POSTGENOMIC CHEMISTRY
(Project No. 2001-005-1-300) IUPAC Technical Report

Sergey Varfolomeyev¹, Elena Efremenko¹, Irina Beletskaya¹, Ivano Bertini²,
G. Michael Blackburn³**, Alexey Bogdanov⁴, Raimond Cunin⁵, Jutta Eichler⁶, Igor Galaev⁷,
Vadim Gladyshev⁸, David O’Hagan⁹, Thomas Haertle¹⁰, Jaak Jarv¹¹, Arkadiy Karyakin¹, Ilia Kurochkin¹, Marian
Mikolajczyk¹², Vladimir Poroikov¹³, Ivan Sakharov¹, Friedrich Spener¹⁴, Normand Voyer¹⁵, and James Wild¹⁶

‡Project leader, **Participant of IUPAC General Assembly, presenting the Project

¹Chemical Enzymology Department, The M. V. Lomonosov Moscow State University, Lenin's Hills, 1/11, Moscow 119992, Russia; ²Magnetic Resonance Center, University of Florence, Italy; ³University of Sheffield, UK; ⁴Belozersky Institute, Moscow State University, Russia; ⁵Vrije University, Belgium; ⁶German Research Center of Biotechnology, Germany; ⁷Lund University Brussel, Sweden; ⁸University of Nebraska, USA; ⁹University of St. Andrews, UK; ¹⁰Institute of National Research Agronomy, France; ¹¹University of Tartu, Estonia; ¹²Center of Molecular and Macromolecular Studies, Polish Academy of Sciences, Poland; ¹³Institute of Biomedical Chemistry, Russian Academy of Medical Sciences, Russia; ¹⁴University of Münster, Germany; ¹⁵Laval University, Canada; ¹⁶Texas A&M University, USA

Main aim of Project

To identify the most promising areas of chemistry that use genomic information and to mark the perspectives in the development of novel trends in chemistry in the Postgenomic era

Main results of the Project

The avenues for potential advance in Postgenomic chemistry

- Organic chemistry: synthetic chemistry and combinatorial approach
- Postgenomic chemistry for drug design and bio- and chemoinformatics
- Biocatalysis
- Education: genomics for Chemists

- Chemical proteomics. Management of biosynthesis by selective ligands: Unique Biomolecular tools
- Artificial proteins for amino acid polymerization
- Synthetic mimics of biologically active materials
- Synthetic chemistry and combinatorial approaches for molecular recognition and protein function analysis
- Organic chemistry: synthetic chemistry and combinatorial approach

- Lipidomics
- Postgenomic Macromolecular chemistry
- Recombinant polymers
- Template-directed Synthesis of Polymers: Self-Proliferating polymers

- Bioanalytical chemistry
- Single-molecule registration
- Mass-Spectrometry of biomolecules
- New nano-analytical Systems and Recognition elements
- Protein and Small-molecule microarrays

- Identification and Comparative Analysis of enzymes in completely Sequenced genomes
- Synthesis of Proteins With Unnatural and Rare Amino acids and with trace elements

More than 20 scientists from 11 countries (Belgium, Canada, Estonia, France, Germany, Italy, Poland, Russia, Sweden, UK, and USA) actively participated in the interdisciplinary project, which analyzed and discussed the most promising areas of bioorganic chemistry in light of information provided by recent advances in functional genomics;

A workshop was organized in Moscow (September 6–8, 2003). It allowed experts to exchange views on chemistry in the postgenomic era and to discuss the implication of advances in genomics, proteomics, biomimetics, and biological and chemical informatics.

The dissemination of these ideas was through lectures of experts involved in the discussion at various scientific forums:

- the XVII International Mendeleev Congress on General and Applied Chemistry (Kazan, Russia, September 21-26, 2003 (Varfolomeyev S.D.));
- Chemistry International, 2004, 26 (2), P.19