



METABOLOMICS: A GATEWAY TO NOVEL DISCOVERIES

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Metabolomics as the latest of the –omics has got quite some attention in the past years. It is a major tool, for example, in functional genomics, quality control of botanicals, studies on the activity of medicines and medicinal plants, and systems biology type of studies of the plant cell factory. Metabolomics has the very ambitious objective to identify and quantify all metabolites in an organism.

Numerous reviews have been written in the meantime pointing out the various advantages and limitations of the possible analytical methods. Also the way to store metabolomic data has been discussed. But where do we stand now? Do we have public databases with the metabolomic data, similar as to gene and protein sequence databases? Can we expect these in the near future? What are the hurdles and can we overcome these? Many questions, few answers. Which is maybe not so surprising after all.

The dream of all natural products people in the past 50 years has been to develop reproducible analytical methods for the analysis of compounds in plants (or any organism). However, from the journals in the field of chromatography and analytical chemistry we know that instead of a dream we rather have a nightmare.

When we wrote our books on chromatography of alkaloids some 25 years ago, we reviewed the analysis of tropane alkaloids: 69 references concerned the HPLC and 32 the GC analysis. Ever year new studies are published on this separation, reporting new methods, but always with the same aim. Apparently standardization failed, we have to develop new methods all the time. The major reason is the improving quality of equipment, and chromatographic materials. But even a seemingly trivial aspect, the method of sample preparation, is not yet standardized in natural products analysis. Major reason is the great variety of physical properties of the analytes. Harvesting, storage, grinding, extraction, there are many steps that carry the risk of artifact formation or loss of compounds due to e.g. insolubility. Consequently everybody makes his own choices, based on the question that needs to be answered, i.e. a targeted approach is used.

For a total analysis of all metabolites we must conclude that we still have no suitable standard method. However, the basic idea of metabolomics, an unbiased analysis of the metabolome instead of a targeted analysis of a certain group of compounds, has already shown to be a very powerful tool in life sciences, it is a novel gateway to new discoveries and innovations.