

OPINION

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# Q&A: The Nordic food lab

Lars Williams<sup>1,2</sup>

## Abstract

Lars Williams, Head of Research at the Nordic Food Lab in Copenhagen, answers *Flavour's* questions on how he uses scientific techniques to create new foods and flavours.

## Opinion

The Nordic Food Lab was founded by Rene Redzepi and Claus Meyer, the same team that introduced the world to the restaurant Noma and the New Nordic Cuisine. Noma is now the world's number 1 restaurant, according to the San Pellegrino rankings. The now-famous restaurant sits in a quiet corner of the Copenhagen docks. A few steps away is the lab itself, moored on a converted houseboat. The lab has many familiar features for a scientist: water baths, centrifuges, conical flasks. But it is also clearly a kitchen, with steel surfaces, ovens and chopping boards. A large white board covers one wall, with scribbled phrases such as 'find use for cryo bottle', or 'check for aflatoxins' and even 'buy a rocket'. Noma championed the use of local ingredients, which meant that French foie gras, Spanish ham and Italian olive oil were not on the menu, and were replaced by wild berries, Limefiord oysters and seaweed. The lab seeks to develop new foods, flavours and recipes based on the New Nordic Cuisine and is headed by Lars Williams, an American chef who trained in some of the world's top kitchens.

In a Q & A with *Flavour*, Lars talks about his background, his approach to science and cooking and some of the new food products his team is creating.

## You conduct research but don't have any formal scientific training. Where did you develop your approach to cooking?

I have a chef's background but have had the luck to work in kitchens that are very curious and have a scientific approach to cooking. This is both at wd~50 (Wylie Dufresne's Michelin starred restaurant in New York) and The Fat Duck (Heston Blumenthal's triple Michelin starred restaurant in England). Chefs often have a child-like curiosity, and may succeed with things because we

know we can't really do them. Just recently we were making a wide range of flavoured vinegars which I discussed with a food scientist at Copenhagen University. He said you can't make celery vinegar, there is a component in there that will impede the fermentation bacteria. The next day I had to bring him a sample of the celery vinegar that I had made at the Nordic Food Lab.

We allow a certain amount of impetuosity and a cavalier attitude to our research and are not ashamed to try things quickly. We document our experiments with as much scientific rigour as we can. If we are reducing a stock we may want to capture the smell coming into the air and make some equipment to catch the aromas, which again works fantastically. In that sense, having a cook's background brings inventiveness and curiosity.

If we decide to start a vinegar project we can quickly make 20 vinegars and use our own judgement in sifting through the initial phases. We can then move the work in a successful direction without testing every vinegar to a level of detail sufficient for publication. To some extent it allows us to progress at a faster rate.

## Why are chefs now interested in science?

Chefs are more and more curious about what is actually happening in terms of physical and chemical senses when they are cooking. It becomes more and more important to have an understanding of the fundamental basics to have a better knowledge of how to do something perfectly or repeatedly, or to generate a novel approach.

## Can you give a recent example where some scientific knowledge has helped your cooking?

Understanding the physical nature of what's going on is critical to doing it well. It is exciting for chefs to have a new frontier and feel that they are exploring. Eggs are the classic example of how we can use our understanding of what is physically happening when we cook an egg to make

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it perfect, for example, using a certain temperature for a certain amount of time. Initially a lot of cooks thought it was just temperature, but now we know you can plot a graph with time and temperature against each other, depending on how you want the finished product. A student of mine wanted a specifically cooked egg, with a soft white, but firm, with a completely liquid yolk. He was attempting to cook it *sous vide* (under vacuum, in a water bath). For his purposes it was much better to simply use hot water, but at a specific temperature and for a specific time period. We know that at 90°C for 5 min and 10 s the temperature will penetrate through the egg white but not yet reach the yolk. He was trying a much lower temperature which gave a creamy egg yolk. Having a firmer grasp of the physical nature of the egg allowed me to suggest a different experiment. It was more back to basics technically but allowed us to use the right tool. This sometimes gets misconstrued, that we are doing laboratory work in the kitchen. It is more that science allows us access to new tools, or new layers in our vocabulary.

### **Is there a particular scientific research project that you are working on at the moment?**

Something we are quite curious about and has some implications for cooking is our work on de-bittering. This first began when we were working on autolysed yeast or yeast extract similar to Marmite (popular yeast extract manufactured in the UK, but not sold in Denmark). The first yeast we used was quite hoppy and thus bitter. I had read that in order to de-bitter a product, one could use a caustic lye to raise the pH, followed by lowering the pH with other chemicals. This seemed to de-bitter the product.

For me it seems like a very odd thing to do, to take these very harsh chemicals and run food through it. After some more reading, we started looking at nixtamalization, an ancient North American Indian technique of cooking corn with ash [1]. The ash raises the pH and breaks down the corn, which was probably developed to extract the full nutritional benefit. I used ash to de-bitter the yeast extract and it worked very well. Subsequent use of flavoured ash from hay or juniper wood added another layer of complexity to the taste. At this stage, I am trying to investigate and understand the process and also see if we can use the ash to de-bitter more ordinary things. For example, juice from endives is quite bitter, but we have successfully de-bittered that with the same ash solution. We try and utilise as many resources as possible, like taking an old technique that I read in a sociology journal (cooking with ash and corn) and using it to further our goals.

### **Do you have access to the scientific literature and read articles in journals?**

I always try and read around a topic as much as possible, because I often learn more if I teach myself rather than

have the problem solved for me. We try and do preliminary research with existing journals, those that we can access. Also if I am going to ask an esteemed scientist I would like to come with as much information as I can.

### **Are there any particular developments in science which are influencing your research or your cooking?**

There's a lot of us interested in fermentation and therefore the microbiological research associated with that. We are also very interested in sensory science, how sounds and colours and different perceptions affect a meal (see the review by Spence et al. [2], published this month in *Flavour*), for example, research showing that hearing an especially crinkly paper makes something taste more crisp. A lot of chefs are starting to take this into consideration. It's another exciting thing – what other fields can we take inspiration from to make an excellent meal? At The Fat Duck we did an experiment with headphones so you could hear the sound of chips crunching while you were eating, which affected how crispy the food tasted. There is such a lot we can glean from scientific research. We are always looking for new implements for our tool box or new techniques to build up our culinary vocabulary so we can make the experience better for everyone.

#### **Competing interests**

LW is an employee of the Nordic Food Lab, a non-profit self-governed institution established with the purpose of exploring Nordic Cuisine and disseminating results from this exploration. The Nordic Food Lab is an independent institution fuelled by finances from external funds, private companies and government sources.

#### **Author's information**

Lars Williams trained as a chef at several of the world's top restaurants including wd~50 in New York, The Fat Duck in England, and Noma in Copenhagen. He is currently Head of Research and Development at the Nordic Food Lab, a non-profit self-governed institution established by the head chef of Noma, Rene Redzepi, and gastronomic entrepreneur, Claus Meyer, with the purpose of exploring Nordic Cuisine, cornerstones of gastronomy and disseminating results from this exploration. His research interests are broad and include fermentation and the development of new umami flavours from seaweed [3].

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