Note by Note Cooking and Note by Note Cuisine

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What Is Note by Note Cooking?
Cooks traditionally make dishes using food ingredients that are primarily derived from plant and animal tissues, but very early in history, fractionation techniques for such materials appeared. For example, meat stocks were produced (“pit cooking”), because our ancestors implicitly realized that keeping part of animal tissues in water was a good way to improve the use of food ingredients, avoiding losses in the fire over which the food ingredients were heated (about 30% of meat can be lost in this way, including water and various nutrients; Wandsnider, 1997).

Progressively over time, new techniques were introduced in order to fractionate more precisely some plant tissues (but also animal tissues, producing, e.g., cream) and prepare extracts such as oil, salt and sugar, which are either pure compounds or mixtures of related compounds (This, 2018). For example, oil is mainly a mixture of triglycerides, and egg white powder is a mixture of the proteins from egg white, but table sugar is almost pure sucrose, and salt is usually almost pure sodium chloride. More and more pure fractions have been produced, in particular by the milk and cereal industries, such as whey from cheese-making being fractionated into a range of protein-rich fractions (Linden and Lorient, 1995).

But even before the developments of plant tissue fractionation, Note by Note (NbN) cooking was proposed by H. This as a culinary technique based on the use of pure compounds in order to make dishes (This and Kurti, 1994; This, 2014). Using this method, any aspects of dishes can be designed: shape, consistency, nutritional properties, colour, odour, taste, trigeminal sensations, temperature and the recent modalities of flavours. For example, in the last decades, the perceptions of calcium ions and of long-chain unsaturated fatty acids have been discovered (Laugerette et al., 2006).

The development of this culinary technique already has a history, moving from a time when even the food industry was strongly opposed to the idea to the situation today, with innovative companies adopting the technique and, for example, coupling it with 3D printing devices (see the chapter by Ross, Burke and Kelly in this book).

A Short Prehistory and a Birth
NbN was an answer given by one of us (This) to an incorrect idea proposed by the late Nicholas Kurti in 1969, during a lecture at the Royal Institution in which he discussed the roots of what would be called “molecular and physical gastronomy” (by himself and by This) in 1988. In this speech (Kurti, 1969), he said (and wrote):

Let me first explain why I should speak about the physicist in the kitchen. My main reason for limiting my subject to physics is that contributions of the chemists to culinary art and to many other activities designed to increase our sensual pleasures are well known. The chemists analyse and explain fragrances and flavours and often invent new ones: a vast chemical industry is concerned with producing dyes to please our eyes.

In later discussions between Nicholas Kurti and This, Kurti considered that developments were possible for physics but not for chemistry (contrary to This’s opinion). The chemistry of flavour was already well developed at that time, with flavourings being used more and more, but one should also recall that, as late as 1990, chefs were often reluctant to use products such as purified gelatine, although they themselves had produced it by cooking calf feet and clarifying the extracts for pastry making. The idea of using “chemicals” in food was considered to be insane, even by chemists.

Then, in the 1980s, the idea of NbN cooking appeared slowly, in particular after it was reported that storing wood with ethanol could dissociate lignin, producing various odorant compounds such as vanillin and other similar compounds (Deibner et al., 1976; Puech, 1984). One of us (H. This) proposed to add vanillin directly to brandies, and he gave public lectures in which he showed how the addition of five drops of cheap vanilla extract to one litre of cheap whiskies transformed the “harsh” flavour of the cheap products into “rounded” flavour.

Slightly later, when it was published that paraethylphenol is partly responsible for the flavour of leather in old Burgundy wine (Etievant, 1989), tests were also organized to add paraethylphenol to wines, but the most interesting results were obtained when this
compound was added to whisky, because when the right amounts of the compound were used (about 4 ppb), results analogous to the character of Lagavulin or Laphroig whiskies were obtained.

In 1993, i.e., shortly after the first international workshop on molecular and physical gastronomy, This was invited by the editor in chief of *Scientific American* to write an article about the freshly created discipline, and as always, he invited Kurti to join in (This and Kurti, 1994). Because a conclusion was needed for this article, and because This was generally doing the first draft of the common texts, he proposed a conclusion in which the use of pure compounds in dishes would be the future of cooking.

As stated earlier, at that time, This was already making such additions publicly, but it was considered heretical or provocative; however, Kurti accepted the conclusion of the article, and the text generated many negative reactions, in particular by wine makers, who could not admit that their products could be “adulterated”. The response to them was that there was a difference between adding a compound to food ingredients for personal consumption, as we do with salt and sugar, and adulterating wines, which is strictly forbidden by law.

### Why Is NbN Different from Molecular Cooking?

This practice of not only adding compounds to dishes but making dishes entirely from compounds was named “Note by Note cooking” in 1996 by This. It is very different from what This called “molecular cooking” (in 1999, i.e., many years after its development, and only because there was confusion with the scientific discipline named “molecular gastronomy”). Indeed, molecular cooking was introduced as a new culinary technique using hardware from (mostly chemistry) laboratories and using more rational methods than in the past. For example, it was proposed to use thermocirculators in order to get precise temperatures during cooking, or to use ultrasonic probes to make emulsions. Molecular cooking still used traditional food ingredients such as whole plant tissues (vegetables, fruits) or animal tissues (meat, eggs and fish).

With NbN cooking, the tools are not very important, and indeed, both traditional and modern tools can be used, but ingredients are the key! For NbN cooking, it is proposed to use only pure compounds, and, of course, these compounds are generally components of traditional ingredients: water, saccharides, amino acids and proteins, particular lipids, polyphenols, etc.

One should be aware of the slight difference between “pure Note by Note cooking” and “practical Note by Note cooking”. For pure NbN cooking, only pure compounds are used, one by one. However, for practical NbN cooking, simple mixtures can be used as well. For example, oils are mixtures of many different compounds, but most are of the family of triglycerides. Similarly, corn starch is not pure amylose but rather, 85% amylose and 15% amylpectin, the behaviour of which is not different from that of pure amylose. This difference is the same as that between producing music using computers and assembling music wave by wave, and making music with simple synthesizers, still synthetic but with fewer possibilities.

### Why Is It Important?

The lawyer Jean-Anthelme Brillat-Savarin wrote that the discovery of a new dish contributes more to the happiness of mankind than the discovery of a new star (Brillat-Savarin, 1825), and certainly NbN cooking can be at the root of many new dishes, because any food is now within reach: any shape, any consistency, any colour, any odour, any taste, etc. In addition, a new style and a new art (“Note by Note cuisine”, but also “Note by Note mixology”), can also emerge.

However, the interest in NbN cooking goes much further than this. Describing all interests would be too long, and deserve a whole book in itself, so that we are only giving a summary list of ideas:

- if an energy crisis happens, it is better to transport dried material than fresh products (a tomato, for example, contains 95% water);
- if the fractionation of plant tissues is performed immediately on production sites (fields or farms), then the water can be kept for irrigation, while added value is obtained through at least two mechanisms: (1) the prices are more regular (because the new products can be stored), which is important for the producers; (2) new products can be designed through fractionation, which contributes to innovation;
- for nutrition and toxicology, the exact composition of food can be decided, which can contribute to the fight against obesity and malnutrition;
- allergies can be avoided by not using the particular compounds responsible for such reactions;
- when compounds are considered useful for human consumption, the origin of such compounds has no technical importance (from natural source or synthetic), and perhaps some specific plants can be selected for synthesizing particular compounds (for example, perhaps alfalfa is more efficient than spinach for extracting chlorophylls, and genetically modified plants could improve the production even more);
- if proteins are extracted from pulses (this is already done today), the non-protein part that remains after recovery of starch can be given as food to insects, so that more proteins are produced and extracted;
- the ever purer fractions that the food industry has been increasingly using lead to greater availability of ingredients to facilitate NbN cooking;
- avoiding the transport of fresh products can reduce spoilage, thereby increasing the global output of agriculture, which will be needed to feed 9–10 billion people in 2050;
- food ingredients with no water can be stored without using non-sustainable cold technologies;
- foods created using NbN cooking have chemical and microbiological traceability, as all the constituent compounds are known;
- appetizing foods can be designed for those with eating difficulties, e.g., dysphagia;
- personalized foods and diets can be created for those with special dietary requirements;
Note by Note Cooking and Cuisine

A Short History

A Comment on the Name

It was said that the root of NbN cooking is in experimental additions of particular pure compounds to foods and drinks, but the idea of giving a specific name to the generalization of this practice came later, probably in 1996. Indeed, it was observed that there is a close parallel between NbN cooking and synthetic music, and this was the basis for the choice of a name.

To begin with music, it is a fact that in the old times, musicians used traditional instruments that make predefined sounds, with an acoustic spectrum that depends on the particular structure of the instruments, i.e., flute, violins, trumpets, etc. After the seminal work by the French mathematician Joseph Fourier (1768–1830) and after the advent of recording systems, it became possible to analyse such sounds and to distinguish between “fundamental” and “harmonic” vibrations, the intensity and time-course evolution of which determined the “timbre” of the particular musical instruments. More recently, the advent of electronic techniques made it possible to synthesize music, assembling pure acoustic waves into new timbres and assembling particular notes or, more generally, acoustic signals. This led to the development of electronic, or “synthetic”, music, which is now found worldwide.

For food, the same occurred, but at a later time. The analysis of traditional food and food ingredients began at almost the same time as acoustic analysis, shortly after the beginning of modern chemistry. Today, a lot is known about the chemical composition and physical structure of food. This makes it possible (but however pointless) to reproduce traditional food synthetically, but it also opens up new, more interesting possibilities, of dishes designed entirely de novo from both a chemical and a physical point of view. Of course, such synthetic food can have the exact properties that one wants to achieve.

So, what name should be given to such a new technical activity? In the 1990s, there was much confusion in culinary circles about the expressions “molecular cooking” and “molecular gastronomy”, and there was also much criticism from traditional chefs and journalists about the presence of “science in the kitchen”. Because cooking is not a scientific activity (as far as natural sciences are concerned), and because it was considered that it would be better to get closer to art than to science, the correct expression “synthetic cooking” was avoided and a comparison with another art, music, was decided. Comparing NbN cooking to electronic music, strictly speaking, the right name should have been “wave by wave cooking”, but this was difficult to say, and instead, “Note by Note cooking” was chosen. In the future, as NbN cooking becomes more and more familiar, perhaps we can finally use the name “synthetic cooking”.

First Lectures

As said, as early as the end of the 1990s, the idea of NbN cooking was shown in public lectures, along with experiments of adding compounds to beverages or making specific flavours by heating specific mixtures of saccharides and amino acids, with a view to obtaining specific glycation products. These experiments developed more and more into making synthetic food.

However, at the end of 1998, it was observed that the number of invitations to lectures and of interviews by journalists was dropping for one of us (This), and it was guessed that this perceived “fear of chemistry” had something to do with a fear of the computer bug of the year 2000. Lectures were changed into simply analysing scientific advances from molecular gastronomy, which in retrospect was probably a bad decision.

Hong Kong

After the year 2000, when it was felt that this decision to “step back” had been a mistake, new lectures were given that showed NbN cooking. However, it was realized that a public event was needed to present the idea more broadly. In 2004, one of us (This) proposed to the French chef Pierre Gagnaire that he should be the first to serve an NbN dish in a restaurant, and together they decided that this would be done in Hong Kong, at Gagnaire’s Mandarin Oriental restaurant, with two diners and a press conference. Many international media covered the events, during which the dish “Note by Note number 1” was served. This included crisp disks (named “peligots”) made from thermally processed glucose, alginate spheres containing synthetic aqueous solutions, and a granité made from water, glucose, citric acid, glucose, colorants and odorant compounds (Figure 127.1).

Pioneers

What next? As Pierre Gagnaire is not a man fixed on one particular cooking trend, he had no reason to go forward entirely in the direction of NbN. On the other hand, shortly afterwards, in 2010, This used a lecture at the meeting of the Japanese Society for the Promotion of Science in Strasbourg to invite two Alsatian cooks, Hubert Maetz and Aline Kuntz, to make two NbN dishes. They prepared these two dishes in front of the audience, assisted by This.

Then, still in 2010, because This is the president of the Educational Committee of the Institute for Advanced Studies in Gastronomy, he organized an NbN educational dinner at the Ecole du Corbon Bleu in Paris. The chefs were Patrick Terrien, Patrick Caals, Frédéric Lesourd, Bruno Stirl, Philippe Clergue, Marc Thivet, Franck Poupard, Patrick Lebouc, Jean-François Déguiinet, Jean-Jacques Tranchant, Nicolas Bernardé and Xavier Cotte.

The menu was the following (Figure 127.2):

Royale de sous bois, blanc-manger truffé et bouillon légèrement mousseux
It can be observed that these dishes still contained animal and plant tissues, but one has to remember that, at that time, cooks did not have easy access to appropriate dilutions of odorant compounds. However, even this practical NbN cooking was already considered as a big innovative step.

We can now jump over the large number of lectures, shows, talks and interviews that followed, and consider only the most important steps. The next one was in 2011: for the International Year of Chemistry, the official partner was the Dow Chemicals Company, which agreed to fund an NbN banquet the day before the official opening at UNESCO in Paris on 26 January. A team from the catering company Potel & Chabot, under the direction of the chef Jean-Pierre Biffi, served this NbN menu:

Sur une idée d’huîtres: huîtres de tapioca, bavarois d’amylpectine, tapioca de citron vert, eau de mer gelée, crème d’huîtres, cristal de vent
(The idea of an oyster, foamy bavarois of amylopectin, lime, seawater jelly, oyster cream and wind crystal)

Soufflé au homard, sauce wöhler et gelée de framboises
(Lobster soufflé, wöhler sauce and agar-agar jelly of raspberries)

Fibres de bœuf, capellini, cylindres orange
(Beef fibres with orange cylinders)

Boule de cassis
(Blackcurrant ball)
Here, the names of the dishes should be discussed. For example, there was no lobster in the “lobster” dish, but an artificial flavouring of lobster. Lime was not present either. For raspberries and blackcurrants, it was the powder of these fruits, which is not entirely NbN. Also, there was a real mistake at the end, because the culinary team put real fruits on the plate around the main element. However, it was so successful that Potel & Chabot served it again in April 2011 to 450 guests (mostly chefs) gathered for the presentation of French Michelin stars at the Espace Cardin in Paris.

That same year, in October 2011, another NbN dinner was served by the chefs-teachers of the Cordon Bleu School in Paris. The chefs were Patrick Terrien, Patrick Caals, Philippe Clergue, Frédéric Lesourd, Patrick Lebouc, Franck Poupart, Bruno Stril and Marc Thivet, Jean-François Deguignet, Xavier Cotte, Nicolas Jordan and Jean-Jacques Tranchant, and the menu was (Figure 127.3):

Réminiscence d’une meurette
(Note by yolk, reminiscent of meurette)
Mille feuilles terre et mer trois couleurs, souligné des deux sauces Kientzheim et crustacés
(Tricolour surf and turf Napoleon with Kientzheim sauce and shellfish sauce duo)
Recherche note à note en pot-au-feu
(Note by Note exploration of pot-au-feu)
Reconstitution d’une mozzarella, huile d’olive et mâche
(Reconstitution of a mozzarella, olive oil and lamb’s lettuce)
Le dessert Cordon bleu
(The Cordon Bleu dessert)

One month later, the Association of Chefs Toques Blanches Internationales held their first innovation workshop on NbN cooking: Jean-Pierre Lepeltier (Hôtel Renaissance La Défense, Paris), David Desplanques (Hôtel Crowne Plazza République, Paris), Michael Foubert (Hôtel Renaissance Arc de Triomphe), Marie Soyez (Hôtel Renaissance La Défense, Paris), David Crenn (Hôtel Renaissance La Défense, Paris), Vincent Vitasse (Hôtel Concorde Lafayette, Paris) and Julien Mercier (Hôtel Pullmann Bercy, Paris) experimented after some products were shown.

This workshop led, in December of the same year, to culinary courses given by the chefs of the same association during the charity event for Duchesne myopathy; Jean-Pierre Lepeltier (Hôtel Renaissance La Défense, Paris), David Desplanques (Hôtel Crowne Plazza République, Paris), Michael Foubert (Hôtel Renaissance Arc de Triomphe), Marie Soyez (Hôtel Renaissance La Défense, Paris), David Crenn (Hôtel Renaissance La Défense, Paris), Vincent Vitasse (Hôtel Concorde Lafayette, Paris) and Julien Mercier (Hôtel Pullmann Bercy, Paris) educated the public who had paid for the courses and tasting of the dishes.

Then, in Montreal in April 2012, a series of lectures and press conferences were organized at the Institut du Tourisme et d’Hôtellerie du Québec (ITHQ). For the first press conference, Ismael Osorio and Erik Ayala Bribiesca, along with chefs and students of ITHQ, served four NbN bouchées to about 150 journalists. A strange phenomenon appeared: the new dishes divided the tasters into groups of “like” and “don’t like”, but these groups were not the same for all bouchées. The next day, an NbN meal that was less “art moderne” was served to international journalists, but because the flavours were more familiar, no rejection was observed by the journalists.

In July 2012, in Dublin, Ireland, This’s lecture was followed by the production of NbN food samples by the chef David Desplanques, and in August of that year, NbN cooking was shown to the students of the Eramus Mundus Master Program Food Innovation and Product Design (FIPDes), at AgroParisTech, Paris. The chef Jean-Pierre Lepeltier (Hôtel Renaissance La Défense, Paris) came to show new NbN dishes.

Acceleration: Book and Courses
In the same year (2012), free public courses were given on molecular gastronomy at which NbN cooking was discussed. During three podcasted days of lectures, chefs participated: Philippe Clergue, from le Cordon Bleu, and Jean Pierre Lepeltier, the president of the Toques Blanches Internationales Association.

In August 2012, a press conference was held with demonstrations when the book La cuisine note à note en 12 questions souriantes (later translated into English as Note by Note cooking) was shown to the press; dishes were prepared by chefs Jean-Pierre Lepeltier, chef Hôtel Renaissance Paris La Défense, Laurent Renouf, sous chef Hôtel Renaissance Paris La Défense, Julien Lasry, chef de partie Hôtel Renaissance Paris La Défense, Marie Soyer, chef de partie Hôtel Renaissance Paris La Défense, Mickael Foubert, chef Hôtel Renaissance Arc de Triomphe, Lucille Bouche, sous chef Hôtel Renaissance Le parc

FIGURE 127.3 Some NbN dishes served in 2011: they were closer to the pure NbN theory.
International Contests

In 2012, in order to foster the development of NbN cooking, it was decided to organize international contests for Note by Note cooking. The first was organized in 2013 in Paris, without any particular topic. Pierre Gagnaire came and showed the dish named “Chick Corea”, which had been shown for the first time some weeks earlier at the Book Fair in Paris.

Now, in 2021, the International Centre for Molecular Gastronomy is organizing the ninth event, following the previous events:

• 2014: using methional
• 2015: playing with proteins, 1-octen-3-ol
• 2016: using cellulose (and/or derivatives of cellulose) and trigeminal compounds
• 2017: fibrous consistencies and acidities
• 2018: crackling and crispiness
• 2019: diracs
• 2020: playing with pectins

For all of these, there are three categories (students, lay people and professionals), and the final event is on the first Friday of June in AgroParisTech, Paris.

Creating an NbN Dish

So, how to start creating a Note by Note dish? There are many ways, but it is probably more rational to have first an idea, a theme or a concept. The schematic in Figure 127.4 shows the stages that are followed by students at Technological University Dublin who develop NbN dishes each year as a project-based learning exercise.

One of us (R. Burke) has noted that many students at Technological University Dublin (some of whom are qualified and working as chefs, and some have science qualifications) start by drawing and creating pictures, and some use a mood board of what they envision their dish will look like, e.g., an underwater scene or a forest floor.

Following this, they research the ingredients and consider the equipment that will be required. It is very important to have access to information about the ingredient suppliers and their products, as ingredients can come in different forms. To take one example, calcium can come as calcium chloride, anhydrous or dihydrate. As outlined in Table 127.1, to obtain the same concentration of calcium ions in solution, different amounts of calcium salt have to be used, depending on the molecular weight (MW).

Another ingredient that can be used in NbN cooking is the emulsifying agent wrongly called “lecithin” by producers. Scientifically speaking, lecithins are a particular class of phospholipids, and, more precisely, choline esters of phosphatidic acids (PAC, 1995). However there are many different products with this name, each having different emulsifying properties. These properties are related to their “hydrophilic-lipophilic balance” (HLB; see the chapter on emulsions and surfactants), the parameter that describes the relative composition of the water-loving (polar) and fat-loving (non-polar) elements of an amphiphilic emulsifier molecule (American Lecithin Company, 2003).

*FIGURE 127.4 The stages in the development of a Note by Note dish.
(Source: Burke and Danaher, 2020)*
During the development of recipes, it is vital to check the maximum permitted levels and safety of the pure compounds and/or fractions that will be incorporated. Potential allergenic and toxic effects of ingredients should be investigated. This information is available from national and international regulatory authorities.

Following recipe development, the next step is to carry out kitchen trials. As outlined earlier, there are many aspects to consider in the design of the dish, including shape, consistency, nutritional properties, colour, odour, taste, trigeminal sensations and temperature. In TU Dublin, it is usual to optimize the structure of a NbN dish first. Functional properties such as emulsification, gelling and foaming are examined. Following this, the odours, colours, flavours, trigeminal sensation, consistency and texture are worked on before and after cooking and other temperature treatments. Production and recipe optimization should include sensory analysis testing.

Finally, the dishes are presented for sensorial valuation by the lecturing staff. Students take photographs to include in their TU Dublin project report and also for the International Note by Note competition. Recent examples of winning dishes include:

2018 Crackling and crispiness (Figure 127.5)
2019 Diracs

The dishes created by the two students met the judges’ criteria. David Hurley created a cocktail that appeared to be an eggnog but tasted of bacon, and what appeared to be a bacon crisp had a flavour of eggnog. His main dish included a Note by Note beetroot-inspired protein cake, horseradish-inspired jelly and beetroot-inspired cremeaux. It was presented in the form of a meat muscle and put under a smoked filled lid.

For her part, Eugenia Xynada created a Note by Note version of a breakfast dish with what appeared to be eggs, layered pork sausage and jellied beans, and bacon flakes, and the tomato element was in the form of a Note by Note “Bloody Mary” cocktail. The dish was sweet tasting rather than savoury and included flavour compounds such as citronellyl acetate, octyl acetate, pentyl pentanoate, ethyl lactate, ethyl acetate and cis-3-hexenalacetaldehyde.

Recent Developments

Since 2012, the development of this field has rapidly accelerated, with about 200 lectures per year, all over the world, showing NbN cooking. Only some of these are described.

- In Denmark, in 2014, the staff of the chemistry department of the University of Aarhus and chefs produced a Note by Note meal served to the king’s family.
- In Copenhagen, Denmark, in Estoril, Portugal, in Boston and New York, in some French culinary schools, and in Dublin, Ireland (since 2012), Note by Note cooking is being taught.
- In Japan, 2015, a collaboration of the Corbon Bleu and Ritsumekan University led to NbN sushis, created by the chef Guillaume Siegler, being shown to the Japanese press (see the recipe in Part III of this book).
- Then, in 2015, when a journalist from the New York Times came to Paris in order to prepare an article on Note by Note cooking, the chef Pierre Gagnaire agreed to make a whole menu in which all dishes were based on one single odorant compound.

Now followed important steps. In 2017, the chef Andrea Camastra, of the restaurant Senses in Warsaw, Poland, transformed his restaurant entirely from molecular cuisine to the NbN domain. He is being followed. For example, on 21 February 2018, the Alsatian chef Julien Binz delivered the first 100% NbN meal in

### TABLE 127.1

<table>
<thead>
<tr>
<th>Salt used</th>
<th>Amount</th>
<th>Calcium concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>calcium chloride, anhydrous</td>
<td>5 g/L (0.5%)</td>
<td>0.045 M</td>
</tr>
<tr>
<td>calcium chloride, dihydrate</td>
<td>5 g/L (0.5%)</td>
<td>0.034 M</td>
</tr>
<tr>
<td>calcium gluconate</td>
<td>5 g/L (0.5%)</td>
<td>0.012 M</td>
</tr>
<tr>
<td>calcium lactate</td>
<td>5 g/L (0.5%)</td>
<td>0.022 M</td>
</tr>
<tr>
<td>calcium chloride</td>
<td>25 g/L (2.5%)</td>
<td>0.114 M</td>
</tr>
<tr>
<td>calcium lactate</td>
<td>25 g/L (2.5%)</td>
<td>0.114 M</td>
</tr>
<tr>
<td>calcium chloride</td>
<td>50 g/L (5.0%)</td>
<td>0.229 M</td>
</tr>
<tr>
<td>calcium lactate</td>
<td>50 g/L (5.0%)</td>
<td>0.229 M</td>
</tr>
<tr>
<td>calcium chloride</td>
<td>9.8 g/L (0.98%)</td>
<td>0.045 M (same as 0.5% calcium chloride)</td>
</tr>
<tr>
<td>calcium lactate</td>
<td>9.8 g/L (0.98%)</td>
<td>0.045 M (same as 0.5% calcium chloride)</td>
</tr>
</tbody>
</table>

Source: Lersch, 2014.
his restaurant in Ammerschwir (France). On 16 March 2018, a big NbN event was organized in Athens, Greece, by the Ecole Le Monde, with NbN cocktails, an NbN dinner and a huge training lecture; the chefs who worked on this were Yannis Vlachos (cocktail), Makis Kalosakas, Nicolas Nikolakopoulos and Michel Ntenoutas (see chapter “New Greek Cuisine”). And in July 2018, chefs of the At-Sunrice GlobalChef Academy in Singapore prepared a dinner and began organizing classes on NbN cooking (see chapter “A Note by Note Traditional Chinese Dinner Created and Served in Singapore”).

What will be the next steps? Of course, there is no certainty, but the fact that NbN cooking was measured (by Julien Binz) as being twice as fast and half as expensive to produce (compared with ordinary restaurant meals) makes it a good argument in favour of the development of this new art for fine dining, whereas the increasing world population will more and more call for new developments in this direction by the food industry and by domestic cooks. Projects for “sustainable food without waste” should become more and more important in the future.

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