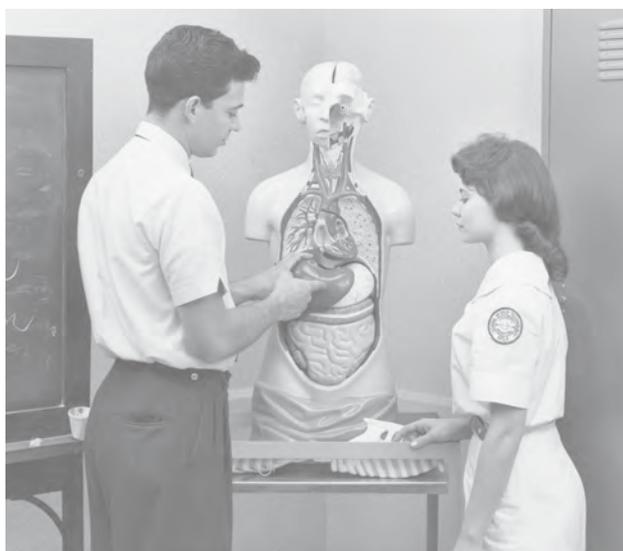


***Gulp***







## *Introduction*



**I**n 1968, on the Berkeley campus of the University of California, six young men undertook an irregular and unprecedented act. Despite the setting and the social climate of the day, it involved no civil disobedience or mind-altering substances. Given that it took place in the nutritional sciences department, I cannot even say with confidence that the participants wore bell-bottomed jeans or sideburns of unusual scope. I know only the basic facts: the six men stepped inside a metabolic chamber and remained for two days, testing meals made from dead bacteria.

This was the fevered dawn of space exploration; NASA had Mars on its mind. A spacecraft packed with all the food necessary for a two-year mission would be impracticably heavy to launch. Thus there was a push to develop menu items that could be 'bioregenerated', that is to say, farmed on elements of the astronauts' waste. The title of the paper nicely sums the results: 'Human Intolerance to Bacteria as Food'. Leaving aside the vomiting and vertigo, the thirteen bowel movements in twelve hours from Subject H, one hopes the aesthetics alone would

have tabled further research. Pale grey *aerobacter*, served as a 'slurry', was reported to be unpleasantly slimy. *H. entrophia* had a 'halogen-like taste'.

Some in the field looked askance at the work. I found this quote in a chapter on fabricated space foods: 'Men and women ...do not ingest nutrients, they consume food. More than that, they... eat meals. Although to the single-minded biochemist or physiologist, this aspect of human behaviour may appear to be irrelevant or even frivolous, it is nevertheless a deeply ingrained part of the human situation.'

The point is well taken. In their zeal for a solution, the California team would appear to have lost a bit of perspective. When you can identify the taste of roadside lighting, it may be time to take a break from experimental nutrition. But I wish to say a word in defence of the 'single-minded biochemist or physiologist'. As a writer, I live for these men and women, the scientists who tackle the questions no one else thinks – or has the courage – to ask: the gastric pioneer William Beaumont, with his tongue through the fistulated hole in his houseboy's stomach; the Swedish physician Algot Key-Åberg, propping cadavers in dining room chairs to study their holding capacity; François Magendie, the first man to identify the chemical constituents of intestinal gas, aided in his investigation by four French prisoners guillotined in the act of digesting their last meal; David Metz, the Philadelphia dyspepsia expert who shot X-ray footage of a competitive eater downing hot dogs two at a time, to see what it might reveal about indigestion; and, of course, our Berkeley nutritionists, spooning bacteria onto dinnerware and stepping back like nervous chefs to see how it goes. The meals were a flop, but the experiment, for better or worse, inspired this book.

When it comes to literature about eating, science has been a little hard to hear amid the clamour of cuisine. Just as we adorn sex with the fancy gold-leaf filigree of love, so we dress the need for sustenance in the finery of cooking and connoisseurship. I adore the writings of M.F.K. Fisher and Calvin Trillin, but I adore no less Michael Levitt ('Studies of a Flatulent Patient'), J. C. Dalton ('Experimental Investigations to Determine Whether the Garden Slug Can Live in the Human Stomach'), and P.B. Johnsen ('A Lexicon of Pond-Raised Catfish Flavor Descriptors'). I'm not saying I don't appreciate a nice meal. I'm saying that the human equipment – and the delightful, unusual people who study it – are at least as interesting as the photogenic arrangements we push through it.

Yes, men and women eat meals. But they also ingest nutrients. They grind and sculpt them into a moistened bolus that is delivered, via a stadium wave of sequential contractions, into a self-kneading sack of hydrochloric acid and then dumped into a tubular leach field, where it is converted into the most powerful taboo in human history. Lunch is an opening act.

**M***Y* INTRODUCTION TO human anatomy was missing a good deal of its own. It took the form of a headless, limbless moulded-plastic torso\* in Mrs Claffin's science classroom. The chest and rib cage were sheared away, as if by some unspeakable industrial accident, leaving a set of removable organs in full and lurid view. The torso stood on a table in the back of the room, enduring

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\* Similar products exist to this day, under names like 'Dual Sex Human Torso with Detachable Head' and 'Deluxe 16-Part Human Torso', adding an illicit serial-killer, sex-crime thrill to educational supply catalogues.

daily evisceration and reassembly at the hands of ten-year-olds. The idea was to introduce our young minds to the geography of their own interior, and at this it failed terribly. The organs fit together like puzzle pieces, tidy as wares in a butcher's glass case.\* The digestive tract came out in parts, oesophagus separate from stomach, stomach from intestines. A better teaching tool would have been the knitted digestive tract that made the rounds of the Internet a few years ago: a single tube from mouth to rectum.

*Tube* isn't quite the right metaphor, as it implies a sameness throughout. The tract is more of an enfilade: a long structure, one room opening onto the next, though each with a distinctive look and purpose. Just as you would never mistake kitchen for bedroom, you would not, from the perspective of a tiny alimentary traveller, mistake mouth for stomach for colon.

I have toured the tube from that tiny traveller's perspective, by way of a pill cam: an undersized digital camera shaped like an oversized multivitamin. A pill cam documents its travels like a teen with a smartphone, grabbing snapshots second by second as it moves along. Inside the stomach, the images are murky green with bits of drifting sediment. It's like footage from a *Titanic* documentary. In a matter of hours, acids, enzymes, and the stomach's muscular churning reduce all but the most resilient bits of food (and pill cams) to a gruel called chyme.

Eventually even a pill cam is sent on down the line. As it breaches the pylorus – the portal from the stomach to the small

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\* In reality, guts are more stew than meat counter, a fact that went underappreciated for centuries. So great was the Victorian taste for order that displaced organs constituted a medical diagnosis. Doctors had been misled not by plastic models, but by cadavers and surgical patients – whose organs ride higher because the body is horizontal. The debut of X-rays, for which patients sit up and guts slosh downwards, spawned a fad for surgery on 'dropped organs' – hundreds of body parts needlessly hitched up and sewn in place.

intestine – the décor changes abruptly. The walls of the small intestine are Silly Putty pink and lush with millimetre-long projections called villi. Villi increase the surface area available for absorbing nutrients. They are the tiny loops on the terry cloth. The inside surface of the colon, by contrast, is shiny-smooth as cling film. It would not make a good bath towel. The colon and rectum – the farthest reaches of the digestive tract – are primarily a waste-management facility: they store it, dry it out.

Function was not hinted at in Mrs Clafin's educational torso man. Interior surfaces were hidden. The small intestine and colon were presented as a single fused ravelment, like a brain that had been thrown against the wall. Yet I owe the guy a debt of thanks. To venture beyond the abdominal wall, even a plastic one, was to pull back the curtain on life itself. I found it both appalling and compelling, all the more so because I knew a parallel world existed within my own pinkish hull. I mark that primary school classroom as the point at which curiosity began to push aside disgust or fear or whatever it is that so reliably deflects mind from body.

The early anatomists had that curiosity in spades. They entered the human form like an unexplored continent. Parts were named like elements of geography: the isthmus of the thyroid, the isles of the pancreas, the straits and inlets of the pelvis. The digestive tract was for centuries known as the alimentary canal. How lovely to picture one's dinner making its way down a tranquil, winding waterway, digestion and excretion no more upsetting or off-putting than a cruise along the Rhine. It's this mood, these sentiments – the excitement of exploration and the surprises and delights of travel to foreign locales – that I hope to inspire with this book.

It may take some doing. The prevailing attitude is one of disgust. There are people, anorexics, so repulsed by the thought of their food inside them that they cannot bring themselves to eat. In Brahmin Hindu tradition, saliva is so potent a ritual pollutant that a drop of one's own spittle on the lips is a kind of defilement. I remember, for my last book, talking to the public-affairs staff who choose what to stream on NASA TV. The cameras are often parked on the comings and goings of Mission Control. If someone spots a staffer eating lunch at his desk, the camera is quickly repositioned. In a restaurant setting, conviviality distracts us from the biological reality of nutrient intake and oral processing. But a man alone with a sandwich appears as what he is: an organism satisfying a need. As with other bodily imperatives, we'd rather not be watched. Feeding, and even more so its unsavoury correlates, are as much taboos as mating and death.

The taboos have worked in my favour. The alimentary recesses hide a lode of unusual stories, mostly unmined. Authors have profiled the brain, the heart, the eyes, the skin, the penis and the female geography, even the hair,\* but never the gut. The pie hole and the feed chute are mine.

Like a bite of something yummy, you will begin at one end and make your way to the other. Though this is not a practical

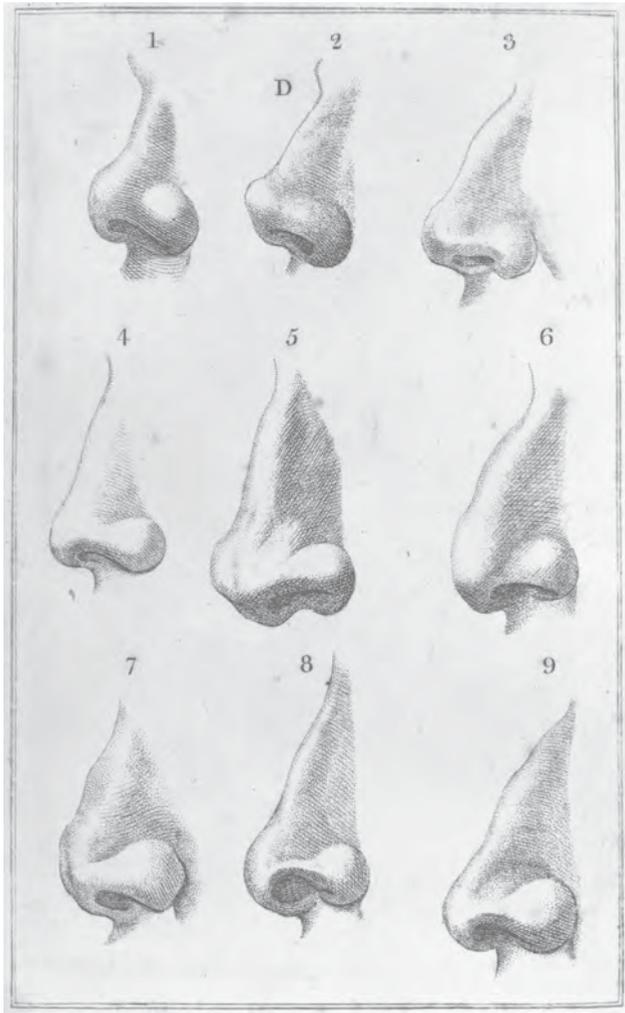
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\* *The Hair*, by Charles Henri Leonard, published in 1879. It was from Leonard that I learned of a framed display of American presidential hair, currently residing in the National Museum of American History and featuring snippets from the first fourteen presidents, including a coarse, yellow-grey, 'somewhat peculiar' lock from president no. 6, John Quincy Adams. Leonard, himself moderately peculiar, calculated that 'a single head of hair of average growth and luxuriousness in any audience of two hundred people will hold supported that entire audience' and, I would add, render an evening at the theatre so much the more memorable.

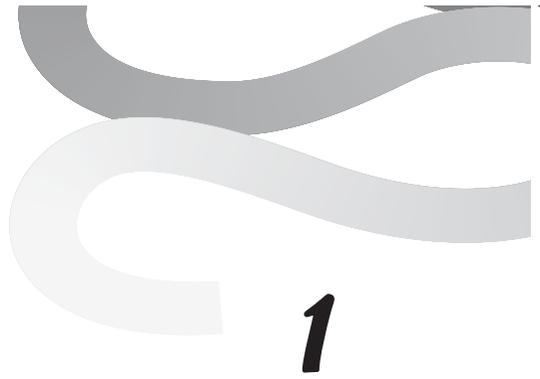
health book, your more pressing alimentary curiosities will be addressed. And some less pressing. Could thorough chewing lower the national debt? If saliva is full of bacteria, why do animals lick their wounds? Why don't suicide bombers smuggle bombs in their rectums? Why don't stomachs digest themselves? Why is crunchy food so appealing? Can constipation kill you? Did it kill Elvis?

You will occasionally not believe me, but my aim is not to disgust. I have tried, in my way, to exercise restraint. I am aware of the website [www.poopreport.com](http://www.poopreport.com), but I did not visit. When I stumbled on the paper 'Fecal Odor of Sick Hedgehogs Mediates Olfactory Attraction of the Tick' in the references of another paper, I resisted the urge to order a copy. I don't want you to say, 'This is gross.' I want you to say, 'I thought this would be gross, but it's really interesting.' Okay, and maybe a little gross.









# Nose Job

TASTING HAS LITTLE TO DO WITH TASTE

**T**HE SENSORY ANALYST rides a Harley. There are surely many things she enjoys about travelling by motorcycle, but the one Sue Langstaff mentions to me is the way the air, the great and odorous out-of-doors, is shoved into her nose. It's a big, lasting passive sniff.\* This is why dogs stick their heads out the car window. It's not for the feeling of the wind in their hair. When you have a nose like a dog has, or Sue Langstaff, you take in the sights by smell. Here is California's Highway 29 between Napa and St. Helena, through Langstaff's nose: cut grass, diesel from the Wine Train locomotive,

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\* A few words on sniffing. Without it (or a Harley), you miss all but the most potent of smells going on around you. Only 5 to 10 percent of air inhaled while breathing normally reaches the olfactory epithelium, at the roof of the nasal cavity.

Olfaction researchers in need of a controlled, consistently sized sniff use an olfactometer to deliver 'odorant pulses'. The technique replaces the rather more vigorous 'blast olfactometry' as well as the original olfactometer, which connected to a glass and aluminium box called the 'camera inodorata'. ('The subject's head was placed in the box', wrote the inventor, alarmingly, in 1921.)

sulphur being sprayed on grapes, garlic from Bottega Ristorante, rotting vegetation from low tide on the Napa River, toasting oak from the Demptos cooperage, hydrogen sulphide from the Calistoga mineral baths, grilling meat and onions from Gott's drive-in, alcohol evaporating off the open fermenters at Whitehall Lane Winery, dirt from a vineyard tiller, smoking meats at Mustards Grill, manure, hay.

Tasting – in the sense of 'wine-tasting' and of what Sue Langstaff does when she evaluates a product – is mostly smelling. The exact verb would be *flavouring*, if that could be a verb in the same way *tasting* and *smelling* are. Flavour is a combination of taste (sensory input from the surface of the tongue) and smell, but mostly it's the latter. Humans perceive five tastes – sweet, bitter, salty, sour, and umami (brothy) – and an almost infinite number of smells. Eighty to ninety percent of the sensory experience of eating is olfaction. Langstaff could throw away her tongue and still do a reasonable facsimile of her job.

Her job. It is a kind of sensory forensics. 'People come to me and say, "My wine stinks. What happened?"' Langstaff can read the stink. Off-flavours – or 'defects', in the professional's parlance – are clues to what went wrong. An olive oil with a flavour of straw or hay suggests a problem with desiccated olives. A beer with a 'hospital' smell is an indication that the brewer may have used chlorinated water, even just to rinse the equipment. The wine flavours 'leather' and 'horse sweat' are tells for the spoilage yeast *Brettanomyces*.

The nose is a fleshly gas chromatograph. As you chew food or hold wine in the warmth of your mouth, aromatic gases are set free. As you exhale, these 'volatiles' waft up through the posterior

nares – the internal nostrils\* at the back of the mouth – and connect with olfactory receptors in the upper reaches of the nasal cavity. (The technical name for this internal smelling is retronasal olfaction. The more familiar sniffing of aromas through the external nostrils is called orthonasal olfaction.) The information is passed on to the brain, which scans for a match. What sets a professional nose apart from an everyday nose is not so much its sensitivity to the many aromas in a food or drink, but the ability to tease them apart and identify them.

Like this: ‘Dried cherries. Molasses’ – treacle. Langstaff is sniffing a strong, dark ale called Noel. We are at Beer Revolution, an amply stocked, mildly skunky† bar in Oakland, California, where I have an office (in the city, not the bar) and Langstaff has a parent in hospital. She could use a drink, and we have four. For demonstration purposes.

In general, Langstaff isn’t a talky person. Her sentences present in low, unhurried tones without italics or exclamation points. The question ‘Which beer do you want, Mary?’ went down at the end. When she puts her nose to a glass, though, something switches on. She sits straighter and her words come out faster, lit by interest and focus. ‘It smells like a campfire to me also. Smoky, like wood, charred wood. Like a cedar chest, like a cigar, tobacco, dark things, smoking jackets.’ She sips from the glass. ‘Now I’m getting the chocolate in the mouth. Caramel, cocoa nibs...’

I sniff the ale. I sip it, push it around my mouth, draw blanks.

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\* An Internet search on the medical term for nostrils produced this: ‘Save on Nasal Nares! Free 2-day Shipping with Amazon Prime’. They really are taking over the world.

† ‘Skunky’ is between ‘rotten egg’ and ‘canned corn’ on the Defects Wheel for Beer. (Langstaff designed diagnostic wheels for off-flavours in wine, beer, and olive oil.) In the absence of skunks, a mild rendition of skunkiness is achieved by oxidating beer, that is, exposing it to air, as by spilling it or leaving out half-filled glasses.

I can tell it's intense and complex, but I don't recognise any of the components of what I'm experiencing. Why can't I do this? Why is it so hard to find words for flavours and smells? For one thing, smell, unlike our other senses, isn't consciously processed. The input goes straight to the emotion and memory centres. Langstaff's first impression of a scent or flavour may be a flash of colour, an image, a sense of warm or cool, rather than a word. Smoking jackets in a glass of Noel, Christmas trees in a hoppy, resinous India pale ale.

It's this too: Humans are better equipped for sight than for smell. We process visual input ten times faster than olfactory. Visual and cognitive cues handily trump olfactory ones, a fact famously demonstrated in a 2001 collaboration between a sensory scientist and a team of oenologists (wine scientists) at the University of Bordeaux in Talence, France. Fifty-four oenology students were asked to use standard wine-flavour descriptors to describe a red wine and a white wine. In a second round of tasting, the same white wine was paired with a 'red', which was actually the same white wine yet again but secretly coloured red. (Tests were run to make sure the red colouring didn't affect the flavour.) In describing the red-coloured white wine, the students dropped the white wine terms they'd used in the first round in favour of red wine descriptors. 'Because of the visual information', the authors wrote, 'the tasters discounted the olfactory information'. They believed they were tasting red wine.

Verbal facility with smells and flavours doesn't come naturally. As babies, we learn to talk by naming what we see. 'Baby points to a lamp, mother says, "Yes, a lamp,"' says Johan Lundström, a biological psychologist with the Monell Chemical

Senses Center in Philadelphia. ‘Baby smells an odour, mother says nothing.’ All our lives, we communicate through visuals. No one, with a possible exception made for Sue Langstaff, would say, ‘Go left at the smell of simmering hot dogs.’

‘In our society, it’s important to know colours’, Langstaff says over a rising happy-hour din. We need to know the difference between a green light and a red light. It’s not so important to know the difference between bitter and sour, skunky and yeasty, tarry and burnt. ‘Who cares. They’re both terrible. *Ew*. But if you’re a brewer, it’s extremely important.’ Brewers and vintners learn by exposure, gradually honing their focus and deepening their awareness. By sniffing and contrasting batches and ingredients, they learn to speak a language of flavour. ‘It’s like listening to an orchestra’, Langstaff says. At first you hear the entire sound, but with time and concentration you learn to break it down, to hear the bassoon, the oboe, the strings.\*

As with music, some people seem born to it. Maybe they have more olfactory receptors or their brain is wired differently, maybe both. Langstaff liked to sniff her parents’ leather goods as a small child. ‘Purses, briefcases, shoes’, she says. ‘I was a weird kid.’ My wallet is on the table, and without thinking, I stick it under her nose. ‘Yeah, nice’, she says, though I

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\* In 2010, inventor George Eapen and snack-food giant Frito-Lay took the comparison beyond the realm of metaphor. They patented a system whereby snack-food bags could be printed with a bar code allowing consumers to retrieve and download a fifteen-second audio of a symphonic interlude, with different instruments representing various flavour components. Eapen, in his patent, used the example of a salsa-flavoured corn crisp. ‘A piano intro begins upon the customer’s perception of the [coriander] flavoring.... The full band section occurs at approximately the time that the consumer perceives the tomatillo and lime flavors.... A second melody section corresponds to the sensation of the heat burn imparted by the Serrano [chilli].’ US Patent No. 7,942,311 includes sheet music for the salsa-flavoured crisp experience.

don't see her sniff. The performing-chimp aspect of the work gets tiresome.

While not discounting genetic differences, Langstaff believes sensory analysis is mainly a matter of practice. Amateurs and novices can learn via kits, such as *Le Nez du Vin*, made up of many tiny bottles of reference molecules: isolated samples of the chemicals that make up the natural flavours.

A quick word about chemicals and flavours. All flavours in nature are chemicals. That's what food is. Organic, vine-ripened, processed and unprocessed, vegetable and animal, all of it chemicals. The characteristic aroma of fresh pineapple? Ethyl 3-(methylthio)propanoate, with a supporting cast of lactones, hydrocarbons, and aldehydes. The delicate essence of just-sliced cucumber? *2E,6Z-Nonadienal*. The telltale perfume of the ripe Bartlett pear? Alkyl (*2E,4Z*)-2,4-decadienoates.

**O**F THE FOUR half-pints on the table between us, Langstaff prefers the lightest, a strawberry wheat beer. I like the IPA best, but to her that's not a 'sitting and sipping' beer. It's something she'd drink with food.

I ask Sue Langstaff – sensory consultant to the brewing industry for twenty-plus years, twice a judge at the Great American Beer Festival – what she'd order right now if she had to choose between an IPA and a Budweiser.

'I'd get Bud.'

'Sue, no.'

'Yes!' First exclamation point of the afternoon. 'People pooh-pooh Bud. It's an extremely well-made beer. It's clean, it's refreshing. If you're mowing the lawn and you come in and you

want something refreshing and thirst-quenching, you wouldn't drink this.' She indicates the IPA.

Of all the descriptors in the Beer Flavour Lexicon I brought with me today, Langstaff would apply just two to Bud: malty and worty. She warns me about equating complexity with quality. 'All that stuff you read on wine bottles, in wine magazines, where they throw out a dozen descriptors? That's not sensory evaluation. That's marketing.'

Taste – as in personal preference, discernment – is subjective. It's ephemeral, shaped by trends and fads. It's one part mouth and nose, two parts ego. Even flavours that professional evaluators agree are 'defects' can come to signify superior taste. Langstaff mentions a small brewery in northern California that has been taking its beers right up to the doorstep of defective, adding strains of bacteria known for their spoilage effects. Whether through exposure or a desire to ride the cutting edge, people can acquire a taste for pretty much anything. If they can come to like the smelly-foot stink of Limburger cheese or the corpse reek of durian fruit, they can come to enjoy bacteria-soured beer. (One assumes there are limits, however. Leaving olive oil in contact with rotting sediment at the bottom of a tank can create flavours enumerated on Langstaff's Defects Wheel for Olive Oil as follows: 'baby diapers, manure, vomit, bad salami, sewer dregs, pig farm waste pond'.)

Because it's hard for people to gauge quality by flavour, they tend to gauge it by price. That's a mistake. Langstaff has evaluated wine professionally for twenty years. In her opinion, the difference between a £250 bottle of wine and one that costs £15 is largely hype. 'Wineries that sell their wines for \$500 a bottle have the same problems as wineries that sell their wine for \$10 a bottle.

You can't make the statement that if it's low-cost it's not well made.' Most of the time, people don't even prefer the expensive bottle – provided they can't see the label. Paul Wagner, a top wine judge and founding contributor to the industry blog *Through the Bung hole*, plays a game with his wine-marketing classes at Napa Valley College. The students, most of whom have several years' experience in the industry, are asked to rank six wines, their labels hidden by – a nice touch here – brown paper bags. All are wines Wagner himself enjoys. At least one is under £6 and two are over £30. 'Over the past eighteen years, every time', he told me, 'the least expensive wine averages the highest ranking, and the most expensive two finish at the bottom'. In 2011, a Gallo cabernet scored the highest average rating, and a Chateau Gruaud Larose (which retails for about £40) took the bottom slot.

Unscrupulous vendors turn the situation to their advantage. In China, nouveau-riche status-seekers are spending small fortunes on counterfeit Bordeaux. A related scenario exists here vis-à-vis olive oil. 'The United States is a dumping ground for bad olive oil', Langstaff told me. It's no secret among European manufacturers that Americans have no palate for olive oils. The Olive Center – a recent addition to the Robert Mondavi Institute for Wine and Food Science, on the campus of the University of California at Davis – aims to change that.

It starts with tastings. I don't know which vineyard first ushered wine-tasting off the palates of vintners and into the mouths of everyday consumers, but it was a stroke of marketing genius. Wine-tastings spawn wine enthusiasts, wine collecting, wine tourism, wine magazines, wine competitions, (wine addictions) – all of it adding up to a massively profitable industry. Olive trees

grow in the same climate and soil conditions as grapes. The olive oil people have been up in Napa Valley all along, going, ‘Hey, how do we get a piece of this action?’

In addition to hosting tastings, the Olive Center has hired Langstaff to train a new UC Davis Olive Oil Taste Panel. Taste panels (or flavour panels, as they are more accurately called) have typically been made up of industry professionals. Langstaff wants to open it up to novices, for the simple reason that know-nothings are easier to train than know-it-alls. The centre has a call for apprentice tasters on its website. The ‘try-outs’ are coming up. At least one know-nothing will be there.

**T**HE OLIVE CENTER is smaller than its name suggests. It consists of a single office and a shared receptionist on the ground floor of the Sensory Building at the Robert Mondavi Institute. Bottles of oil and canned olives line the tops of cabinets and have begun to colonise the wall-to-wall. There’s no room in the centre to hold the try-outs, so they are taking place next door in the Silverado Vineyards Sensory Theater, the building’s lecture hall and classroom tasting facility. (Silverado helped fund it. Additionally, each seat has a sponsor, with the name engraved on a small plaque.)

Langstaff makes her entrance burdened like a pack mule. Three tote bags hang off her shoulders, and she wheels a multi-tiered cart crammed with oils, laptops, water bottles, and stacks of cups. She wears dun-coloured trousers, black sport sandals, and a short-sleeved shirt in the Hawaiian style, though without an island motif. She calls roll: twenty names. Of them, twelve will make the first cut, and six will go on to apprentice.

Langstaff lays out the ground rules for future apprentices: be here, be on time. Be agreeable. ‘We will be evaluating some nasty oils. You will have to put them in your mouth.\* For the good of science. For the good of olive oil. We are here to help the producers, to tell them, What attributes does the oil have, does it have defects, what can they do differently next year – treat the olives better, pick them at a different time, et cetera.’ There will be no pay. No one will reimburse for the seven-dollar parking fee. The existing panellists are known to have some prickle, to borrow an official olive-oil sensory descriptor.

‘You may be thinking, *wow*, I really don’t want to be on this thing.’ The faint of heart are invited to pack up and go. No one moves.

‘All right then.’ Langstaff surveys the room. ‘Shields up.’ She is referring to removable panels used to partition the room’s long tables into private tasting booths. This way, you aren’t influenced by the facial expressions (or test answers) of the people seated next to you. Hired sensory-science students move along the rows, pulling the panels out of slots in the front of the tables and sliding them into place, like helpers on a game-show set.

A plastic tray is set in front of each of us. The trays hold eight small lidded cups: our first test. Each cup holds an aromatic liquid. Swirl, sniff, identify. A few seem easy: almond extract, vinegar,

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\* It could be worse. In 1984, goat-milk flavour panellists were enlisted by a team of Pennsylvania agriculture researchers to sleuth the source of a nasty ‘goaty’ flavour that intermittently fouls goat milk. The main suspect was a noxious odour from the scent glands of amorous male goats. But there was also this: ‘The buck in rut sprays urine over its chin and neck area’. Five pungent compounds isolated from the urine and scent glands of rutting males were added, one at a time, to samples of pure, sweet goat milk. The panellists rated each sample for ‘goaty’, ‘rancid’, and ‘musky-melon’ flavours. Simple answers proved elusive. ‘A thorough investigation of “goaty” flavor’, the researchers concluded, ‘is beyond the scope of this paper’.

olive oil. Apricot required two full minutes of deep thought. Others remain unfamiliar no matter how many times and how deeply I sniff. According to the journal *Chemical Senses*, a 'typical human sniff' has a duration of 1.6 seconds and a volume of about half a litre. I'm sniffing twice as hard. I'm sniffing the way clueless Americans try to make non-English speakers understand them by shouting. One aroma will turn out to be olive brine – the water from a bottle or can of olives. Reflecting the preponderance of olive people trying out today, an impressive thirteen out of twenty get this right.

Next is a 'triangle test': three olive-oil samples, two of them identical. Our task is to identify the odd one out. We are given paper cups of water for rinsing and, for spitting, large red plastic cups of the kind that litter the lawns and porches of American fraternity houses on weekend mornings. The red here today perhaps serving as a warning: Do not drink! Langstaff sits at the front of the room, reading a newspaper.

It's not going well here in the B.R. Cohn Winery seat. All three oils taste the same to me: a hint of freshly mown grass, with a peppery finish. I do not detect apple, avocado, melon, pawpaw, old fruit bowl, almond, green tomato, artichoke, cinnamon, cat urine, hemp, Parmesan cheese, fetid milk, plaster bandages, crushed ants, or any other olive-oil flavour, good or bad, that might set one of these oils apart. With time running out, I don't bother spitting. I'm sipping oil as though it's tea. Langstaff glances at me over her glasses. I wipe my lips and chin with my palm, and a shiny smear comes away.

Our final challenge is a ranking test: five olive oils of differing degrees of bitterness. This proves a challenge for me, as I would not have described any of them as bitter. All around me, people make sounds like ill-mannered soup-eaters, aerating the oils to free the

aromatic gases. I'm doing a *mnyeh-mnyeh-mnyeh* Bugs Bunny manoeuvre with my tongue, but it's not helping. Well before the test period ends, I stop. I do something I've never done in my entire overachieving life. I give up and guess. I do this partly at the behest of my stomach, which is struggling to cope with the unusual delivery of a sizeable amount of straight olive oil.

After everyone else leaves, Langstaff shares some of the group's answers (with names removed). Those who performed well on the oil rankings – incredibly, several got it close to exact – also noted that aroma number 7, on the first test, was not just olive oil, but *rancid* olive oil. Four out of twenty people, all olive professionals, nailed that detail. (The oil smelled fine to me. I was right there with the numb-nose who wrote, on his answer form, 'Oh, for a piece of good bread!')

Here's what I find interesting. The people who work with olives and olive oil, most of whom performed supernaturally well on the ranking and triangle tests, were occasionally stumped by some of the most common and, to me, obvious aromas. A woman who, in the initial sniff test, realised that the olive oil was 'rancid, fusty' failed to recognise almond extract. She wrote, 'Cranberry, fruity, sweet, aloe juice'. She described diacetyl, the smell of artificial (cinema popcorn) butter, as 'liquorice, candy, bubble gum'. Those aren't important flavours in the day-to-day of the olive world, so there's no reason for her to know them. This supports what Langstaff said earlier. As with any language, proficiency builds with exposure and practice. (Though not quickly; the average training period for a sensory panellist is sixty hours.)

In my case, it won't be happening any time soon. An email from Langstaff arrives around nine that night. 'Hi Mary. Hope you enjoyed the try-outs. Unfortunately you did not make the cut.'

**S**ENSORY ANALYSIS IS not limited to the epicurean industries of Napa Valley. For any food or drink manufactured on a reasonably large scale, there are trained panellists and sensory descriptors. Poking around in the sensory-science journals, I have seen flavour lexicons for mutton, strawberry yoghurt, chicken nuggets, ripening anchovies, almonds, beef, chocolate ice cream, pond-raised catfish, aged Cheddar cheese, rice, apples, rye bread, and ‘warmed-over flavour’.

The work entails more than just troubleshooting. Sensory analysts and panels help with product development. They keep the flavours of established products on track when a formula is altered – say, to lower the fat or salt content. They work with the market research staff. When focus groups of consumers prefer one version of, say, a ranch dressing over another (or over a competitor’s dressing), sensory evaluators may be brought in to figure out the salient attributes of the more popular item. The food scientists can then work backwards from those attributes to tweak the formula.

Why use humans rather than lab equipment? Because the latter would yield dozens of chemical differences\* between a pair of products. Without a human evaluator, it’s impossible to assign sensory meaning to them. Which of those dozens of differences in chemical make-up translates to a perceptible flavour shift, and which is below the threshold for human detection? Which ones, in short, make the difference in the consumer’s mouth and mind? ‘And you can’t ask the consumer’, says Langstaff. ‘You ask the consumer, “Why does it taste better?” They say, “Because I like it better.”’ The consumer’s flavour lexicon is tiny: yum and yuck.

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\* Probably more. The *Handbook of Fruit and Vegetable Flavors* includes a four-page table of aroma compounds identified in fresh pineapple: 716 chemicals in all.

Which product the sensory evaluator prefers, by the way, is irrelevant. He or she may not like any of them, or even the general category. (Langstaff, for instance, rarely drinks beer for pleasure.) 'You don't ask your gas chromatograph if it likes the olive oil it's analysing,' Langstaff told us at the try-outs. The goal is to be as neutral, as analytical – as 'Mr Spock' – as possible.

This perhaps explains how it was possible for a team of Canadian researchers to find nine men and women willing to create a canned-cat-food flavour lexicon and a set of tasting protocols. For humans. Tasting cat food. And they couldn't be shy about it. The protocol for evaluating the 'meat chunk' portion ('gravy gel' having its own distinct protocol) stipulated that the sample be 'moved around mouth and chewed for 10 to 15 seconds, [and] a portion of the sample swallowed'.

The idea was to come up with a sort of code, a way to translate the mute preferences of cats. In theory, companies could use human tasters and sensory profiles of the foods cats like in order to predict the success of new formulations. In practice, the technique never really took off.

Because there was a concern that people with a 'strong negative attitude' towards tasting cat food would drop out before the project ended, panel applicants at the initial screening were asked not only to describe the cat foods but also to rate them according to how much they liked them. (The average rating, I am gobsmacked to report, fell between 'like mildly' and 'neither like nor dislike'.) Thanks to this unusual data set, we now know that humans prefer cat food with a tuna or herbal flavour over cat food with the flavour descriptors 'rancid', 'offaly', 'cereal', or 'burnt'.

But humans, as we are about to see, are not cats.