number of four nucleobases (A, G, C, and T) in DNA to twelve including nonstandard purines and pyrimidines. In connection with this a question has been posed what effect and consequences will follow in the case of eventual use of such an enlarged number of informational units. It has been proven that such a system is efficient with regard to the possibility of including the new nucleobases as parts of nucleic acids and further transcription. Moreover, the artificial system is used now in clinical tests to monitor the levels of the presence of HIV-1 and/or RNA hepatitis C viruses in patients. This is only a part of a broader planned research in exploring the replacement of DNA building blocks such as the sugar and phosphate moiety in polynucleotides. So far, it has been shown that the double helix can be changed quite broadly, but only certain replacements are feasible and that artificial polynucleotides exhibit similar properties as the natural ones, i.e. they form double helix and undergo replication.

Recently, the euchromatic sequence of the human genome was shown to contain 2.851.330.913 nucleotides. With the 341 gaps, about 1% still to be determined, it is estimated that the human genome will contain about 3 billion nucleotides. The results of this large experimental work reported in the October issue of *Nature* in 2004 and covering the continuation of research from the year 2001, were achieved in 18 research centres in various parts of the world with more than 2700 researchers and technical staff. The results represent the beginning of investigations which will allow more precise studies of genetic information and its influence on health and disease.

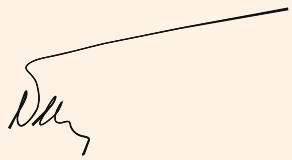
The selected two examples of research development reveal the trend and extensiveness of the present investigations as well as the extent of international connections involving interdisciplinary and multidisciplinary research and at the same time the orientation towards a timely topic, i.e. the ascertainment of the complex function of biomolecules in the human body. In the future, two leading research fields will be undoubtedly proteomics and genomics, involving the research of dynamics and function of proteins on the whole as well as the role and impact of genes in functioning of the organisms. Of course, this does not mean that other important topics in chemistry should be neglected. One should keep in mind that chemical investigations penetrate into all fields of natural sciences, technology and medical research. Undoubtedly, paramount interest will be dedicated to research of chemical systems with memory, to photosensitive and reversible

molecular systems and receptors, to macromolecules for transport of chemical compounds used by biological systems, to research on the level of nanotechnology and bionanotechnology with application of the last to nanomedicine. Expected trends from the year 2010 envisage the world leading towards technical applications in the field of environmental technologies, technologies connected with energy production from natural sources as well as technologies of new materials.

It is naive to expect that the progress of chemistry depends only on good ideas and competitiveness of chemists, without economic and political influences. Irrespective of these there should exist prevalent striving of gifted researchers for more and better knowledge and at the same time they should limit the above mentioned negative influences in order to allow science progress.

Chemical research is becoming more and more connected to life sciences, to biology and physics. The old fashioned division between »pure« and »applied« chemistry is becoming obsolete and today at the outmost we could say that achievements in chemistry have so far not been applied or, they have been applied. An interesting aspect of anticipation of linking the chemical research in the future with other sciences has been already recognized by the Dow Chemical Company in the USA. The company does not emphasize only chemistry but it calls itself now as science company.

At the end of the year 2004 Chemical Abstracts Service (CAS) had registered over 25 million of organic and inorganic compounds and daily they add about 4000 new entries. They collect data from 9000 main scientific journals. Among them is also Acta Chimica Slovenica starting now in a new and better looking outer and inner appearence. Today, contemporary computer technology makes possible to represent models and research results in a colourful manner. Nevertheless, an important condition must remain, i.e. the high scientific level of research contributions. This is feasible among others by evaluation and selection of the best articles by internationally recognized scientists. Good wishes and ambitions of the Editors for further development are not enough and chemists from Slovenia should contribute more to the prestige of Acta Chimica Slovenica by publishing still more of their scientific achievements.



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