

## How the Sense of Taste Has Shaped Who We Are

Journalist John McQuaid on the science and history of flavor  
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Pulitzer prize-winning journalist John McQuaid

*Credit: Hannah McQuaid*

What is flavor? Beginning with this simple question, the Pulitzer prize-winning journalist John McQuaid weaves a fascinating story with a beginning some half a billion years ago. In his new book, Tasty, McQuaid argues that the sense of taste has played a central role in the evolution of humans. McQuaid's tale is about science, but also about culture, history and, one senses, our future. He answered questions from Mind Matters editor Gareth Cook.

### **What made you decide to write a book about taste?**

I have two kids, a boy and a girl born two years apart – now teens – and a few years ago, I became fascinated with how their tastes and preferences in food differed. My son liked extremes, especially super-hot chili peppers and whole lemons and limes. My daughter hated that stuff. She preferred bland comfort foods such as mashed potatoes, pasta, cheese and rice. Both kids were also picky eaters. They liked what they liked, and it didn't overlap (except for pizza). Speaking as a parent, this was maddening.

So I wondered where these differences came from. Were they genetic? The kids had mostly the same genes. Environment? They lived in the same place. And yet clearly both genes and environment were in play somehow. So I began to look into the question, and a whole world opened up.

And the basic answer to my original question is: kids are, biologically speaking, weird creatures. Pickiness seems to be programmed by evolution: it would have protected small

children from eating strange, possibly poisonous items. Certain preferences, meanwhile, can develop arbitrarily and become very strong, then suddenly fade – every kid goes through phases as the brain matures and the neural networks that shape perception and behavior grow. Each person's sense of flavor is like a snowflake or a fingerprint, in this way, shaped by partly by genes, but largely by experience. And always changing as more meals are eaten.

### **What is known about the earliest origins of the sense of taste?**

The sense of taste – or let's say taste and smell, the two big components of flavor – is impossibly ancient, dating back more than a billion years to the earliest cells, which needed to sense chemicals in the seawater around them – stuff to avoid, or stuff that was beneficial. So over time natural selection crafted receptor proteins. These are coiled molecules in cell walls that respond to specific kinds of chemical signatures (and also to light, vibration and other stimuli).

The really interesting thing is, as more complex life evolves – that is, multicellular life with mouths, brains, and internal organs – taste and smell play a central role. They are linchpins of survival, of winning the game of natural selection. They allow an animal to sense prey is nearby, and to derive some satisfaction from devouring it. The more acute they are, the better. And the more acute they become, the more brainpower is needed to process them. So the emergence of more sophisticated brains and behavior are, in evolutionary history, very often tied to sharpening senses of smell and taste. You can see this in anatomy: our systems for taste and smell are tied into the oldest, most "primitive" parts of the brain.

### **You also draw connections between the sense of taste and the earliest humans. What did you find most interesting about this?**

Flavor plays an underappreciated role in the evolution of *Homo sapiens*, and in the invention of culture. How the human body evolved – the big brain, small gut, upright posture – is a hotly-debated topic. But a big driver is a series of dietary revolutions: from vegetarian to omnivore, from raw to cooked food. These go hand-in-hand with the use of tools, which were all about food: killing it, cutting it up, preparing it. And as tools improve, so does the food. Cutting and pounding meat or tubers tenderizes them. Cooking fires make everything more palatable and easier to digest. A positive feedback loop emerges between tastier food, better food, better tools, and changing bodies and brains.

Cooked game, for example, tastes vastly better than raw game. It's also a bigger challenge to obtain and to prepare than, say, jungle fruits. The hunt requires the ability to run, the right weapons, a complex strategy, cooperation. Meal prep requires the ability to render the meat, make a fire, roast and serve communally. As with earlier life forms, flavor is the crux of big evolutionary changes.

You also see one legacy of these changes in the shape of the human head. The retronasal passage running from the mouth up to the nasal cavity – where the aromatic component of flavor arises as food is chewed – shortened as human jaws shrank and faces flattened.

The shorter distance supercharged flavors. So, although we have a weaker sense of smell than many other mammals, for us, smell plays a much more powerful role in flavor. Our big brains, meanwhile, allow flavor to tap into a range of memories, thoughts, emotions and associations. This is what allows us to appreciate the fine flavors of braised meats, wines or cheeses.

**You mentioned your son's love of "extreme" tastes. What are some of the most extreme tastes you discovered in your reporting?**

I took my son Matthew to visit Ed Currie, a South Carolina pepper grower who now holds the Guinness Book of World Records title for hottest chili in the world. It's called Smokin' Ed's Carolina Reaper. There is a lively and competitive subculture in the United States and around the world devoted to breeding ever-hotter chili peppers. Just in the past five years, the record has changed hands several times and the spiciest peppers are now twice as hot as they used to be. It's quite a phenomenon. There's no good biological explanation for why anybody likes chili heat – a form of irritation or pain. It's more a matter of psychology, perhaps a form of thrill-seeking or so-called "benign masochism." How far can it go? Are there physical limits to how much heat we're willing to endure?

We tried very tiny slivers of the Carolina Reaper, and a few other super-hot varieties. The sensation builds for about 15 to 20 seconds, then becomes unbearable on the tongue and elsewhere in the mouth. You feel it through your whole body – the molecule behind the sensation, capsaicin, binds to heat receptors and taps into the body's temperature regulation system. Fortunately, capsaicin has another feature: after a few minutes, it starts shutting down the nerves it has inflamed, and the pain dulls. Which means you can try some more! Our host, meanwhile, was eating entire peppers without breaking a sweat – you can develop a tolerance for the heat.

Another time, my family and I went to Iceland, where we tried hákarl, which is the fermented meat of the Greenland shark. It's a national dish, yet considered one of the most disgusting foods in the world. Vikings originally buried shark meat for months in the sand; today it's placed in wooden crates with weights on top, to squeeze out toxic chemicals that exist naturally in the flesh. After a few months of this and some curing, it smells like a combination of rotting fish and ammonia. We put small chunks in our mouths, and the ammonia pretty much overwhelmed everything. My daughter spit it out.

Many cultures have this type of food: beloved at home and reviled everywhere else. This shows how powerful conditioning is: the human brain can learn to like almost anything under the right circumstances. This is a legacy of our ancestors' experience as hunter-gatherers colonizing habitats everywhere on earth. Sometimes, you had to learn to like some new food just to stay alive.

**How can our sense of taste be used against us?**

Flavor is an eminently corruptible sense. It is a very old part of the brain's motivational architecture. This is what the pleasure in a scoop of ice cream, or a sip of single malt scotch, really is: a motivational nudge, a behavioral reward. You can't separate pleasure from flavor, and yet they're not exactly the same thing – pleasure in food waxes and

wanes depending on the circumstances. A lot of today's foods – particularly junk food and the menus of chain restaurants – are about bombarding the brain's pleasure circuits with sensations. Some of this is the unholy trinity of sugar, salt, and fat. Some of it is strong or evocative spices engineered to stand out, because humans also crave variety and contrast in food.

Keep overloading any system, and eventually it gets out of whack. It's similar to addiction. Persistently overindulge, the same amount of some treat doesn't taste quite as good, so you eat more to make up for it. This corruptible aspect of flavor affects diet, eating habits, self-image, your whole life.

### **What is the future of taste?**

I wish I knew! So much is happening, so fast, compared to the last 100 years, or the last 10,000. Two thoughts. One is that we're at a dangerous juncture. Food companies now employ geneticists and neuroscientists. Yet the technology for making new foods and outré flavors far outstrips our understanding of brain or body. So we're running a massive experiment.

But it's also a very exciting time. Take fermentation. For hundreds of thousands of years, alcoholic beverages, cheeses, pickles, sauerkraut, tofu, kimchi and other fermented foods and drinks were made using traditional recipes. But no one understood the biology of how the yeasts, fungi and bacteria involved in fermentation made flavor. The actual molecules that create many fine sensations are almost always very numerous and obscure, the result of microbial metabolisms churning away. But now scientists are developing a better understanding of how those metabolisms work, and the ability to manipulate them. This will open up vast new domains of deliciousness. In many respects, we're just getting started on the taste adventure.