An Educational Satellite Project around the Scientific Elucidation of Culinary Precisions in Lebanon and in the Middle East

Reine Barbar1,2, Jean-Marie Malbec3, Christophe Lavelle4 and Hervé This vo Kientza5,6
1 Department of Agriculture and Food Engineering, School of Engineering, Holy Spirit University of Kaslik, P.O. Box 446 Jounieh, Mount Lebanon, Lebanon
2 UMR IATE, Univ. Montpellier, INRAE, Institut Agro, 2, place Pierre Viala, 34 060 MONTPELLIER Cedex 02, France
3 Conseiller pédagogique sur la zone MOPI, Lycée Bonaparte, Doha, Qatar
4 National Museum of Natural History, CNRS UMR7196 / INSERM U1154, Sorbonne University, 43 rue Cuvier, 75005 Paris, France
5 Groupe de gastronomie moléculaire, INRAE-AgroParisTech International Centre for Molecular Gastronomy, F-75005, Paris, France
6 UMR 0782 SayFood, AgroParisTech, INRAE, Université Paris-Saclay, 91300 Massy, France

Introduction

Food and cooking habits are important features of Lebanese society, as they link with the social life in Lebanon. Lebanese culinary culture and terroir are rich in traditional recipes and ingredients that are in high demand and appreciated by affluent as well as poor people. Tradition dominates the food system in rural and urban areas and is demonstrated at home, on the street and in restaurants (Zurayk and Abu Ghyda, 2009).

The term “tradition” derives from the Latin word “tradere”, which essentially means “to transmit” or “to send”. Tradition thus represents a form of transmission, or an information flow through time, of ideas, praxes, habits, methods, etc. Through such continuity, traditions not only have a link to the past but also push towards the future (Cannarella and Piccioni, 2011). Similarly, “heritage”, from Latin patrimonium, refers etymologically to the legacy of the father, that is, by extension, to all properties inherited by the family. Accordingly, the cultural heritage is an essential part of the content of the daily life of a community, but it remains linked with its past and its future. Also, tradition and modernity are not necessarily conflicting terms: they collide when one of these human expressions becomes an absolute value.

For this reason, progress and modernity are opposed to tradition when modernization tends to interrupt the links with the past (Cannarella and Piccioni, 2011).

Traditional foods are considered a long-lasting legacy throughout the centuries, passed on to us by our ancestors. Due to altered lifestyles and international exchange of information and goods, this national legacy is slowly vanishing, and future generations may be totally deprived of it (Trichopoulou et al., 2006). However, ongoing research initiatives and funding are taking place to counteract this. In 2006, the European Commission gave the following definition of “traditional” related to foods: “Traditional means proven usage in the community market for a time period showing transmission between generations; this time period should be the one generally ascribed as one human generation, at least 25 years” (EU, 2006). In this regard, the convention for the safeguarding of intangible cultural heritage was passed by the UNESCO General Conference held in 2003. At that time, the international community recognized the need to raise awareness about cultural manifestations and expressions that until then had had no legal or programmatic framework to protect them. The know-how linked to traditional crafts and traditions is part of the intangible cultural heritage.

In support of this convention, UNESCO recognized this culinary heritage by integrating the Lebanese region of Zahle into its Creative Cities Network in the gastronomy category (Ilkincas, 2013). Zahle is the first city in the Arab world to join the UNESCO network in the food category. The Creative Cities Network is currently formed of 116 members from 54 countries covering seven creative fields: Crafts and Folk Art, Design, Film, Gastronomy, Literature, Music and Media Arts (http://en.unesco.org/creative-cities/).

Lebanese cuisine is mainly based on rural dishes. Until the political independence of the country in November 1943, Lebanon was under the rule of several major foreign powers: the Persians (6th–4th century BC), the Assyrians (9th–6th century BC), the Greeks and Seleucids (4th–1st century BC), the Romans and Byzantine Greeks (64 BC – 636), the Arabs (AD 636–1099), the Crusaders (AD 1099–1291), the Mamelukes (AD 1291–1516), the Ottoman Empire (AD 1516–1918) and the French mandate (AD 1918–1941) (Gabriel, 1978). This has certainly left an impact on the national cuisine and led to its current richness and diversity.

Among the specific customs in Lebanese culinary preparations, we can cite the mezze, from the Arabic word maza, originating...
from the Persian word maza (taste) (which is an array of starters or snacks), the mouneh (provisions made in autumn in preparation for winter to transform seasonal perishable food into durable preserved food), and the slikké (edible plants picked by hand) (Yazbeck, 2009). Mezze, for example, while being commonly inherited by the whole Lebanese population, is at the same time diverse. Each region in Lebanon will have its own variation of some mezze items, depending on its climate, its geographical location and thus, its natural resources.

Although Lebanese cuisine is not as precisely codified as French cuisine, we should find a rigorous way of preserving the recipes. One way to preserve the culinary heritage is to have a closer look at the technical steps described in a recipe leading to the final result. While several books list typical traditional Lebanese recipes, no link has been made between academia and rural communities to bridge the gap between the two and build other ways to preserve culinary heritage.

Molecular gastronomy (MG) is the scientific activity of looking for the mechanisms of phenomena that occur during culinary processes (preparation and consumption) (This, 2011; Barham et al., 2010). The word “gastronomy” is derived from the Greek γαστήρ (gaster, which means “stomach”) and νόμος (nómos, which refers to “laws”); it is therefore the “laws of the stomach” and became “the knowledge and understanding of all that relates to man, as he eats” under the pen of Brillat-Savarin in his masterpiece Physiology of Taste (Brillat-Savarin, 1825). One could therefore paraphrase Brillat-Savarin to state that molecular gastronomy is the physical and chemical knowledge and understanding of all that relates to man as he eats.

In 2011, the Faculty of Agricultural and Food Sciences at the Holy Spirit University of Kaslik organized a series of lectures and workshops addressed to different audiences. A project funded by the Agence Universitaire de la Francophonie (AUF) was undertaken by an academic team in Lebanon under the theme “Preservation and development of Lebanese culinary heritage through molecular gastronomy” in order to better understand scientifically the particularity of Lebanon’s traditional recipes. The project targets several actions in teaching, research, social outreach and regional expansion (Figure 100.1). These actions aim to orchestrate interdisciplinary work about Lebanese culinary precisions for transfer in the future to the Middle East region. The term “culinary precisions” describes the technical or procedural information present in a recipe (oral or written), which provides added value in terms of improved quality and a greater chance of a successful product (Fooladi and Hopia, 2013). Precisions lead to a better understanding of traditional culinary culture while providing opportunities for innovation. Current actions aim for a better understanding of Lebanese culinary heritage and the preservation, conservation and development of the latter (Barbar and This, 2012).

In this context, the focus in this project is on developing the following objectives (Barbar and This, 2012):

- preservation of Lebanon’s culinary heritage;
- help for rural development by the valorization of culinary ancestral know-how in Lebanese villages;
- helping sustainable development through the development of local products;
- helping the development of agro-tourism in Lebanon by ensuring better visibility of Lebanese rural regions and their food as well as culinary resources;
- helping sustainable food production;
- valorization of natural resources found in Lebanon, like plant exudates, medicinal herbs, typical spices, etc.

### Research Activities

The information given by recipes can be challenged through scientific investigation; at the same time, these investigations provide abundant pedagogical supports for scientific classes, since cooking is familiar to most human beings (Fooladi and Hopia, 2013). Beside scientific and pedagogical opportunities, molecular gastronomy can not only help us to better understand (hence potentially improve) the way we cook, but also provide inspiration for new techniques and dishes (Arboleya et al., 2008; Barbot et al., 2014).

In this instance, several projects were conducted. Examples are listed in Table 100.1. These projects were carried out by food engineering students, who scientifically explored culinary technical proposals (“culinary precisions”) in traditional recipes by means of molecular gastronomy as well as helping small-scale food producers to develop and stabilize their food products. Each specific research task fits a broader objective set at the beginning of the project. These objectives could be transferred to other countries of the Middle East in order to better link science to traditional food at both industrial and consumption scales.

One example in Table 100.1 is concerned with the analytical exploration of elementary production steps of Lebanese hommos bi tahine. Different types of hommos bi tahine were studied: industrial and ready-to-eat hommos bi tahine, and traditional hommos bi tahine (from the traditional restaurant Akra in Tripoli). The main ingredients are the seeds of *Cicer arietinum* L. (chick peas) and “sesame cream” or *tahine* (a suspension obtained by mechanical treatment of the seeds of *Sesamum indicum*), which were...
also explored. The results of experimental and rheological tests demonstrated the influence of a flow chart (and thus, the steps of the production process) on the composition and microstructural and textural quality of the end product (Barakat, 2014).

The literature data on consumer perception of Lebanese cuisine is sparse. This is why one study conducted by our team aimed to explore and understand the relationship between the Lebanese population and Lebanese cuisine (Mitri, 2014). The study, conducted on 506 Lebanese consumers (between 18 and 60 years old), revealed that Lebanese cuisine represents for them habits, culture and heritage (95% totally agreed or completely agreed). Moreover, all agreed that this cuisine had its origin in rural areas. Despite their emotional attachment to familiar food, 68% of Lebanese participants accepted the introduction of new flavours into their dishes. According to the study, consumer curiosity is explicit from the fact that 65% were ready to examine a reworked menu. Analysis of the results showed that 90% of participants were ready to eat dishes presented differently, while 68% were willing to try dishes fused with other cuisines, and 73% of consumers were interested in discovering new textures in dishes.

Today, leading worldwide chefs are competing for innovation. Many of them are looking closely at science and often work directly with scientists to help create new textures, shapes and tastes (Arboleya et al., 2008). While some customers seek reassurance by consuming well-known traditional dishes, others are open to being surprised. Balance is thus sought in some new Lebanese restaurants between traditional dishes and the introduction of some reworked Lebanese items. An example by the chefs Pedovic and Hasic is illustrated in Figure 100.2.

**TABLE 100.1**
Research Topics Addressed in the Scope of the Project

<table>
<thead>
<tr>
<th>Research topic</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimization of gluten-free kneffe bread</td>
<td>Strengthening links between academia and the private sector through research and development and innovation</td>
</tr>
<tr>
<td>Study of traditional marzipan from Zouk-Mikael</td>
<td>Developing specific protection labels for local traditional products</td>
</tr>
<tr>
<td>Exploration and colloidal stability development of fermented milk drinks (ayran)</td>
<td>Exploring by molecular gastronomy the molecular reasons for instability of certain Lebanese food products</td>
</tr>
<tr>
<td>Scientific exploration of culinary precisions of different preparation modes of hommos bi tahine</td>
<td>Promoting traditional Lebanese products and their scientific development by molecular gastronomy</td>
</tr>
<tr>
<td>Development of a new Lebanese menu: explorative study</td>
<td>Understanding consumers’ perception of traditional and new Lebanese recipes</td>
</tr>
</tbody>
</table>

Among some examples of topics discussed during these monthly seminars are the following: mixing order of arak (alcoholic beverage obtained from fermented grape juice and flavoured by adding aniseed and distilling again) with water, whitening effect on baba ghanoush or moutabal (which is a dish made by mixing grilled fruits of *Solanum melongena* (aubergines) and sesame cream), salting aubergines before frying, marinating chick peas with sodium bicarbonate, browning of different fat sources used in Lebanese villages, cooking acid yogurt for some Lebanese dishes, and the effect of different ingredients on maintaining the stability of heated yogurt.

A collaboration took place between the Department of Agriculture and Food Engineering and the laboratory IDEES (Idéités et Développement – Espaces de l’Environnement et des Sociétés) of the social sciences department at USEK (Université Saint-Esprit de Kaslik). The laboratory is dedicated to scientific and technical experiments as well as targeted professional studies, and promotes the emergence of a working attitude starting from a problem identified in Lebanese society. It collaborates with a number of municipalities, NGOs (non-governmental organizations), and local and international

**Social Outreach**

Similarly to France and other countries in the world, Lebanon organizes monthly seminars on molecular gastronomy (Figure 100.3). Anyone interested in culinary activity is invited to join these monthly meetings (cooks, scientists, teachers, engineers, food writers, etc.) in order to consider open questions about culinary transformations at both home and restaurant scales.
organizations, in particular with UNESCO National Commission for Education and Culture. It manages its projects in a multidisciplinary way, and for this purpose, it uses the expertise of other faculties at USEK.

The collaboration took place in the scope of a main axis for this laboratory, which is the rehabilitation of the Lebanese cultural heritage. Through this broad theme, the aim is to raise awareness of the importance of the intangible heritage, to foster recognition of its content and to design a strategy for action involving schools, academia and municipalities.

A major part of this project included visits to different rural regions in Lebanon conducted by students enrolled in a food engineering programme. These field trips initiated work with women’s associations as part of different municipalities involved in the project with IDEES laboratory on intangible cultural heritage. Scientific exploration followed in order to study the scientific validity of culinary sayings in traditional recipes in Lebanon. With molecular gastronomy, it is possible to track the technical components of the recipe through history and understand how they occurred, how they evolved, and why they are true or false.

At various events, the students explained to visitors, mainly composed of school students and their families, the work done on traditional Lebanese recipes explored by means of molecular gastronomy (Figure 100.4).

Teaching Structures

In France, educational efforts towards better knowledge and understanding of the culinary heritage have been carried out in schools at both primary and secondary level, as well as universities (This 2007; This, 2013). At the same time, professional teaching is also evolving towards an “investigation-based” approach rather than an “imitation-based” approach, as testified by the new programme of the cooking technology Baccalaureate (Cardinale et al., 2015).

School Level

The action entitled “Between Science and Cooking” initiated through this project is focused on the idea of recovering and preserving the culinary heritage of our parents (in Arabic and French) by means of molecular gastronomy. This transversal research work helps to develop intercultural collaboration among science teachers, on the one side, and language teachers, on the other. It explores culinary transformations from the perspective of technique, technology and science and also from a cultural perspective (art, literature, history, society and languages). The model can be applied in schools as well as at university level.

To create a multidisciplinary collaboration around taste, the current project suggests the study of culinary sayings regarding dishes from all over the world with a focus on French and Arab countries’ cuisines. This action is already being implemented in Doha (Qatar) with the objective of extending this pilot project to the surrounding countries of the Middle East. It involves 40 teachers in primary schools.

It is therefore important to initiate the new generation, starting in school, on how to re-appropriate the old recipes and culinary sayings but also how to modernize them (when relevant) using molecular gastronomy without altering the recipe and its spirit.

The students are asked to collect recipes from their parents and grandparents; these recipes should be regional. In Doha, the recipes are of Arab tradition. The recipe is then written, and sometimes translated from Arabic to French, and contains all the technical steps for its realization.

Each group of students works on a specific recipe, and the following should be investigated for each recipe:

- a complete procedure (e.g., mass – temperature – duration of cooking);
- utensils to use (robot, whisk, grinder, traditional utensils);
- foods defined (amount, mass, volume);
- condiments.
The recipe is translated into French and explained to everyone. The teacher presents more details about the ingredients, and in doing so, he/she will explain the main food components and their composition. The recipe is then distributed to students and colour-coded; blue is used for the culinary precisions, while red is used for the definitions section, and colourless sections indicate the unnecessary parts from the technical point of view.

A small statistical calculation on the three colours of the recipe allows us to highlight the fact that the precision component outweighs the other two parts. We can therefore conclude that the technical precision part of a recipe is always the most important part.

Then, a list of culinary precisions for each recipe is prepared. Each group of students works on a chosen culinary precision. Several culinary precisions can then be treated in the same class. An experiment is then done in order to conclude the validity, or otherwise, of each culinary precision. Revision of the recipe can be done with the help of a chef.

The experiments are a very efficient way to encourage students to use language abilities. The curiosity aroused by the proposed experiments requires the use of a specific vocabulary, and periodic times of brainstorming and summaries must be facilitated with the help of the teacher.

**Bachelor Degree Level**

Molecular gastronomy courses were also developed at bachelor and master levels of the food engineering programme at the Faculty of Agricultural and Food Sciences of USEK (Lebanon).

Visits took place in several regions (in collaboration with municipalities) to meet women working on traditional recipes and investigate, as part of field trips, the details of recipes that have been prepared on site.

Students’ work includes the scientific study of culinary precisions of each recipe as well as the results of tests done at the laboratory to check their accuracy. The presentation of students’ work includes an oral presentation, a scientific poster prepared by the students and a tasting of an improved version of the traditional recipe.

**Master Degree Level**

Students of the Master’s in Food Engineering have a stand each year at the Science Days Fair that takes place at the Beirut Hippodrome (Figure 100.5).

By addressing the general public and school students as well as families, the master students have highlighted several activities: awareness of molecular gastronomy through simple experiments, explaining gelification, and stability of sauces observed under a
microscope. In addition to this, the students demonstrated simplified scientific elucidation of culinary precisions in traditional Lebanese recipes collected during their visits to the Lebanese villages; examples of such culinary sayings include enzymatic browning of aubergines during their cooking, acidification of kechek (which is a dried Lebanese cheese made from fermented milk and wheat), frike cooking (which is made from green wheat that goes through a roasting process) and water cooking of aubergines while covering with a textile to preserve the colour.

The ancestral know-how is thus best described by the scientific mechanisms involved. The university students at both bachelor and master levels were able to discover a region and its culinary resources with which they were unfamiliar at first. They were able to understand them, to explore them and to modernize them by working with a chef. This collaborative work between science and social aspects aims to provide a better understanding of the traditional culinary culture, while it allows innovation and promotes the domestic economy. Traditional crafts related to cooking are reliable growth factors for economic development of the country, especially for a small country like Lebanon.

Continuing Education and Knowledge Transfer

In the scope of the project, regular workshops with international experts are planned for food science students, culinary school students and professional cooks to update their knowledge and give them information on the latest developments in the field (Figure 100.6). In addition to professional workshops, round tables are regularly organized with NGOs and municipalities in order to better link academia and science in the service of small producers and associations implicated in traditional food production.

In November 2015, chefs Marijana Pedovic (Serbia) and Sasa Hasic (Croatia) gave several lectures to food engineering and culinary school students as well as professional cooks (Figure 100.7).

They introduced their methodology to work on traditional recipes of their countries while making sure to preserve the taste. They also conducted sessions during the Beirut Cooking Festival, which is a culinary event open to the public.

Regional Expansion

The project initiated in Lebanon in 2011 aimed to expand its activities to surrounding regions of the Middle East having in common a rich food heritage and culinary similarities in some recipes.

An educational project around culinary precisions at both university and school levels could be one way to unite the efforts of academia, the private and public sectors, and communities in each country towards the common target of exploration of food heritage and culinary practices (Table 100.2). A pilot project was therefore suggested in order to orchestrate multidisciplinary

![FIGURE 100.5 Food engineering students at Beirut Science Days fair. Interaction around culinary sayings in traditional Lebanese recipes with students coming from schools.](Image)

![FIGURE 100.6 Workshop with Cordon Bleu and food engineering students held at USEK (Lebanon) in October 2014 hosted by Christophe Lavelle.](Image)
efforts and complementary work to be done by all disciplines related to science, food production and food heritage.

Conclusion

A specific Unit of Molecular Gastronomy has been built in Lebanon with the scientific findings shared in the scope of this chapter, with a main academic core interacting with multidisciplinary partners in the field: municipalities, universities, cooks, schools, industries, restaurants and research centres. The collection and study of culinary precisions has the potential to create a framework for research, not only in food science and molecular gastronomy, but also in other disciplines such as social sciences and humanities, allowing multidisciplinary approaches and cross-fertilization among a broad range of sciences (Fooladi and Hopia, 2013). In order to innovate, one must learn more about culinary traditions and precisions.

“The discovery of a new dish does more for the happiness of mankind than the discovery of a star”, Brillat-Savarin (1825) once said. Obviously, the (re)discovery of an old dish also matters. A balance is sought through this project between the meaning of traditional cooking and innovation through the knowledge gained by food science. This is how we keep cuisine as both a social activity and a living art.

Acknowledgements

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REFERENCES


TABLE 100.2
Pilot Educational Project around Culinary Precisions

<table>
<thead>
<tr>
<th>Step</th>
<th>Disciplines involved</th>
<th>Persons involved</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice of a recipe</td>
<td>–</td>
<td>Students and their parents/grandparents Teachers</td>
<td>Promote local recipes of the country/region</td>
</tr>
<tr>
<td>Explore the regional variations of the recipe</td>
<td>History</td>
<td>Students Teachers</td>
<td>Promote the culinary diversity of regions</td>
</tr>
<tr>
<td>Database of special culinary gestures</td>
<td>History</td>
<td>Students Teachers</td>
<td>Develop agro-tourism around culinary traditions</td>
</tr>
<tr>
<td>Translation to French/English</td>
<td>Arabic, French, English</td>
<td>Students Language teachers</td>
<td>Study the culinary vocabulary of a recipe</td>
</tr>
<tr>
<td>Describe the ingredients/technical components of the recipe</td>
<td>Mathematics, Chemistry, Physics, Food processing</td>
<td>Students Science teachers</td>
<td>Identify the culinary precisions of the recipe and confirm their predominance in the recipe</td>
</tr>
<tr>
<td>Experimental study of culinary precisions</td>
<td>Scientific disciplines</td>
<td>Students working in groups Science teachers</td>
<td>Prove scientifically the validity or otherwise of culinary precisions by studying their variations</td>
</tr>
<tr>
<td>Renovation proposals</td>
<td>Cooking Science</td>
<td>Professional cooks Teachers Students and their families</td>
<td>Let students explore their innovation potential to re-appropriate traditional recipes according to their consumption trends</td>
</tr>
<tr>
<td>Animation and presentation of project results</td>
<td>All disciplines listed</td>
<td>Audio-visual media Students/teachers/families Teachers Restaurants Municipalities and NGOs Wider public International associations: UNESCO, FAO (Food and Agriculture Organization) International Center of Molecular Gastronomy</td>
<td>Celebrate knowledge around food and promote students’ work</td>
</tr>
</tbody>
</table>


This H. 2013. Programme “Dictons et plats patrimoniaux”. www2.agroparistech.fr/Le-projet-Dictons-et-Plats-Patrimoniaux.html

