

COMPLEMENTARY APPROACHES IN FOOD OMICS TOWARDS NEW HORIZONS IN FOOD ANALYSIS

Michael Rychlik^{1*}

¹ Chair of Analytical Food Chemistry, Technische Universität München, München, Germany

*Corresponding author - E-mail: michael.rychlik@tum.de, Phone: ++49 (0) 8161 71 - 3746

Since the advent of the concept “-omics” in “genomics”, “proteomics” and “metabolomics” there has been inflationary use of this term. In case of foods, the “foodomics” were born and encompass all “-omics” methods in relation to the matrix food. A straightforward application of foodomics is elucidating or confirming the authenticity of foods. This term generally is related to one or more of the following attributes: geographic origin, type of agricultural production, species and kind of raw materials, or certain process qualities such as sustainability or ecologic foot print. In the recent years, there has been tremendous progress in high resolution methods to elucidate the molecular fingerprint of foods. On the genetic scale (genomics), apart from classical polymerase chain reaction, new developments of isothermal amplifications or next generation sequencing will enable more accurate identification of species. On the protein level (proteomics), specific biomarker peptides are being used. Further methods for profiling are assessing the ratios and positions of stable isotopes in marker molecules (Stable Isotope Ratio Analysis, isotopologomics) or ICP-MS of rare earth elements (metallomics). For a fingerprint of metabolites, the new methods of non-targeted and targeted metabolomics, e.g. via Fourier transform ion cyclotron mass spectrometry (FT/ICR-MS) or multidimensional NMR already allow a specific authentication of some food items. Apart from authenticity, non-targeted metabolomics may also open new avenues into safety evaluation of foods and food components. In this way, combination effects of contaminants may be monitored by their respective metabolic response or metabolomic approaches may serve to partly substitute animal testing. These and further developments in food analysis will be presented.

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