

How does your sense of taste work?

The world is divided into people who love coriander and people who think it's the work of the devil. Marmite, brussels sprouts and blue cheese are similarly divisive – along with a whole host of other foods. Deputy editor Susan Low went on a mission to find out why

Our descriptions of so many things relate to our sense of taste. Kittens and children are sweet (sometimes). Ribald stories are ripe, salty or spicy. An incident leaves a bad taste in the mouth. Relationships turn sour and people can become bitter. Sick jokes are in poor taste, while attractive people are tasty.

All this flavour-packed language isn't so surprising, perhaps, when you think how important taste is to us. It's one way we learn about the world as a baby, putting everything we find in our mouth. It's a primal urge. But how much do we really know about this powerful sense?

TASTE VERSUS FLAVOUR

The five basic tastes are sweet, sour, salty, bitter and umami. (The latter is a deeply savoury flavour identified by the Japanese scientist Kikunae Ikeda in the early 1900s – think parmesan or porcini mushrooms.) All areas of the tongue can taste these five – the idea that different areas of the tongue pick up specific tastes is a myth.

So talking about the basic taste of food is straightforward – it's what can be detected by receptors in the taste buds, located in and around various bumps, or papillae, on the tongue. But things get more complicated when we talk about flavour: the combination of taste and smell. (To see the difference between taste and flavour, try the

experiment on the opposite page.)

Although there are just five basic tastes, there are myriad flavours, from strawberry and banana to clove, chocolate and more. Scientists say 80 per cent of our flavour perception is down to olfaction, or sense of smell. That's why our favourite dishes lose their appeal when we have a cold.

THE ROLE OF SIGHT AND SOUND

It's now known that the other senses – sound, sight and touch – also influence our perception of flavour, as do our expectations of what we're going to eat. This is something chefs have been keen to explore. In the 1990s, Heston Blumenthal, a man not unknown to use science in the kitchen, found diners tasted his crab ice cream differently depending on what he called it. Those told to expect 'savoury mousse' loved it; those told it was 'ice cream' usually hated it.

Later, Heston's work with Professor Charles Spence of the Department of Experimental Psychology at Oxford University resulted in one of The Fat Duck's most talked-about dishes: 'sound of the sea'. For this, the diner is presented with a seascape of shellfish, sea foam and 'sand', served with an iPod hidden in a seashell. You're encouraged to eat the dish while listening to sounds of the seaside. According to Heston and Spence, most people who've tried it say listening to the sounds intensified the flavour of the dish.

Earlier this year, Professor Spence set up an experiment with three rooms, each with colours, smells and sounds chosen to bring out specific flavours of The Singleton whisky, and reported a 10-20 per cent change in people's perception of the drink's flavour in each room.

Other recent research suggests that the size, weight, colour and even shape of the cutlery used to eat a dish affects flavour perception, as do sounds – such as the rustling of a crisp packet and the Pavlovian response it elicits in crisp-lovers. Taste is a multisensory experience that involves more than just a chemical reaction between the food and your taste buds.

ARE WE BORN GOURMANDS?

To an extent, you have your parents to thank (or curse) for how finely tuned your palate is, and whether or not you're sensitive to certain flavour compounds. In the 1990s, experimental psychologist Linda Bartoshuk coined the term 'supertaster' to describe people with a heightened ability to taste. She found they all had a genetic trait – a greater than normal number of papillae on their tongues. As a result, they were wary of bitter flavours, such as coffee, leafy green vegetables and dark chocolate. They are also highly sensitive to two bitter-tasting chemicals called PROP and PTC.

Scientists now group people into three categories for tasting: >>

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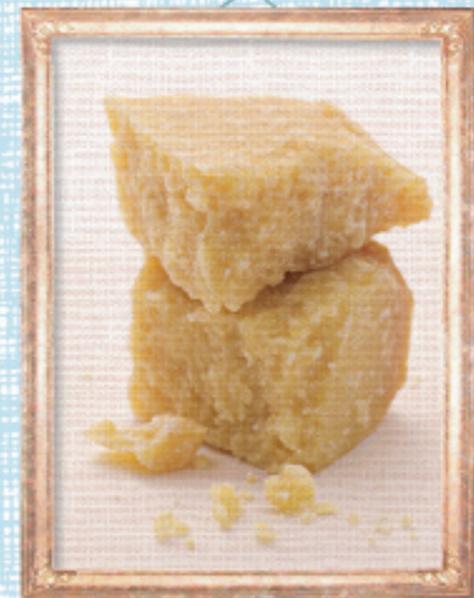
SWEET
by Knickerbocker Glory



SOUR
by Lemonade



SALTY
by Fish and Chips



UMAMI
by Parmesan



BITTER
by Coffee

DO TRY THIS AT HOME! Taste versus flavour: how to tell the difference

The Flavour SenseNation team (see 'get more scientific', p22) have a clever way to show the difference between taste and flavour. Hold your nose firmly closed and put ½ tsp cinnamon sugar on your tongue. Keep your nose tightly closed for 15 seconds. You'll taste something a bit sweet. Let go of your nose – et voilà! You get the full-on flavour combo of cinnamon and sugar.

“If Julia Child saw coriander in a dish, she’d pick it out and throw it on the floor”

supertasters, medium tasters and non-tasters (those with fewer than average taste buds). A quarter of all people are supertasters and another quarter are non-tasters. The rest are plain average. Women are more likely than men (35 per cent versus 15 per cent) to be supertasters, as are people of Asian, African and South American descent.

If the elite-sounding name has you wishing to be among this über-league, think again. Being a supertaster can be a handicap if you work with food or wine. Supertasters tend to abhor bitter flavours, so black coffee, kale, brussels sprouts and tannic wines can have them turning up their noses in disgust.

The role of genetics also comes into play with coriander, a herb that divides the world into love-its or loathe-its. In a study in US magazine *Nature*, scientists identified two genetic variants associated with coriander-abhorrence. While loving or hating coriander can be put down to genetics to some degree, it can also be caused by something as simple as the emotions you felt when forced to eat guacamole when you were a child. Incidentally, America’s First Lady of haute cuisine, Julia Child, hated rocket and coriander. In an interview with Larry King in 2002, Julia said that if she saw coriander in a dish, she would “pick it out and throw it on the floor”.

SOMETHING WE CAN ALL LOVE

So are there likes and dislikes that we’re all born with? According to Professor Barry Smith, Director of the Institute of Philosophy at the University of London’s School of Advanced Study, the answer is yes. “Human infants, rats and monkeys

ARE YOU A SUPERTASTER? TRY THESE TESTS TO FIND OUT

Go online for a quickie...

Want to know if you’re in the super league, merely average or – God forbid – a non-taster? You can try an online quiz, such as the one on the BBC Science website (bbc.co.uk/science/humanbody/body/interactives/supertaster), but the test is too simplistic to be accurate.

...or get more scientific

Find one of those reinforcement rings for hole-punched paper from the stationery cupboard. Next, get hold of some food colouring and paint your tongue blue. Done that? Right, now grab a mirror and a magnifying lens, put the hole reinforcer on your tongue and count the number of pink dots you can see inside the hole. Those pink dots are the papillae, which contain the receptors we call taste buds (the papillae don’t take up the blue dye). As a rough guide, if you can count fewer than 15, you’re a non-taster; more than 30 and you’re a supertaster; in between, and you’re average.

The blue tongue method has its shortcomings because you’re only counting the number of papillae, not the number of taste receptors or their sensitivity. The best way is to get hold of some PTC, the chemical that only supertasters can detect. (Amazon in the US sells PTC-impregnated paper strips, as well as Super Taster Test Kits.)

Once the PTC paper strip touches your tongue, you’ll be in no doubt if you’re a supertaster. I found this out at an event in London run by Flavour SenseNation*, a ‘travelling exhibition exploring the role our senses play’. It’s devised by Lulie Biggs and Kianna Bahrami, who’ve collaborated with sensory scientist Dr Lisa Methven, Professor Charles Spence and molecular physicist Professor Peter Barham. Two of our group of 12 spat the paper out in disgust and called for water to get rid of the horrible taste, while the rest of us looked on bemused. To me it tasted a bit like a watery gin and tonic – nothing special, but not disgusting. It’s great being average.

all respond the same way to sucrose solution: they lick their lips. This is a common pleasurable response to sweetness,” he says. “They’re also all averse to bitterness and have to learn to overcome it. That’s why it takes youngsters a long time to learn to like tea, coffee and beer. The responses to the sweet and bitter tastes are innate, not learned.”

But taste likes and dislikes aren’t just down to the hardware we’re born with. How the information about taste/flavour is interpreted varies from culture to culture, says Smith. A case in point is vanilla. “To people in the West, the smell of vanilla usually evokes sweetness, even though vanilla isn’t itself sweet but bitter,” he says. “To

people from Japan, however, vanilla doesn’t smell sweet but salty. That’s because the Japanese don’t mix vanilla with sweet things like ice cream, custard or cakes, but with salty and fish dishes. How we taste vanilla isn’t nature but nurture – it’s the associations the brain makes once it has been regularly exposed to certain food combinations.”

Nature may determine whether or not we’re supertasters, but nurture shapes most of our food preferences. Emotions and all sorts of things (the names of the dish, sounds and even cutlery) affect our perception of food. So when some people swear they can taste when a dish is made with love, who’s to say they can’t? **d**