

Handbook of Molecular Gastronomy Conference #2

June 30th, 2021

The four Editors of the Handbook of Molecular Gastronomy are organizing an online conference, about the book, on the 30th of June (included the time span), the topics discussed will reflect the 3 parts of the book:

- Molecular and physical gastronomy: scientific aspects
- Education practices of molecular and physical gastronomy
- Applications of molecular and physical gastronomy to culinary art

Application <https://indico.in2p3.fr/event/24316>

Connexion to follow the conference : <https://eu.bbcollab.com/guest/0cc2fd5fda9a4da5aa97910371b51039>

Introduction

14.00-14.05 : Welcome adress by the Irish Ambassador in Paris Her Excellency Patricia O'Brien.

14.05-14.15 : Hervé This.

Session 1, chairperson Alan Kelly

14.15-14.35 : Sugars: Soft Caramel and Sucre à la Crème – an Undergraduate Experiment about Sugar Crystallization, by Irem Altan, Patrick Charbonneau, Justine de Valicourt

14.35-14.55 : Dehydration in the kitchen, by José Miguel Aguilera

Session 2, chairperson Roisin Burke

14.55-15.15 : Meat tenderness and its evolution during cooking, by Jean-François Hocquette and Alain Kondjoyan

15.15-15.35 : Sourdough, by Mark Traynor and Imran Ahmad

Tea Break (or coffee, or rather Cremant from Alsace)

Session 3, chairperson Christophe Lavelle

15.45-16.05 : Food Innovation from traditions A satellite educative trip from Paris-Beirut-Doha to Montpellier, by Reine Barbar

16.05-16.25 : Note by Note Cooking, by Dao Nguyen and Pasquale Altomonte

16.25-16.45 : Questions, Comments, Discussion, Follow up with the third event (September 8th).

The event is under the patronage of the Académie d'agriculture de France and of the INRAE-AgroParisTech International Centre for Molecular and Physical Gastronomy.

Part I.

Sugars: Soft Caramel and Sucre à la Crème – an Undergraduate Experiment about Sugar Crystallization

Irem Altan, Patrick Charbonneau, Justine de Valicourt

Duke University, Department of Chemistry, Durham, USA

Candy-making requires fine control of the phase transitions of aqueous solutions of sugar. Both kinetic and thermodynamic aspects of sugar crystallization are at play. As part of a course on the chemistry and physics of cooking taught at Duke University, we have illustrated these undergraduate-level concepts by preparing and contrasting soft caramel and sucre à la crème recipes that, remarkably, differ only in their tempering. This laboratory experience allows students to explore the delicate dependence of look and mouth feel of confections on the microstructure of sugar and teach them about the underlying scientific concepts. In this talk, we provide historical background on these candies, detail the physical chemistry involved in their making, as well as share our experience of teaching these concepts to undergraduates.

Dehydration in the kitchen

José Miguel Aguilera

Gastronomic Engineering Unit, School of Engineering, Universidad Católica de Chile

Dehydration is the removal of water (moisture) from a food that occurs or purposely or unnoticed. This presentation will first delve on the definition of moisture content and water activity of foods.

Ten reference will be made to controlled drying in its many common ways in food technology as well as phenomena in kitchens such as reduction of broths. Mention will be made to moisture removal by baking, toasting and during equilibration of moist foods with ambient air.

Meat tenderness

Jean François Hocquette and Alain Kondjoyan

Clermont University & INRA, Saint-Genès Champanelle, France

Skeletal muscles consist of several cell types (muscle fibers, intramuscular adipocytes, etc) and of an extracellular matrix. Their characteristics differ across and within muscles and do induce variability in eating quality of meat either directly or indirectly by affecting meat ageing. The latter is a major but complex process for the post-mortem tenderization of meat. Cooking is also a major factor affecting tenderness. Indeed, heat during cooking induces contraction of the muscle structure and a progressive denaturation of proteins and of the extracellular matrix depending on cooking temperature. Grading schemes to predict eating quality, such as the Meat Standards Australia, start to include many of these factors from the production side to the consumer end. A complementary approach is to optimize cooking equipment and procedures.

Sourdough Bread

Mark Traynor and Imran Ahmad

College of Human Sciences, Auburn University & Chaplin School of Hospitality and Tourism Management, Florida International University, USA

Humans have been making sourdough bread since around 3500 BC. Pre-ferment, levain, poolish, biga, barm, pâte fermentée, mother, chef, and sponge, various names are given to a simple mix of flour and water. Today, sourdough bread is prized for its remarkable sour taste, aromatic crumb and crust, and unique textures. During

the early months of the Covid-19 pandemic, sourdough bread soared in popularity amongst home bakers. The fundamental science behind creating high-quality artisan bread can bewilder many people. More conventional bread use less labour-intensive methods and ingredients. For sourdough bread, the ingredient mixture itself is truly simple; however, it is the complex microbial interactions between microflora (Lactic Acid Bacteria and wild yeasts) that naturally contaminate the mixture that produces the desired results. While many variables must be considered when creating bread, controlling the type of microbes in the sourdough levain is crucial, this can be achieved through a process known as back-slopping.

Part II

Food Innovation from traditions. A satellite educative trip from Paris-Beirut-Doha to Montpellier (and why not to the rest of the world)?

Reine Barbar

Institut Agro-Montpellier SupAgro, Montpellier, France

Discovering, appreciating and inventing food heritage constitute a challenge which is based on complementary scientific, technical and technological approaches. Describing and analyzing ancestral practices using modern knowledge, tools and approaches should help to anchor the identity of traditional food products in response to the emerging needs of new consumers and new consumption modes. Based on a previous research and education project launched in Lebanon entitled “Preservation and development of culinary food heritage by means of molecular gastronomy”, a module was initiated this year at Montpellier Supagro. The TRAD-INNOVATION module addresses food innovation from the food heritage by integrating multidisciplinary knowledge with the aim to rediscover, claim local specificities, preserve and improve regional and local recipes and products, whether at artisanal or industrial scale. Tradition and modernization are not contradictory and conflicting terms. They can become so when progress and modernization lead to the complete break up with the past. The TRAD-INNOVATION module addresses the process of identification, scientific exploration and invention to be imagined as part of an innovation project under constraints of a typical food from the French food heritage (like Paris-Brest, quiche Lorraine, blanquette de veau, hachis parmentier). An Erasmus+ project called “FeedTheMind” (Food-related European Education in the Digital era to Motivate Innovative New-product Development) is currently ongoing and aims to promote a food innovation education of excellence and a project-based approach using a digital pedagogical platform. In the scope of this talk, all these initiatives are presented from a broader perspective to discuss the creation of a wider transversal educational project that could harmonize and co-construct opportunities among several countries, based on complementary fields of expertise.

Part III

The Kitchen Lab

Dao Nguyen and Pasquale Altomonte

<http://kitchennlaboratory.wixsite.com/researchdevelopment>

Passionate about science & cooking, we are in constant research and development and also share our knowledge and passion related to culinary innovation. Through KITCHEN LAB., we collaborate with different institutions in order to help patients and their families to love food again.

Few years ago, we met Simon, a child of 7 years old. Highly allergic to proteins found in cow's milk since birth, he couldn't eat anything containing cow's milk proteins which provoked an anaphylactic shock. For 75% of children, they spontaneously lose their cow's milk allergy at the age of 2 and up to 90% after they reach 3 years of age. But for Simon, his allergy went on to take a turn for the worst and he unfortunately also developed cross

allergies. He became allergic to goat, sheep and mare milk and also to beef, pork and mutton meat, as well as eggs, soy and nuts.

The treatment consisted of an allergen immunotherapy. At the hospital (in Geneva, Switzerland), the Pediatric Allergology Unit developed a muffin recipe containing a defined amount of cow's milk proteins. Every 6 weeks, the cooking time was reduced by 5 minutes, allowing a gradual introduction of allergens. The muffin (about 150 g) has to be eaten every day for at least 12 months. After less than 10 days, Simon refused to eat the muffin and wanted to drop out the therapy. The muffin had always the same taste, texture and size. When the nurses contacted us, they wanted us to help Simon with new recipes, because he started to develop a food disorder (e.g. refusing to eat).

Thanks to molecular gastronomy, medical knowledge and note by note cooking, we developed a series of recipes, with different shapes, colors and taste in order for Simon to enjoy food without thinking that it is a treatment. After 12 months, Simon was able to eat a slice of pizza at the restaurant for the first time with his siblings and parents. Now, his allergy to cow's milk proteins is under control.

We also help people after receiving a gastric bypass. A gastric bypass is a bariatric surgery whose objective is to reduce the volume of the stomach (the size of an espresso cup) and to modify the food circuit. The absorption of food will be restricted, reducing daily calories intake (treatment against obesity). The weight loss is important and is accompanied by an improvement in high blood pressure, lipid and blood sugar level. Thanks to note by note cooking, we are able to propose dishes that have the size of an espresso cup, containing a high amount of proteins, vitamins and minerals, but also look good and taste great!

Culinary art (always keeping in mind the taste) combined with scientific knowledge helps patients to regain their love of food and health.