

Study Group / Task Force Name: Bioanalytics Study Group

Study Group / Task Force Members and Affiliations:

Head of Study Group: George Horvai – Hungarian Chemical Society

Guenter Gauglitz – Gesellschaft Deutscher Chemiker (GDCh)

Jens Andersen – Danish Chemical Society

Hendrik Emons –IRMM-JRC, European Commission

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Objectives:

The aim of the Bioanalytics study group is to search ways for bringing closer the analytical and bioanalytical chemistry community. This is still a formidable task because a community of bioanalytical chemists does not appear to have formed yet. Many biochemists do analytical work but their emphasis is mostly on biochemistry itself. On the other hand there has been a growing trend for chemists and analytical chemists to do more and more bioanalytical work. Certain groups of (analytical) chemists have had a natural tendency for this, e.g., food chemists, pharmaceutical chemists and forensic chemists. The tendency of moving biosciences into the molecular dimension continues which can also be described as intensifying the marriage between biology and chemistry. This holds also particularly true for the analytical activities in bio- and life sciences.

Activities and Outputs in 2011-2012 (e.g. reports, publications, seminars, meetings):

At IRMM bioanalytical work has been focused on three main areas:

- enabling reliable healthcare measurements
- allowing comparable GMO (genetically modified organisms) analysis
- advancing microbiological analysis.

Since September 2011 their research and development projects, which are performed in most cases in collaboration with experts from all over the world, have been directed to:

- the establishment of health-related reference measurement systems and the development and provision of certified reference materials for crucial health status markers such as serum proteins (new CRM for C-reactive protein), enzymes and DNA fragments (new CRMs for Leukaemia monitoring);
- the development of CRMs for calibration and quality assurance in the monitoring of GMOs in the food and feed supply, including for the new Regulation (EU) No 619/2011 on the low level presence of GMO events in feed stuff;
- the development of highly reliable methods for the characterisation of candidate reference materials regarding bacterial toxins, and microbiological measurands (e.g., for the typing of bacteria strains).

Fundamental research was performed, for instance in the frame of collaborative projects of the European Metrology Research Programme (EMRP), towards a better understanding of protein and DNA-related measurements. Among others, cutting-edge methods for a better characterisation and quantification of protein and DNA molecules or fragments thereof by highly accurate amino acid analysis and digital PCR, respectively, have been developed. The gained knowledge contributes also to international standardisation efforts.

The cooperation with the key international organisations, such as the Consultative Committee for Amount of Substance (CCQM) of the International Committee for Weights and Measures (CIPM), the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC), the Joint Committee for Traceability in Laboratory Medicine (JCTLM), and the International Organization for Standardization

(ISO) has been continued. For instance, ISO/REMCO is drafting a Technical Report on reference materials for qualitative analysis, demonstrated on examples for the reliable identification of nucleic acids and proteins.

Moreover, the number of GMO events for which independent plasmid calibrants and DNA copy number certified matrix reference materials are available has been increased. In that context fundamental progress was achieved in the understanding of influencing factors on quantitative PCR and GMO quantification in various crop materials (see, e.g., M. Caprioara-Buda et al.: *Anal. Bioanal. Chem.* *404* (2012) 29-42; W. Meyer et al.: *Eur. Food Res. Technol.* (2012) DOI 10.1007/s00217-012-1787-7).

Due to a proposal by Professor R. Salzer the education of bioanalytical chemistry in the usual analytical curricula was presented by one of us at Euroanalysis 2011 in Belgrade during a session devoted to teaching analytical chemistry. The same topic was presented in ABC (copy attached).

Professor Jan Labuda together with Professor Guenter Gauglitz have prepared details on a content of the report on **Recent advances in bioanalytical chemistry: characterization and classification** with respect to preparation of **Chapter 11** of the **IUPAC Orange Book** re-edition. Possible co-authors are still invited to contribute to this large topic.

In Romania there is a high interest in Bioanalytical Chemistry – there are courses taught at the 3rd year and MSc levels. In national institutes of research there are Centers/Departments of Bioanalysis. A workshop on Bioanalysis was organized in Bucharest on 14th of December 2011: Bioanalysis vs. Biotechnology by the Center of Bioanalysis of National Institute of Research and Development for Biological Science. The Workshop on new materials for electrochemical recognition of minerals and biological species, NOMARES, May 13-17, 2012 was organized in cooperation with the International Society of Electrochemistry.

Publication: G. Horvai, Teaching bioanalytical methods in a BSc analytical chemistry course, *Anal. Bioanal. Chem.* (2012) 404:1–3, DOI 10.1007/s00216-012-6081-9
(Added to report by Secretary)

Activities planned for 2012-2013:

Professor Jan Labuda together with Professor Guenter Gauglitz and other co-authors are preparing the contribution on Recent advances in bioanalytical chemistry: characterization and classification with respect to preparation of Chapter 11 of the IUPAC Orange Book re-edition. Possible co-authors are still invited to contribute to this large topic.

Presentation during the RO-ICAC 2012: Analytical Chemistry for a Better Life, 18-21 September 2012 of oral and poster sessions on Bioanalysis and Biomedical Analysis.

Report submitted by: **Professor George Horvai**

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