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Analytical chemistry and bioanalytical chemistry – an unshaped social relationship

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The title Analytical and Bioanalytical Chemistry (ABC) represents a trend which is observed in several important analytical chemistry journals: more and more papers on research in bioanalytical chemistry are being published in traditional analytical chemistry journals. For an outsider this might be seen as evidence of more and more analytical chemists being attracted to bioanalytical topics. A more thorough investigation does not fully support this observation. Many authors of bioanalytical papers in the traditional analytical journals come from outside of the traditional analytical chemistry community. This has led the Division of Analytical Chemistry (DAC) within the European Association for Chemical and Molecular Sciences (EuCheMS) to set up a study group to investigate the reasons for this phenomenon.

The first thing to clarify is a broad definition of bioanalytical chemistry. This is far not easy because the term has been used for a variety of fields. Analytical chemists tend to think that bioanalytical chemistry is a science devoted partly to the chemical analysis of biological systems/analytes and partly to the application of tools derived from biology to other branches of analytical chemistry. A

different, much narrower definition has been used for some time in the pharmaceutical industry, where bioanalysis is the name for the biological testing of pharmaceuticals, e.g. in bioequivalence studies. Then there is a huge field, clinical chemistry, which might be considered as a subdivision of bioanalytical chemistry, but has developed in its own way and remains a distinct field.

The uncertainty surounding the definition of bioanalytical chemistry is reflected in the social aspects of this science, which appears to be very fragmented and geographically unevenly distributed. A survey of some prominent bioanalytical chemists has shown that researchers in this area are not as well organised socially as analytical chemists have traditionally been. They have societies and meetings devoted to sub-fields of bioanalysis, e.g. proteomics analysis or specifically mass spectrometry in proteomics, but a broader community does not seem to have formed. The geographical distribution of authors of bioanalytical papers published in analytical chemistry journals appears to be biased towards a few countries. For example in two recent issues of the Analyst (10 and 11 in 2010) 22 bioanalytical papers were published (this number having been established by a somewhat subjective classification) and only 2 of them were authored from Europe. While this is a single example we have got the impression that there is a preponderance of US compared with European contributors in this field. A good service to the community has been, e.g., to profile many European authors in recent bioanalytical thematic issues of ABC 391(5) and 398(6).

Who are the scientists doing bioanalytical research? When browsing authors' affiliations in the bioanalytical papers published in analytical journals one rarely finds familiar sounding names of departments and industries that have been strongholds of analytical chemistry. There are naturally many authors coming from institutions devoted to biology and biochemistry, and pharmaceutical chemists appear to play an important role. This might be due to their training, which is a suitable mix of biology and chemistry.

The observations made above quite naturally raise the question: should the two, apparently only slightly overlapping communities of analytical and bioanalytical chemists, who are now sharing the pages of many analytical journals, be brought closer together in a more personal way? Can these communities understand each other and offer something that is mutually beneficial? At this moment the answer is not known. The DAC of EuCheMS has been promoting the social mixing of these scientists by encouraging the organizers of its meetings, particularly the traditional Euroanalysis meetings, to organize bioanalytical sessions. The last Euroanalysis meeting in Innsbruck, Austria [1], attracted many bioanalytical presentations and hopefully this will also happen in Belgrade, Serbia, in 2011 [2].

What can the two communities offer each other? Biology has undergone a revolution in the last two decades. It has been transformed from a phenomena-descriptive science to a much more measurement result-based science. Biological studies have enriched science with many new ideas

which are potentially very useful within the analytical chemistry community. We should not forget that some of the most important analytical chemistry tools of today came from biological laboratories, e.g. chromatography, immunoassays, enzymatic methods. Analytical chemists can offer from their side basic concepts and approaches for qualitative and quantitative analysis, including the vast experience in metrology and quality assurance. This includes the establishment of more universal and sustainable reference systems, approaches to calibration and the estimation of measurement uncertainty. In this respect one should mention the important role of metrological institutes (such as NIST in the US, LGC in the UK, and IRMM for the EU) that have also embraced with great enthusiasm the issue of quality assurance in bioanalytical assays. It is useful to note here that the science of analytical chemistry developed into a distinct principle within chemistry when – following the explosive development of chemistry at the turn of the 19th and the 20th century – many chemists devoted their research efforts to making precise and reliable chemical quantitation a reality. A similar development may be needed in the wake of the biological revolution.

If the two communities are to meet for their mutual benefit, there is a clear obstacle to be overcome: analytical chemists need to be better trained in biology and biochemistry while those already in the profession should pay more attention to the rapid progress of biological sciences. In some sub-fields of analytical chemistry this has not been a problem, e.g., in food analysis, where such education has always been a necessity. The education of biochemists would also certainly benefit from courses given by traditional analytical chemists.

When underlining the importance of bringing analytical chemists and biochemists closer together one should not forget that bioanalysis is not restricted to these two communities. Physicists are making important contributions, e.g., by providing novel optical tools for biosensors. Engineers and medical doctors play a crucial role in, e.g., developing point of care devices. Fellow chemists should also be mentioned, e.g., for creating various nanoparticles and biomimetic systems. The long experience of analytical chemists as team-players will help us to integrate the efforts of all of these groups of scientists.

Annual reports of the Bioanalytics study group of the EuCheMS-DAC can be found at the DAC website [3]. The 2010 report includes a non-exhaustive list of bioanalytical scientists from Europe to help with the identification of this community. Comments about this list and the DAC reports are welcome and should be addressed to george.horvai@mail.bme.hu.

Information from the EuCheMS Division of Analytical Chemistry

Euroanalysis 16 is the main DAC event of 2011. Slavica Razic is the Chairman of Euroanalysis 16 [2] to be held in Belgrade, Serbia, 11-15 September 2011. The international year of chemistry will be celebrated at Euroanalysis 16 thus promoting chemistry to young students.

Euroanalysis 17 is planned for Warsaw, Poland in 2013.

The Robert Kellner Lecture (RKL), generously sponsored by Springer Publishers, was awarded to Jonas Bergquist of Uppsala University who will give his lecture at Euroanalysis 16.

The Chairman of DAC retired from office by the end of 2010 and Paul Worsfold was elected as the new Chairman by the Delegates at the Annual Meeting in Nuremberg on Sunday, August 29, 2010. EuCheMS-DAC congratulates Paul Worsfold and supports his plans of inviting Delegates to participate in making DAC more visible by contributing to newsletters, supporting Study Groups and Task Forces, establishing scientific and social networks and maintaining Euroanalysis as the number one DAC event. Bo Karlberg and George Horvai retired from the Steering Committee (StC) but will continue to participate as Delegates. Jiri Barek and Slavica Razic were appointed as new Members of the StC. The Members Wolfgang Buchberger, Paul Worsfold (Chairman) and Jens Andersen (Secretary) complete the StC for 2011.

DAC has appointed liaison persons to other EuCheMS Divisions: Education (Reiner Salzer), Food (Bo Karlberg), Environment (Gemma Rauret), Electrochemistry (Luigia Sabbatini), Computational Chemistry (Maria Filomena Camoes and Bo Karlberg) and Life Sciences (George Horvai) and Jan Labuda is the liaison person to IUPAC. Nominations for liaison representatives at other EuCheMS Divisions are welcome.

The Delegates of DAC are also organized in Task Forces and Study Groups. A single Task Force entitled 'Opportunites for Analytical Chemistry' is currently initiated while other matters of importance to DAC remain in the custody of the five Study Groups Education, History, Quality Assurance, Bioanalytics and European Analytical Chemistry on the Web.

The Study Group on Quality Assurance also considers the development of Metrology where Hendrik Emons reported that a large EU programme in Metrology has started, with a budget of 400 M euros over 7 years.

Additional matters arising; the journal Analytical and Bioanalytical Chemistry is considering publishing a special issue on GMO analysis. It was proposed to prepare separate list with names of potential conferences in the field of Bioanalysis.

The DAC is looking forward to seeing you in Belgrade!

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References

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