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Once chief technology officer to Bill Gates, Nathan Myhrvold has assumed a similar role in the culinary world.

The golden loaves of bread cooling on the rack, the seven gleaming ovens and the 23-kilogram sacks of flour would look at home in a commercial bakery. But the chefs bent over tubs of dough also have a washing-machine-sized centrifuge, a freeze-dryer and a fully outfitted photo studio at their disposal.

And instead of bread for sale, the team of chefs and scientists at work in this cavernous kitchen in the suburbs east of Seattle are producing a 2000-page, vividly photographed book full of molecular research and recipes that will challenge traditional assumptions about how to produce the perfect loaf. The five-volume *Modernist Bread: The Art and Science*, coming to sturdy bookshelves in March 2017, is the latest tome from The Cooking Lab, the research kitchen and publishing house founded by Nathan Myhrvold.

A former chief technology officer with Microsoft, Myhrvold left Bill Gates's side in 1999 with hundreds of millions of dollars worth of Microsoft stock. He officially moved on to create a company that invests in intellectual property – but also made time to pursue his lifelong passions of food and photography. Out of his culinary explorations

grew an insatiable hunger to deeply understand and explain the “why” behind good food: why, for example, does one technique produce a fluffier loaf of bread?

Myhrvold, 56, is a scientist, and his Cooking Lab follows a rigorous testing protocol: the experiments behind *Modernist Bread* stand at 1500 and counting. With his curly red hair and rollicking laugh, the man who started his career researching cosmology with Stephen Hawking comes across as a boy excited to share his latest discoveries. “The more we’ve tested things that everybody knows, the more we’ve found the results are uneven,” he says. “Sometimes the traditional explanation or traditional technique works. A lot of times it doesn’t.”

Myhrvold’s Cooking Lab has built a thriving publishing business out of busting culinary myths. It spent its first six years researching a wide range of techniques before laying out its conclusions in 2011 in the six-volume *Modernist Cuisine: The Art and Science of Cooking*. The James Beard Award-winning publication explained advanced gastronomy methods such as sous vide, cementing in the process Myhrvold’s position as chief technology officer of the culinary

world. Since then a roll call of more than 100 international chefs – among them Ferran Adrià, Dominique Crenn, Thomas Keller and Jacques Pépin – have savoured Myhrvold’s highly technical and whimsical food at exclusive dinners in The Cooking Lab, where he eagerly shares the results of his research with the pantheon of high-end cuisine.

As his team wraps up *Modernist Bread*, on the heels of two single-volume books – all intended for professional chefs and passionate amateurs – Myhrvold’s counsel is also sought directly by chefs, such as New York’s Amanda Cohen and Philadelphia’s Marc Vetri, eager to better understand the science within their own kitchens. By fostering a culture that challenges some of the food world’s most sacred assumptions, Myhrvold sees an endless opportunity to encourage innovation – and ever better food – from high-end chefs and home cooks alike.

“Knowing why is really important if you want to do something new,” Myhrvold says. “Our book’s got 1800 recipes but the value of the book isn’t just following the recipes. It’s that we try to tell you enough that you can go and make your own.”



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Myhrvold's culinary curiosity started as a nine-year-old in Los Angeles, when he discovered cookbooks at the library and announced to his mother that he wanted to cook the Thanksgiving holiday dinner. He nearly set the table on fire with a flambéd sweet potatoes recipe from *The Pyromaniac's Cookbook*. "It was actually really good," he insists. He howls with laughter recalling a subsequent dinner that included a "surprise course" involving a firecracker timed to go off under the table as he lifted the cloche off the platter.

Despite such dramatics, his cooking explorations at home were allowed to continue while his formal science education sped along. That education involved studying mathematics at university in his mid-teens. By the time he was in his early 20s Myhrvold was pursuing advanced theoretical physics and mathematical economics degrees at Princeton University. But still: "I did all kinds of cooking. It was sort of my thing."

He was not yet however actively connecting his passions for science and food. "In that era, it was before Harold McGee's book [the acclaimed *On Food and Cooking: The Science and Lore of the Kitchen*, published in 1984] and so although I was aware that there was science in cooking, there wasn't any good source to get into it."

Myhrvold's career launched with postdoctoral work researching cosmology and quantum theories in gravitation with Hawking at Cambridge, then rocketed to the high-tech stratosphere when he founded a software company that was purchased by Microsoft in the 1980s. It wasn't until the mid-1990s, when he was a senior vice-president, that he determined to formally pursue a culinary education. "I had all these degrees in tons of other subjects and cooking was at least as important."

At that time, he asked Microsoft founder and chief executive Bill Gates for leave to attend Ecole de Cuisine La Varenne in Paris, only to discover the school wouldn't accept him unless he had apprenticed in a professional kitchen. An enthusiastic diner at Rover's, then a fine-dining French restaurant in Seattle, Myhrvold approached owner and chef Thierry Rautureau to inquire if he could work as a stagiaire in his kitchen.

Rautureau remembers his staff were sceptical, but that Myhrvold was willing to work all stations: "Nathan is humble." He assigned Myhrvold to meat, fish and vegetables prep. "When he came into the kitchen, the son of a gun would always remember everything," he says. Rautureau marvels that he only had to show him how to butcher a chicken once. Myhrvold recalls the dual life he was leading. "At the time I used to say that I had only worked for two men and only one of them carried a knife," he laughs. "Bill Gates didn't need to!"

He learnt as much about technique from working at Rover's as he did earning his culinary diploma at La Varenne in 1995. "The first thing I learned is there are tons of things in a kitchen that are passed down through the oral tradition that you just don't find in cookbooks."

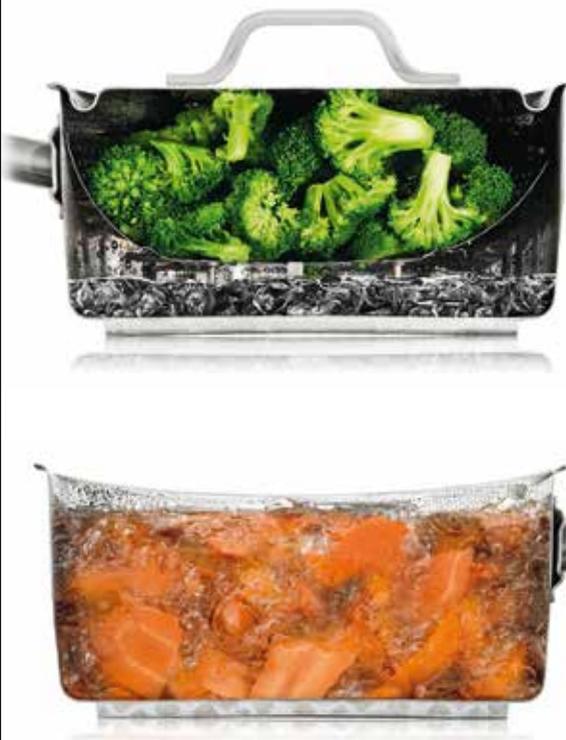
Myhrvold returned to Microsoft after culinary school and rose to chief technology officer. He left in 1999 to form Intellectual Ventures, which acquires patents and licenses the rights to the intellectual property. His goal was to create a marketplace for innovation – but the change also gave him more time to explore his love of food. "After I left Microsoft, I was cooking more. I had built this big house with a big kitchen that I hadn't spent enough time in. I bought some sous vide equipment because I was aware that this was sort of a new frontier. I naively thought that there would be some big book that I could buy that would tell me all about it."

There wasn't. As he researched the technique, Myhrvold started talking about writing a book on sous vide. Rautureau could see the appeal. "I have a science side to me. I'm a very 'Curious George', as all chefs are," Rautureau says, sipping wine under his signature fedora at downtown Seattle's Loulay, one of his two restaurants. There were plenty of books that would tell a cook what to do, Rautureau notes: "There was a lack of explanation of why."

Myhrvold explored the interconnected science behind



On decanting wine, he thought, "why don't we just put it in a blender?"



Above: To see the science occurring in the cooking process, Myhrvold cut food, saucepans and even ovens, in half.

techniques and ingredients, and realised early on that he would need to hire a team of scientists, editors and chefs – including eventual co-authors Chris Young and Maxime Bilet – to produce the book he envisioned. He also knew that it wouldn't be about just sous vide. It would be much more comprehensive. "I wrote an outline in late 2005 and that's basically the book we shipped," he says. "The part that was wrong is I thought this would be a huge book. I thought it would be, like, 600 pages. Now I can't clear my throat without 600 pages. It's ridiculous." *Modernist Cuisine* came off the presses in 2011 at 2438 pages.

The first print run of 6000 sold out before it arrived in the US from the printer, snapped up by professional chefs and foodies willing to shell out the \$US625 asking price. There are now more than 237,000 copies in print in four languages, with a Chinese translation under way. It became available in Australian bookshops in 2015. Follow-up, single-volume titles include *Modernist Cuisine at Home*, which focused on

high-tech methods suitable for a home kitchen, and *The Photography of Modernist Cuisine*, explaining the techniques behind the lavish photography in all of Myhrvold's books.

The style of the photography grew out of Myhrvold's search for evocative ways to illustrate his team's technical discoveries. He wanted readers to see the science occurring in the cooking process, literally, so he cut the exhibits in half – food, pans, even ovens were split down the centre – to show what was happening inside. To pull this off, a variety of techniques were used, including holding food in place with toothpicks and sealing half of a saucepan with clear, heat-tolerant glass to hold boiling liquids inside. The first photo shoot was done in Myhrvold's garage.

"We tried the cutaways and those two pictures are in the book – of the carrots and the broccoli," he says. "It's really cool. You've never been inside your pot while the lid's on."

When New York City chef Amanda Cohen, of the award-winning vegetarian restaurant Dirt Candy, received her 20-kilogram copy of *Modernist Cuisine*, she was so excited she posted photos of herself opening it on her blog. "These are books that every chef wants to write, but just can't."

Inspired, she and her staff essentially turned their restaurant kitchen into a lab during a six-month break between closing her original 18-seat location and reopening in a 50-seat Lower East Side space. "I'm part of a generation of chefs coming up who really like to question everything," she says. "*Modernist Cuisine* is like the cornerstone of this new world." A lot of their experiments never made it to the new menu, but Cohen says, "From failure, we learn."

During that break, Cohen also became one of the fortunate few invited to a dinner in The Cooking Lab. The dinners, offered two to three times a year, started soon after the launch of the first *Modernist Cuisine* book, when Myhrvold decided to host small groups of chefs for elaborate tasting menus, serving 30, even 50 courses. It was partly in response to critics who wondered, as he puts it: "Can these guys cook? Is this just a weird science project?"

"Fundamentally, cooking is a thing that you share with other people," he says, adding that his team has gained skills – and a bit of street cred in the food world – by hosting their multi-course dinners. "Part of the reason why you do music or writing or food is to share it with other people. Those dinners have been an important part of that experience."

After one dinner, Charlie Trotter was so impressed with Myhrvold's team that when he closed his Chicago restaurant in 2012, he invited them to cook six courses of a 12-course tribute dinner, which also highlighted Sydney's Tetsuya Wakuda, Charleston's Sean Brock and Trotter's team. Myhrvold leans forward: "To me, that was an awesome thing, that this guy who had been one of the leaders of New American cuisine, as his restaurant is closing, he had us go and cook."

Cohen's invitation in 2014 was to The Goddess Dinner – The Cooking Lab's answer to a *Time* magazine feature "*The Gods of Food*", which had highlighted only male chefs. The lab often chooses to celebrate a specific chef's work at its dinners; in this case, Myhrvold invited 25 women chefs and food writers to the 35-course feast, which took a high-tech spin on tastes from steak frites to a porcini broth "cappuccino".

Cohen calls the meal "mind-blowing". As the chef who created "broccoli dogs" – smoked and grilled broccoli served on buns with broccoli kraut and a mustard sauce – she found an affinity with Myhrvold's playful style and came away with an appreciation of his generosity. "The Lab is so willing to share everything. Most chefs don't share." Since then, she has emailed him several times to brainstorm various techniques.

Also in 2014, Myhrvold fielded a highly technical question from Marc Vetri when the Philadelphia chef was on a deep dive into the world of wheat. The owner of several restaurants, including his James Beard Award-winning namesake, Vetri was researching his *Mastering Pasta* book when he became



Above: The Cooking Lab near Seattle is an industrial kitchen with its own freeze dryer, centrifuge and photo studio, where Nathan Myhrvold can dramatically capture the work of his research team for his various culinary books.



obsessed with figuring out why the texture of artisan dried pasta differed so dramatically from supermarket brands.

Vetri had a theory that he sent to Myhrvold in a lengthy email. He still sounds stunned at the response. “All of a sudden, I’m having weekly phone meetings with his lab.” He received regular updates from food scientist Larissa Zhou for months, and some of the microscopy images appear in Vetri’s book. Vetri offered to pay The Cooking Lab for part of its time, but says Myhrvold donated the research. “It was hours and hours of phone calls and work.”

Myhrvold acknowledges that he can’t devote those kinds of resources to every chef’s question, but his interest was piqued by Vetri’s. “He had some ideas, and they were very plausible. We tested them. It turned out they were wrong. We had some ideas and those were wrong. Ultimately, it came down to having a very long, slow drying process and that long, slow drying process created a different texture in the final pasta.”

Within Myhrvold’s business interests, this mission of sharing knowledge sets The Cooking Lab apart. As CEO of Intellectual Ventures, he oversees a network of more than 10,000 inventors worldwide, including 400 inventors and two institutions in Australia. He keeps a laser focus on developing, purchasing and monetising intellectual property – a controversial venture to some in the tech world who label him a “patent troll”.

But with the *Modernist Cuisine* books, he says, “We decided that our schtick, our thing, is to share knowledge – both to figure stuff out, either by talking to others or figuring it out by ourselves, and then sharing it.”

The funny thing is, the schtick has paid off. The Cooking Lab, which is a separate business from Intellectual Ventures, has reportedly earned about \$US30 million from its books up to the end of 2013. The Cooking Lab doesn’t discuss sales figures, but says the publishing division that grew out of Myhrvold’s passion for food remains its primary business focus. The Lab has also spawned other businesses, such as ChefSteps in Seattle, which was founded by Chris Young and other alumni to offer online cooking classes and recipes, and is developing its own sous vide tool with a companion app.

Myhrvold’s corner office in Bellevue, Washington, looks west towards the silver skyline of Seattle. But he’s facing south, shaking his head at an ugly nearby garage, and comparing architecture to the culinary arts. “That parking structure is not

a piece of art,” he says. “But there are buildings that are pieces of art. There are buildings that are functional sculpture. In the same sense, cooking runs the full gamut, from cooking as fuel, as minimum daily nutrition for our bodies, to food that can be art.” His scientifically tested methods are intended to be artists’ tools: “A chef can use these techniques to create what I would view as art.”

Sometimes innovation in the culinary arts is about preserving the high quality of the end result while saving time or a step in the process. Consider traditional conventions on how to best decant a bottle of wine. Myhrvold points out that the logic behind hours-long decanting is to take gases out of the wine and bring oxygen in. “I thought, why don’t we just put it in a blender?” he says. “So, we do! We call that hyper-decanting.”

His instructions, if you want to try it at home: pour half a bottle into your blender. Keep your hand on the lid so it stays tightly closed as you hit the fastest speed for about 30 seconds. Let it set for a moment while the head dissipates. Pour.

“You give everyone two glasses: one that was hyper-decanted and one straight from the bottle and see if they can tell the difference.” He assures that you can. “I love great wine, but the almost religious level of overtones that it can get can be oppressive,” he says. “When you do that to a bottle of great wine, it shocks the hell out of people.”

For our future home kitchens, Myhrvold envisions more “robotics” along the lines of the bread machines that have been around for the past few decades. He’s found them good for a particular type of bread. To a joke that what the world needs is a bacon-making robot to accompany the bread machine, he counters: “OK, you laugh! But I suspect that we will have bacon-making robots.”

Digital technology is perfect for creating a consistent, repeatable result. “So, why should we put up with overcooked food anymore?” Myhrvold wonders. He sees new kinds of appliances and better methods for packaging food coming. “The reason so many people, myself included, eat things that are packaged is for convenience,” he says, acknowledging that the quality of packaged foods is lacking. “Fix that with technology and I think you’ve really got something.

“Some people will say ‘We should all go back to a simpler way of life.’ And hey, for people who can manage to do that, my hat’s off to you. I write 2500-page cookbooks, so a simpler way of life isn’t the thing.”

The Cooking Lab may be the only professional kitchen

with a quarter-scale model of a dinosaur tail on the landing outside. Myhrvold, who has funded palaeontology digs and has a full T-rex skeleton in his living room, built the apatosaurus model to prove that the prehistoric giants could snap their tails at supersonic speed.

This is also likely the only kitchen sharing a building with a lab researching renewable nuclear energy – part of TerraPower, an energy technology company with Gates and Myhrvold at its helm – and another experimenting with vaccine storage for the Global Good, a collaborative effort between Gates and Intellectual Ventures that focuses on humanitarian inventions.

These diverse scientific and business interests find unexpected synergy in Myhrvold’s world. One experiment for the Global Good involved making a vaccine shelf-stable by turning it into a hard candy. “We actually know how to make candy pretty well.” When The Cooking Lab needs to cut a pot in half, the tools are in the machine shop nearby.

Inside The Cooking Lab, meanwhile, all thoughts are on bread. Head chef Francisco Migoya has his team retesting each other’s recipes as the print deadline approaches. An army of 11 home bakers and nine professional chefs outside the lab are testing as well. The goal is to learn and share everything they can about the science of baking and bread.

For Myhrvold, bread – and the mythology around it – was just waiting for his team to poke holes in it. He scoffs at those beautiful “peasant loaves” at your neighbourhood artisan bakery. “They have nothing to do with any peasant tradition. They are brand new creative inventions.”

His team has built a digitiser to create 3-D models of hundreds of loaves, studying the structure inside and out. He loves the realisation that bread can be described as a foam. “A light, fluffy bread will be about half the density of whipped cream, which still shocks me.”

While reluctant to give away revelations to come in the book, Myhrvold cheerfully declares: “Kneading is a fraud.” And there’s fair warning that the book’s recipes – like everything The Cooking Lab produces – will be big. As for why he’s focusing on one of life’s most simple pleasures: “Bread is a human-created technology and it required enormous skill and effort for early bakers to figure out the technology of it. If you think it’s trivial, go make some without a recipe and see how well it turns out for you.” ●