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REVIEW ARTICLE

"Food Quality, an issue of molecule-based science". EUROFOODCHEM XIV

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The14th international EuroFoodChem conference, entitled "Food Quality, an issue of molecule-based science" took place in Paris, France from the 29th to 31st August 2007. It was organised by the Food Chemistry Division of the European Association of Chemical and Molecular Sciences (EuCheMS), the French Society of Chemistry (SFC) and the French Circle of Analytical Scientists (CSA), and was generously sponsored by Eurofins, CAMAG, and Springer-Verlag. This conference was intended to bring together food specialists, researchers, students, officials and other professionals from a number of different universities, laboratories, and research institutes. Members of the food industry, the food trade and public authorities were also present. The 200 delegates from over 30 different countries in Europe and worldwide gathered together at this conference to discuss the general aspects of food quality and molecular-based science. The number of participants and the diversity of their geographical backgrounds reflected the general interest from different sectors of the food industry (if restaurants and chef schools can be included) in both chemical and physical transformations that occur during the processing of food aimed for human consumption.

As a meeting point for scientists in all fields of molecular-based science, this international conference addressed the results of the latest research in food chemistry, molecular gastronomy, and the chemistry of food processing. All sessions were followed by poster exhibitions which also showed a large range of expertise and diversity in the field. Dr. Trygve Eklund (EuCheMS, Chairman of the Food Chemistry Division) made the welcome address, followed by the opening lecture by Dr. Reto Battaglia (Battaglia GMBH Food Safety Systems, Gossau/Switzerland) who delivered the Peter Czedik–Eysenberg lecture for Dr. Roger Fenwick, who was unable to attend: "European Food Chemists —Past, Present, Future: Fulfilling the Vision of Peter Czedik–Eysenberg". In his talk, he outlined the present situation of Food Chemistry in Europe, considering the past and the expected situation for the future.

The first session of the Congress, entitled Molecular Gastronomy, was launched with the lecture: "Molecular Gastronomy: Definition, Programme and Recent Results", given by Prof Hervé This, from the Paris Institute of Technology for Life, Food and Environmental Sciences (AgroParisTech). His presentation involved defining Molecular gastronomy, and characterizing the objectives that construct this recent discipline of food science. He explained that Molecular gastronomy is the scientific exploration of culinary and, more generally, gastronomic transformations and phenomena, as described either by culinary books or by cooks. Molecular Gastronomy should be considered a part of food science, but it focuses more on the culinary transformations that occur in the home or restaurant and the phenomenon of eating, rather than just the physical and chemical structure of ingredients or transformations as researched by the food industry.

His introduction was followed by several oral presentations, and a large number of posters, which displayed some recent results in molecular gastronomy. The topics of the four oral presentations themselves covered a large range of different subjects, exemplifying the diversity of this broad

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field of research. Firstly, the influence of crop production and food processing, especially thermal processing, on the thermal stability of onion flavones was discussed. It was then shown how the stability of tocopherols in over a 100 different foods is affected by the cooking procedure, and can even depend on the type of cooking vessel used. Results into research carried out monitoring the changes in phenolic content of virgin olive oil following roasting compared with sunflower oil were also presented in this session. Insights into all of these processes can have obvious benefits to both chefs and the food industry, and hence fitted well into the overall theme of this session. Finally, factors affecting the stability of foams, particularly meringues, were discussed. This work demonstrated how knowledge acquired on foam structure in general can be useful for restaurant-based applications, and therefore clearly exemplified one of the objectives of molecular gastronomy.

The second session focussed on the analytical, technological, and nutritional aspects of flavour, and opened with a plenary lecture given by Prof. Patrick Dirinck, from the Catholic Technical University St-Lieven (Gent/Belgium), on the "Use of mass fingerprinting for the classification of wines". In his talk, he compared the flavour quality of different wines from the four wine producing regions in France using sensory analysis; time consuming gas chromatography–mass spectrometry (GC–MS), and fast and automated mass fingerprinting (MS-nose). For both the white wines (Sauvignon Blanc and Chardonnay) and the red wines (Cabernet Sauvignon and Merlot based), MS fingerprinting and GC–MS profiling showed good agreement, and indicated that fast mass fingerprinting could be regarded as a promising tool for the objective quality evaluation of wine.

Six oral presentations and 22 poster presentations were also included in this session, and covered a large range of different topics. Continuing in the theme of the plenary talk, it was shown by three speakers how advanced analytical techniques can be used with much success to monitor a number of processes that occur during food processing. Examples included the loss of polyphenols from potatoes during commercial potato flake production, the monitoring of oxidation volatiles in virgin olive oil as a result of olive paste malaxation conditions, and analysis of the volatile extracts of smoke salmon subjected to four different industrial techniques. Two speakers focussed on the relationship between flavour release and rheological properties of different food systems ; both strawberry flavoured custards and hot hydroxypropyl methyl cellulose (HPMC) gels were considered. This second session was rounded up by a general overview of the possible applications of MS-nose for the aroma analysis of food and drinks, using coffee and wine as examples. The large variety on subjects presented orally was reflected in the diversity of topics covered in the 22 poster presentations. This session clearly showed the success of these analytical techniques to measure and predict the flavour characteristics of foods and drinks, and proposes optimistic routes for the future. It may be possible that, on some occasions, such techniques could be used to replace the time-consuming and expensive technique of sensory analysis. This first day was brought to a close with a Wine and Cheese party, which provided the conference attendees with a chance to integrate, share knowledge, and experience, while simultaneously enjoying a fine selection of wines and cheeses.

The third session focussed on avoiding the formation of undesirable molecules during thermal food processing, and was introduced with a plenary lecture given by Dr. Richard Stadler from Nestlé Product Technology Centre (Orbe/Switzerland), on the wide occurrence of the processing contaminant 3-monochloropropane-1,2-diol (3-MCPD) in foods, in the form of esters, and highlighted the need for measures to be taken. He suggested that a holistic evaluation of foods, which combined the risks and benefits of a single product (e.g. acrylamide), would help justify the possible need for measures to be taken that may seriously affect the nutritional profile of the food.

Five of the oral presentations in this session continued this theme of detecting and quantifying the presence of undesirable molecules in food processing. Specific examples covering a wide range of different food products, included the formation of acrylamide in both potato products as well as spice extracts; the presence of boar taint compounds in pig fat; the formation of biogenic amines and fat oxidation products in wild boar salami; and the formation of dialkyl phosphates as breakdown products of organo-phosphorous insecticide (OPI) residues present in or on fruits during fruit juice processing. Two further oral presentations focussed more on the formation of undesirable molecules as a result of food packaging and food contact materials — loss of quality in orange juice as a result of storage in plastic packaging materials was considered, and a method for the determination of photoinitiators in food in contact with packaging materials was explained. All these research are obviously very important for the food industry, where any such undesirable changes during processing will affect product quality and therefore customer satisfaction and repeat purchase. During the afternoon of the second day there was an optional open session entitled "Chefs meet scientists" which gave chefs and scientists a chance to meet and discuss a variety of topics in an open forum, further highlighting the improved alliance between these different sectors of the food industry and food science. The day was crowned with a wonderful dinner while on a boat trip along the river Seine, where attendees were able to enjoy both the beautiful views, and the delicious food and drink.

The final session of the conference focussed on the possibilities and limitations of molecular science for the charac-

terisation of authenticity and typicality. Dr. Bert Popping, from Eurofins Scientific Group (Hamburg/Germany), opened the session with a plenary lecture on the applications of molecular, biological, and immunological techniques for food authenticity testing. He reviewed how DNA-based techniques, previously used only as research tools in universities, show a potential use in the food industry for a wide range of different functions. These included detecting the presence of pathogens and allergens, detecting genetically modified and counterfeit products, as well as identifying varietal variation in vegetal and animal products. The second plenary lecture of the session was given by Prof. Gary Williamson, from the Nestlé Research Centre (Lausanne/Switzerland) which focussed on the extensive occurrence of polyphenols in plant-based foods and drinks. He explained how polyphenols can have both advantageous and disadvantageous consequences on food quality and safety.

Specific oral presentations covered a wide range of topics in this session's theme. Techniques that could be used to identify genetically and non-genetically modified soy were discussed. The potential use of analytical techniques to identify a large number of food products ranging from different varieties of yoghurt to different classes of Iberian pigs, as well as the characterisation of lignins from different fruits and vegetables was also explained. Analytical techniques that could be used to identify oligopeptides in Parmigiano–Reggiano cheese, cholesterol oxides in foods of animal origin, phenolic compounds in different wine and fruit juices and their by-products, as well as methoxypyrazine ratios in wine were also discussed. Currently, when counterfeit products such as cheap imitations of parmesans and balsamic vinegars are commonly found in supermarkets at a fraction of the price of the real product, techniques such as these are essential to maintaining product quality and authenticity.

In the closing session of this conference, three posters received awards for being clearly understandable, well designed, consistent with the congress topic and scientifically innovative. Prizes were awarded to: Hela Gliguem et al. for their poster on the structural behaviour of processed cheese; Hans Steinhart et al. for their poster on the analysis of furan fatty acids by different techniques, and to Stefano Sforza et al. for their poster on oligopeptides as molecular markers in the cheese industry. This conference was brought to a close with Prof. Sorensen announcing that the next EuroFoodChem conference will be held in Copenhagen in 2009. He invited everyone to attend.

The large amount of research presented, throughout all four sessions, from both research laboratories and the food industry reveals the good present alliance between these fields. Furthermore, work presented by doctoral and post-doctoral students gave the chance for young well-trained scientists and engineers to contribute and integrate in the two areas of academia and industry simultaneously. In return, these two fields benefited from the combined enthusiasm and interesting analytical perspective of these young researchers. Hopefully in the future of Food Science and Technology, these collaborations will increase in both number and in activity. The next EuroFoodChem meeting at Copenhagen (Denmark) in the first week of July, 2009 will be an excellent opportunity to confirm this evidence.

All oral and poster proceedings of the EUROFOOD-CHEM XIV, are compiled in two proceedings volumes (ed. by H. This and T. Eklund) and are available under request at the web page of the Conference: http://www.eurofood-chem14.info.