Sample translation

SMELL

THE TALE OF A FADING SENSE

by Bjørn Berge

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Translated from Norwegian by Lucy Moffatt

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Agent: NORTHERN STORIES

Astrid Dalaker: astrid@northernstories.no

To my long-dead grandfather, Einar:

One sunny summer's day a few years ago, I was driving through the mountains on the coast of southwest Norway. Finding myself in need of a pee, I turned off into a suitable birch thicket among the smooth rocks.

The instant I opened the car door, it surged towards me: an unmistakable scent of damp nature. Sweetish, spicy and earthy, with a hint of chalk and rusting iron. And all at once I was transported more than half a century back in time to your cabin by a remote fjord in Western Norway. It was a cloudy day. We were sitting right up close, you with that friendly body of yours, your string vest, shining pate, thick hornrims, great hairy hands. The little off-cuts of wood equipped with paper sails that we sent back and forth across the small pond. Spanish galleons, you insisted in your good-natured growl.

Wild with joy, I jogged into the thicket to find the source of the smell – maybe willow blossoms, bog, fungus, something rotten. But suddenly it was gone, as abruptly as it came. I wouldn't give up, though. I crawled through the blueberry bushes, scraped up handfuls of turf and soil from between the rocks. But all in vain. The smell had evaporated.

Like an addict in the throes of withdrawal, I returned again and again in the days that followed, dawn and dusk, rain and shine. And I combed the area. But it was no good. The smell could not be summoned up again. It was gone for good. And with it, my childhood summer. It felt as if you'd died a second time.

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FOREWORD

Pay attention to people when they shake hands and you'll notice that the very next instant, they will touch their nose quickly, as if to inhale a final vestige of the handshake. And that tiny, uncouth gesture repeats itself – with few exceptions – even during the most high-profile encounters, between heads of state or ministers, for example. After handshakes have been exchanged on the red carpet by the steps of the plane, you can almost count down the seconds – rarely more than fifteen – before the hands rise into the air, as discreetly as possible of course.

The smell of the hand communicates.[1] It carries chemical signals with information about mood, stress and, perhaps, disease; things that are otherwise concealed to avoid showing weakness and undermining negotiating positions. But the transmission of knowledge is unconscious and does not result in strategic assessments or shrewd analyses. Yet it *does* inform our gut feeling. And this is often all it takes to choose between friend and foe, war and peace

Powerful men prefer to present themselves with energetic gazes, gleaming white teeth, elegant ties, wide-shouldered suits and perhaps a Rolex if their country doesn't have much else to offer. Because vision is the sense that rules the world. Or so we think at least.

Soon everything will be image – and nothing but. We live in an age of ocularcentrism, in which the Euro-American human privileges the visual world above all.[2] It is more important for something to look good than for it to work, whether we're talking about a house, a cake, a bomber or a person. For the generation currently growing to adulthood, life is like one long catwalk.[3]

The second place in the hierarchy of senses is occupied by hearing, which still has a certain status, whereas taste, touch and smell are ranked lowest – with smell trailing far behind the rest.[4] A global

[1] Idan Frumin (2015). "A social chemosignaling function for human handshaking." *eLife* No.4 2015.
[2] Jean-François Loytard (1988). *L'Inhumain: Causeries sur le temps.*
[3] Helene Asphaug (2022). "Stivpynta feminister. Du er ikke frigjort når du bruker mer tid på å bli sett enn hørt." NRK Ytring.
[4] Juhani Pallasmaa (2005). *The Eyes of the Skin. Architecture of the Senses*. Unless otherwise stated, the quotations are translated by the author.

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study in 2011 revealed that young people would rather give up their sense of smell than either their computer or their mobile phone.[5]

Our senses and the interplay between them give us direct access to the world and provide a basis for the multitudes of decisions we have to make to exist and survive. Despite the incessant challenge of the media's constant information flow, the only things we can truly rely on when it comes down to it are our immediate sensory experiences. All the rest may well be baloney, bluff and propaganda.

When our senses become imbalanced so that certain of them are suppressed, drowned out or no longer deliver information, we face the risk that the hallucinations will take over. Our brain begins to invent our lives. We are on our way into a fantasy world, according to Finnish architect and philosopher, Juhani Palasmaa.[6]

In an age when artificial intelligence is taking over increasing swathes of our lives, even our sense of vision is sometimes forced to capitulate. Yet the sense of smell is the worst placed of all. It is in the process of vanishing forever. And it doesn't help that it cannot be digitised.

Humanity has long had an ambivalent relationship with the sense of smell. For long periods, it has been hailed as the finest and most informative of all our senses. At other times, it has been hedged about by taboos and exploited in order to stigmatise social out-groups such as women, peasants, workers and immigrants.

Its final decline began in the late 18th century, during the Age of the Enlightenment. Unlike visual impressions, smells proved impossible to organise, categorise and quantify. And it wasn't just that this posed problems for the expanding natural sciences. It was also a question of power, dominance and control[7] – and that has become increasingly the case right up until the present day, not just in authoritarian regimes with a particular interest in purity, hygiene and structures, but also in more democratic societies.

[5] McCann Worldgroup survey referred to in A. S. Barwich (2020). *Smellosophy. What the Nose Tells the Mind.*
[6] Juhani Pallasmaa (2005). *The Eyes of the Skin. Architecture of the Senses*.
[7] David Michael Levin (1993). *Modernity and the Hegemony of Vision.*

Smell is associated with the dark, the ungovernable, the erotic, the asocial and the primitive – the very opposite of modernity and progress. In the past few hundred years, great efforts have therefore been made to water down and combat the many sources of smell so that today, a total absence of smell is perceived as the ideal. The vestiges that are still tolerated are limited to the functions of cooking, perfuming and deodorising – always under control and usually with commercial ends.

This book is my contribution to the battle to liberate our sense of smell in all its beauty and repulsiveness. It opens with an introduction that explains how this sense works as well as the fundamental conditions that enable smell, then continues on a voyage of discovery through the history of smells, from the establishment of the first towns in ancient times, via the plague epidemics of the Middle Ages and the Industrial Revolution to the present day.

The book primarily examines European culture. And this is also where the sense of smell has encountered most opposition. Not only have our homes and cities ended up as olfactory deserts, we are also in the process of evolving a kind of sensory illiteracy in this regard. That could prove fateful in a world where established routines and social structures are teetering, and the value of our ability to improvise and unmask disinformation may soon prove more important than ever before.

We must nurture our sense of smell to prevent it from withering away, and it can only be developed through experience.[8] On the plus side, the training process is quick. Whereas it takes several repetitions for visual impressions to establish themselves, even the smallest sniff is rarely forgotten.[9] Each of this book's twenty chapters introduces a particular smell that has played an important role in most people's lives – a kind of olfactory canon. Each of the smells is presented along with its origin and chemical attributes, and, to stimulate the reader's recognition, the olfactory qualities and character are also described. In addition, the book offers advice about how we can continue to get wind of them.

[8] Matthew Cobb (2020). *Smell. A Very Short Introduction.*
[9] Ibid.

The book is based on contemporaneous historical sources – mainly fiction and above all comedies and satires that are particularly concerned with smell. I have only exceptionally resorted to modern historical literature because it often overlooks the fact that the world does not just smell different than it used to: the status of our sense of smell was also entirely different in the past. Honourable exceptions include a group of sociologists, social anthropologists and cultural historians who have developed an interest in the cultural history of smell since the second half of the twentieth century; these include Constance Classen of Canada, Trygg Engen of Norway, and Alain Corbin and Robert Muchembled of France.

Many people have contributed to the work on this book, not only through their professional expertise, but also by taking part in on-the-spot explorations and descriptions of smells. Particular thanks are due to Anders Eik Pilskog, Andrea Bergh Pettersen, Anna Fara Berge, Dag Roalkvam, Jan Gunnar Skjeldsøy, Marie Rosenberg, Nina Castracane Selvik, Simon Holmen, Sofia Lersol Lund, Stian Tveiten, Svanhild Naterstad and Trond Berge.

Most of all, though, I would like to thank visual artist Anette Rosenberg for the illustrations in this book. They were developed as representations of colours, shapes and textures based on a delicate and sometimes demanding exploration of smells.

Of course, it is something of a paradox to illustrate a book about smell in the first place. But it is an unfortunate fact that all engagement in our age must first go through the eye. My hope is that this will also stimulate the reader's sense of smell.

Bjørn Berge
Lista, summer 2024

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THE NATURE OF SMELL – AN INTRODUCTION

THE BASIS OF SMELL

Out here on the coast of Western Norway, storms can blow up out of nowhere even in summertime. When that happens, our sensory apparatus is abruptly roused by the roar of the vast foaming crests that surge up the pebble beaches, the sudden drop in temperature amid clouds of sea spray, the chalk-white scraps of foam that break loose and swirl up into the air like great gulls – but above all, the smell.

It is the smell of the sea. Not of the turbid brackish water between the boats in a marina or of a fjord saturated by salmon farming. This is the primal smell itself, a smell that must have been the same for millions of years – boundlessly fresh and powerful, with clear notes of rotten egg, medical iodine, and a faintly nauseating whiff of cooked cabbage. Without being off-putting.

When I stand on the pebble beach below my house, I feel I am being cleansed, from my nostrils all the way to my frontal lobes, and I long to keep having this smell served up to me in boundless quantities to the point of intoxication.

The smell of the ocean originates from the life beneath the surface. The faintly cabbage-like component is created when bacteria feed off the huge populations of plankton that drift upon the world's oceans. That signals a banquet for the entire food chain – from jellyfish to blue whales, from pelicans to turtles. The sharp and slightly metallic smell of iodine stems from the metabolism of algae and marine worms, and when the wind drops and piles of brown kelp lie stranded on the beach quietly fermenting in the spring sunshine, they are accompanied by sharp hints of rotten eggs and overripe cheese. Sometimes, we can also pick up a faintly rancid element of lobsters, crabs, flatfish and other marine creatures. And if the sea is still choppy, we can detect a chalky component stemming from the masses of diatoms that are being churned around in their minuscule silica carapaces.

The Sense of Smell

The nose, that semi-rigid and slightly peculiar growth in the centre of our face, is the only bodily orifice that cannot be closed with either muscles or skinfolds. Instead, it ends abruptly in two arched portals that always stand wide open. When we breathe in – as we do more than twenty thousand times a day without giving it a second thought – the airflow passes over the yellowish-brown olfactory mucosa high up in the nasal cavity. It is the size of a postage stamp and is densely packed with slimy sensory cells, which pick up smell substances or odorants. The information is transmitted to the olfactory centre in the brain, which identifies the smell in question, and if it has not previously been experienced, it is stored as a new one. The whole process takes a fraction of a second.

The olfactory centre is directly linked to the limbic system, which instantly processes the impressions to produce emotions and memories. This explains the fresh, spontaneous and individual character of the smell. And our sensations can vary according to mood. Things may smell different if we are tired or turned on, hungry or well-fed, happy or sad, pregnant or hungover.[10] Sex, age, diet, health and personal experience also play a role. Women are somewhat more sensitive to smell than men, and in all cases, sensitivity peaks after puberty, then declines with age until only vestiges remain by the time we turn eighty.[11]

Twenty per cent of the European population have a deficient sense of smell and around one per cent of us suffer from anosmia, a condition in which all smells vanish. This can be caused by growing up in a severely polluted environment, as well as by brain injuries and disease – for example a Covid infection. Some people also experience a distortion of their sense of smell known as parosmia. Suddenly your dinner might smell like garbage and bananas like rotting meat.

Some smells can also summon up sensations of intense cooling or burning, with a faint tingling of the nostrils. Even people with anosmia can experience this phenomenon, which is not directly linked

[10] A. S. Barwich (2020). *Smellosophy. What the Nose Tells the Mind.*
[11] Günther Ohloff, Wilhelm Pickenhagen, Philip Kraft & Fanny Grau (2022). *Scent and Chemistry. The Molecular World of Odors*.

to the sense of smell, but is associated with irritation of the trigeminal nerves that regulate the sensitivity of our facial muscles. Some odorants such as menthol and ammonia have this dual effect.

Smell and Taste

The sense of smell interacts with the other senses to create overall experiences. The sense of gustation is in a class of its own here. Alone, it is responsible only for a few basic tastes: sweet, sour, bitter, salt and umami. All nuances beyond that – of which there are thousands of course – originate in our sense of smell. For example, a dried apricot tastes of nothing at all if you hold your nose while eating it.

At the same time, conflicts constantly arise between these two closely associated senses. Anyone who loves strong cheese, fermented cabbage and Swedish fermented herring knows that. And for many, the smell of parmesan is almost identical to the stink of sweaty socks. If our nose were the sole arbiter, such signals could easily become problematic. Only the persistent assurances of our fellow humans persuade us to risk the experience.

Smells

Most of the substances that fill the atmosphere – oxygen, nitrogen, carbon dioxide and water vapour – don't smell of anything at all. In order for a substance to smell, it must first be sufficiently water-soluble to cross the membranes and gain access to the four hundred-plus sensory cells in the upper part of our nasal cavity. Next, the size and shape must match. Each individual sensory cell is specialised in and receptive to a limited number of odorants. When the odorant matches the cell, it's almost like a key in a lock: the neural circuit is completed and the signal is transmitted to the brain.

But we are rarely dealing with a single odorant. Most olfactory experiences originate from a combination of many such substances. Potatoes emit at least a dozen, roses 250, tomatoes 400 and the smell of coffee, more than 600.[12] And the pattern that all these activated sensory cells form in combination is what creates the overall olfactory impression.

[12] N. Gilbert, Avery & Charles J. Wysocki (1987). "The Smell Survey". *National Geographic,* Vol.172.

Given the countless combinations that can arise, it is commonly assumed that no two smells are identical. All olfactory impressions have their own subtle singularity, even though the nuances that separate the scent of two lemons will be barely perceptible.[13] Nonetheless, there is little doubt that the human brain can distinguish between a million different smells – some say more, perhaps even an infinite number.

A SPOT OF SMELL CHEMISTRY

Odorant[14]	Gross Formula	1. Molecular Mass [u]	2. Boiling Point [°C]	3. Odour Detection Threshold [ppb]
Dimethyl sulphide	C_2H_6S	62	37	1-20
Hydrogen sulphide	H_2S	34	60	1-130

Every odorant consists of a well-defined molecule that can be described with a chemical formula. The atoms that form the molecules represent irreducible elements. One of the most common elements in odorant molecules is carbon, whose symbol is C, and whose presence makes them organic molecules. In sea air, the organic molecule *dimethyl sulphide* contributes the smell of cooked cabbage. In addition to two carbon atoms, it also contains six hydrogen atoms, H, and one sulphur atom, S.

Hydrogen sulphide is an example of an inorganic odorant molecule, and is also a familiar component in the smell of the sea. In this case, the loss of some carbon and hydrogen atoms causes the smell to switch abruptly from rotten cabbage to rotten egg – hardly a drastic change, many would claim. But the addition or subtraction of a single atom can often lead to far greater differences in smells – from violet to orange, for example, or from apple to vinegar. And to further complicate matters, some molecules with the same chemical formula may smell different, like carraway and mint. In such cases, the shape of the atomic structure is the determining factor.

[13] Günther Ohloff, Wilhelm Pickenhagen, Philip Kraft & Fanny Grau (2022). *Scent and Chemistry. The Molecular World of Odors*.

[14] The information in this and the following tables is drawn from Günther Ohloff, Wilhelm Pickenhagen, Philip Kraft & Fanny Grau (2022), publicly available research articles on Google Scholar and various internet databases, including PubChem (National Centre for Biotechnology Information). The figures cited must be considered approximate since they may be calculated using different methodology.

Odorants are either latent in the mother material or are created by external influences. Bacterial attack (decomposition), solar radiation (photochemical reaction) and the addition of oxygen (oxidation) can all transform otherwise odour-free molecules into aromatic compounds.
Several conditions must be in place in order for the odorant molecule to escape from the material, disperse into its surroundings and, eventually, be picked up by our olfactory apparatus. Three factors are key: molecular mass, boiling point and odour detection threshold.

MOLECULAR MASS

The weight of the molecule, its *molecular mass*, is the fundamental determinant of whether it will be capable of activating the sensory cells in the nose at all. It cannot be higher than 300u, where *u* is the applicable unit of atomic mass.

Molecular mass also affects how the smell is dispersed in its surroundings. Light molecules spread quickly, whereas heavier molecules are less keen on travelling. However, heavy molecules frequently offer richer and more complex olfactory experiences. They linger for a longer time in homes, clothes, nostril hairs and mucous membranes.

BOILING POINT

The molecule's ability to escape its mother material is determined by the boiling point of the substance, which ranges from 0°C to 400°C for the most common odorants. The lower the boiling point, the easier it is for the substance to evaporate. At the same time, high atmospheric humidity reduces the boiling point, as does a drop in atmospheric pressure. Odour production is therefore at its most intense in humid, low-pressure weather.

That said, the term boiling point should not be taken too literally. Even where substances have high boiling points, molecules located close to the surface of the material will still evaporate at room temperature, just in lower doses. They will also take longer to fully exit the material.

ODOUR DETECTION THRESHOLD

Even after accessing the sensory cells, the amount of odorant molecules must exceed a given level in order to be perceived. The required concentration is known as the odour detection threshold and is usually measured in ppb – parts per billion – where 1ppb corresponds to a billionth of the volume of the air. Still, the detection threshold must be seen as a rough measure since it varies greatly from one individual to another.

The Presence of Smell

Odorant molecules are often tiny fragments of life – animals, plants and bacteria – which have become dislodged and float freely through the air until they end up in our noses. So when we smell the sea, it is because our bodies have absorbed a minuscule portion of the life in the ocean. The same thing happens when we smell another person's body – a thought that can be quite disturbing, given that there isn't all that much difference between eating and smelling. In a sense, we are all cannibals.

The sense of smell also tells us about the atmospheric processes that are further transforming life forms. While solar radiation releases the smell of sulphur from a calm sea, the addition of oxygen to a stormy sea generates more iodine – and the more powerful the crashing of the waves, the more intense the smell becomes. In principle, a good nose can replace both eyes and ears. Is the sun shining? Is it day or night? Is a storm raging?

At its most extreme, our sense of smell can also perceive changes in the planet's climate. When evaporation wanes, and increasing acidification and carbon dioxide content alter the living conditions of all the creatures in the sea, the smell also changes.

THE TRANSIENCE OF SMELL

So you're standing there in the storm filled to the brim with the powerful smell of the sea – then suddenly it's all over. Sure, the waves are still rolling towards the land, and the roar of the breakers and the cries of the gulls are unchanged, as is the salt taste on your tongue. But the smell has vanished altogether. At best, you're left with a sensation of freshness, but the smell of the ocean is

no longer there. The heavenly gates have closed and the rich aroma is transformed into sluggish gravity.

Familiarity

The main focus of our sense of smell is to detect changes in our surroundings, and we quickly grow accustomed to them. From the moment you enter a landscape, house or car, it will often take just minutes and rarely more than half an hour for the smell to vanish. And that applies even to the most pungent and unpleasant stinks, albeit with variations. Some smells last mere seconds, such as the scents of certain roses, while others, such as camphor and fresh manure, can persist for days. However, the same principle applies.

The intensity often begins to diminish after the first sniff, or even in the very first fractions of the first sniff, until the brain has located and identified the smell. From an evolutionary standpoint, there's no need for any more.[15] We have the information we need, whether it's a matter of sea, roses or cat pee. Or our own smell, for that matter, which we only experience as a whiff of skin and sweat after a session at the gym. Or the smell of our home, which we only notice after we've been out for a hike, or our home town, only after a longish trip. Or our workplace, only for the few minutes after we arrive each morning.

Renewal

And it does no good to strain yourself in the hope of making the smell last or return. Quite the opposite: repeated quick and intense sniffing tends to further numb your receptivity.

The best way to cleanse your olfactory palate is to go elsewhere – to a house or car that smells different – and then come back again. If you don't have any such options to hand, some simpler procedures may work: if you've walked yourself into a sweat, try sniffing your armpit. Taking a few breaths through a woollen scarf will also help. But the best thing of all is to have a special odorant that has as little as possible in common with the olfactory environment you want to explore.

[15] Matthew Cobb (2020). *Smell. A Very Short Introduction*.

Professional “noses” in the perfume industry often use mild ammonia solutions, camphor or freshly roasted coffee beans.[16]

THE INDEFINABLE NATURE OF SMELL

And when you return home after experiencing a stormy sea, how are you supposed to tell people about it? Visual and auditory experiences are no problem; if more precise information is needed, you can describe the breakers in terms of colour and wave size, and the roar in terms of volume and pitch. The taste can be described as salty and sour, and the tactile experience of sea spray and flying sand as damp, cold and stinging. But when it comes to smell, your descriptive powers soon fail you. You’ll find no terms on the tip of your tongue. Our sense of smell lacks language.

Language

There’s no question that a lemon is yellow. But what does it smell like? Like a lemon of course. And coffee smells like coffee. We quickly end up with the phrase *smells like* – like roses, like apples, like freshly laundered sheets, like rotten eggs, like hospitals, like asphalt, like a new car, like a dental surgery, like a wet dog. And all of this is more intimately associated with other sensory experiences – often with the sense of vision.

We can also borrow some adjectives from the sense of taste: sour, sweet and bitter. And the smell of fresh chilli pepper can be described as complex, rich and hot, whereas vinegar smells plainer, thinner and colder.

At the same time, some synonyms hint at a kind of quality. While *aroma* is associated with food and drink, and *fragrance* is often used to describe perfumes and floral smells, odour tends to be linked to sweat or faeces. If we presume to assign a value to the smell we can also refer to it as a stink. It all gets pretty vague pretty quickly, and this is roughly as far as we get using everyday language.

[16] This information was sourced, among others, from Margit Walsø (2022). *Din femte sans. Hvordan luktesansen beskriver deg, din fortid og din fremtid.*

Classification

But things looks quite different to a dedicated chemist. By as early as the mid-twentieth century, new analytical techniques, primarily mass spectrometry and gas chromatography,[17] enabled us to identify the structure and attributes of many odorants. All were described using chemical formulae and they were often named after the elements they contained. And when a chemist returns home from a stormy sea, he can state with some authority: "Well, there was plenty of methanethiol in the air today, but perhaps a little less hydrogen sulphide than usual." This is undoubtedly valuable information, but it hardly lends itself to a description of the olfactory experience – it's almost like describing the flavour of a moist cheesecake as a happy combination of water and fatty acids.

Ever since the Ancient Greeks, philosophers and natural scientists have tried to develop comprehensive classification systems for olfactory experiences, to no avail. More recently, specialists in the wine, perfume and cheese industries have produced various aroma wheels and scent circles, but although they are interesting enough in themselves, they are rarely useful outside these specialist fields. And when the experience cannot be defined and fenced in by language, it cannot be immediately socialised either. The experience of smell remains a primarily personal affair.

FREEDOM OF SMELL

Although genetic variations do occur, our sense of smell is less innate than other sensory experiences. No one will react in exactly the same way and responses mostly depend on past experiences, especially those that occurred in the earliest stages of our lives.[18] Everything our mother eats during pregnancy will influence the scent of the amniotic fluid, and this, together with the smells the new-born child encounters, will shape its odour preferences for the rest of its life – whether we're talking about garlic, tobacco smoke or shampoo.

[17] Gas chromatography and mass spectrometry are often used in combination to analyse gases, but they play different roles. The first separates out the various substance based on their movement through the gas phase and absorption in a material, whereas mass spectrometry measures the mass of ionised particles to identify and quantify molecules in the sample. In other words, gas chromatography helps to sort the substances, whereas mass spectrometry provides information about the components of each individual substance.
[18] Trygg Engen (1982). *The Perception of Odors.*

Individuality

Our assessment of a smell also depends on the associations it evokes in us, then, and connotations of pain or happiness will determine whether we experience it as nasty or nice. Consequently, even the dull stench of rotting seaweed may forever be a positive smell for many people because of its associations with summertime and holidays. And if a smell makes us feel nauseous, that doesn't mean it is intrinsically nauseating, but rather that it makes us think of the stomach upset we had after eating something that disagreed with us.[19] If off fish was the culprit, the same nausea will well up the next time someone serves you fish. And it may be a long time before you can stomach the offending foodstuff again.

One evolutionary consequence of this freedom is that we humans rank among the world's most successful generalists. Like rats and cockroaches, we are capable of surviving in pretty much any environment.[20] If we, like the Chinese panda, had only been able to eat fresh bamboo shoots, we would soon have died out. Instead, we greet new food smells without any fixed prejudices, yet with a certain caution.[21] One well-known example of the latter is Norwegians' scepticism about garlic, which took several decades to overcome.

Culture

With the exception of ammonia and a few other substances, no smells have universally negative connotations; and even in those cases, it is our trigeminal nerve responding rather than our sense of smell. Not even the odour of human excrement is perceived as wholly unpleasant. According to research, European children only begin to react negatively to it between the ages of four and eight, and then only after vigorous lobbying by adults.[22]

Even though personal experience has an absolutely decisive impact on the formation of our odour preferences,[23] culture also comes into play. While global surveys rank the smell of banana as

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[19] Ibid.
[20] Rachel Herz (2006). "I Know What I Like. Understanding Odor Preferences". Jim Drobnick, Ed. *The Smell Cultural reader.*
[21] Ibid.
[22] Robert Muchembled (2020). *Smells. A Cultural History of Odours in Early Modern Times.*
[23] A. Arshamian et al (2022). "The perception of odor pleasantness is shared across cultures". *Current Biology,* Volume 32, Issue 9.

the absolute best, and natural gas as the absolute worst – an assessment I reject vehemently after living solely on bananas for three days during a rough sea crossing in India – major regional differences still apply.[24] The smells of petrol, campfires and cheese fluctuate, and there are more people who dislike than like the smell of honey.[25] In the United Kingdom, the smell of freshly baked bread is a clear winner, with fried bacon in second place and newly mown grass in third. [26]

And the divergences of opinion continue – between population groups, classes, geographical locations and, not least, generations. Britons born in the 1960s and 1970s disagree with both their older and younger fellow-citizens about the excellence of newly mown grass. Perhaps because they were the generation who had to mow the lawn with those manual monsters that prevailed before the advent of the petrol-driven lawnmower.[27]

THE MEMORY OF SMELL

Smells are fleeting and leave no physical traces. But their mental traces are incontestable. Olfactory memories fade much less than other types of memory, and smells can revive moments we have long ago forgotten, often from childhood.[28] They immediately burgeon into full-blown sensory experiences: the shimmer of the afternoon sun on the waves, the keening of the gulls and the grittiness of the warm sand. We feel the presence of the people who were there. Most of all, we relive the feeling of being a small child.

The Madeleine Effect

This is often referred to as *the Madeleine Effect,* named after an episode in Marcel Proust's 1913 novel, *Remembrance of Things Past*.[29] He writes about the scent of the madeleine cake, a little scallop-shaped delicacy, which instantly transports the protagonist back to his childhood visits to

[24] N. Gilbert, Avery & Charles J. Wysocki (1987). "The Smell Survey". *National Geographic,* Volume 172.
[25] Åke Bresle (1986). *Näsa för lukter.*
[26] Gemma Francis (2015). "Freshly baked bread tops poll of Britain's top 50 favourite smells". *Daily Mirror*, 25th May 2015.
[27] Alan R. Hirsch (2006). "Nostalgia, the Odors of Childhood and Society". Jim Drobnick, Ed. *The Smell Cultural reader*.
[28] Cretien Van Campen (2014). *The Proust Effect. The Senses as Doorways to Lost Memories.*
[29] Trygg Engen (1982). *The Perception of Odors.*

Great-Aunt Léonie in Combray: the neat garden, the pond, the pavilion and all the rest. She always served madeleine cakes dipped in lime-flower tea:

> When from a long-distant past nothing subsists, after the people are dead, after the things are broken and scattered, still, alone, more fragile, but with more vitality, more unsubstantial, more persistent, more faithful, the smell and taste of things remain.[30]

Complete olfactory memories are rarely necessary to spark this. A fragment can often be enough, like the faintly rancid smell of seafood and flounder in a fishmongers, or the aroma of bread and cakes in a bakery. Suddenly, you've gone back fifty years in time.[31]

The sense of smell's ability to summon up memories is also linked to navigation and sense of direction. Many animals, from migratory birds to wild salmon, use smell for orientation. Every place has its own singular olfactory chemistry, and such navigation is based on an arsenal of accumulated smell memories – almost like programming a GPS.[32] We humans probably have this ability too. And although the processes are not yet fully understood, we have reason to believe that the better you are at recognising smells, the better your sense of direction.[33]

The Smells that Vanished

Many of our olfactory memories will be a kind of common property. We can, to a certain extent, agree on them. However, one thing separates us: age.

Most people of my generation – those of us who were born in the 1950s – will probably remember the slightly fishy smell of burnt dust on the electric panel heaters in autumn, the smell of white moth balls, cap guns, newly varnished desks on the first day of school, the terror-inducing smell of the dental surgery, newly smoked sausages in the butcher's shop, mildewy comic books in the outdoor toilet at the holiday cabin, and the smells of fricassee, stuffed cabbage rolls and other old-fashioned dishes once served up on our kitchen table at home. If you were born in the 1960s,

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[30] Marcel Proust (2006 [1913]). *Remembrance of Things Past, Volume I.* Translated by C. K. Scott Moncrieff.
[31] Alan R Hirsch (2006). "Nostalgia, the Odors of Childhood and Society". Jim Drobnick, red. *The Smell Cultural reader*
[32] Kei M Igarashi, Li Lu, Laura L. Colgin, May-Britt Moser & Edvard I. Moser (2014). "Coordination of entorhinal–hippocampal ensemble activity during associative learning". *Nature* 510, 2014.
[33] Matthew Cobb (2020). *Smell. A Very Short Introduction*.

you'll remember tinned pineapples, French fries, fish fingers, leather pencil cases, stencil sheets, Crayola colours and the dusty scent of newly sharpened pencils, while 1970s children can bond over the profusion of sweet aromas in plastic, glue, hairspray and suntan oil. And all of them will nod in recognition when they catch a waft of the sharp and sweetish smell of a petrol station on a hot summer's day – an experience children born in the 2020s can only dream of.

Some smells have vanished, and new ones have arrived – like the chemical scent of disinfectants in the supermarkets, the cloying fragrance of e-cigarettes and the sharp metallic smell of EVs. Given rapid changes in technology, dietary habits and materials, smells rarely survive for more than one generation. It feels as if we barely have time to familiarise ourselves with a smell before it's gone. And many of them will never be smelt again. "I miss Fornebu," writes Jon Fosse in an ode to the closed-down airport outside Oslo. "And the smell of smoke in the café there, I miss that too."[34]

Cookies or Cake

Marcel Proust was aware of this and before he settled on the madeleine cake, he mulled several alternatives – including toast and honey, and biscotti, the nutty Italian cookie. Only in the final draft did he opt for the madeleine cake, which was already a well-established part of the French diet by the end of the 19th century.[35] Nowadays, very few people know what he's talking about. But in Henriette Schønberg Erken's cookery book, now more than a century old, we can still find the recipe:

> Take 250 grams of icing sugar, 250 grams of flour, 250 grams of butter, 8 eggs and 1 tablespoon of vanilla sugar. Whip the egg and icing sugar together. Sift in the flour with the melted, cooled butter. Pour the mixture into small moulds (or roll it into balls). Bake for around 6 minutes at 210 degrees Celsius.[36]

And don't forget the lime-flower tea!

[34] Jon Fosse (2008). "Eg saknar Fornebu". Contribution to V. Jordal et al , Eds. *Luft og kjærlighet.*
[35] Angelique Chrisafis (2015). "Proust's memory-laden madeleine cakes started life as toast, manuscripts reveal." *The Guardian,* 19th October 2014.
[36] Henriette Schønberg Erken (1941 [1914]). *Stor kokebok for større og mindre husholdninger.*

Chapter 1 The Midden – The Smell of Safety

In his autofictional novel *My Struggle,* Karl Ove Knausgård recalls the unique smell of home:

> Even after all that had happened, there were still echoes of the smell I remembered from childhood. As a young boy I had already wondered at the phenomenon: how every house I had been in, all the neighbours' and the family's houses, had a specific smell all of their own which never changed.[37]

Walls of Turf

If you'd found yourself roaming through the turf bogs of Iceland in the late summer a hundred years ago, or a thousand years ago for that matter, you would have found a special experience awaiting you. The Icelandic farm lay half-buried in the ground and, from a distance, you might well mistake it for an unevenness in the terrain. Still, you knew you were on the right track when the spicy scents of heather and bog myrtle borne on the mountain wind gradually gave way to the sour smoke of a cow-dung-cake fire. And then suddenly you were there – on the doorstep before a sun-faded trapdoor in the turf wall. And only when the trapdoor was opened did the smell become truly intense. "The stalls beneath were offensive with the damp of earthen walls and refuse fish, while the room upstairs stank of death and a reeking lamp," according to the midwife who visited the farm of Summerhouses in Haldór Laxness's novel, *Independent People*. "And," she added with a shudder, "down in the stable it was cold and dark, the air sour with the smell of earth, the toadstools flabby."[38]

Domestic Animals

In Northern Europe, the animal stalls were closely connected to the living quarters until the late Middle Ages, and even later in some places. The householders ate their meals among the sheep, dairy cattle and poultry. Here, too, they spun wool, sewed nets and read the Bible on Sundays. In his account of a journey through Sweden at the end of the 16th century, German merchant Samuel Kiechel spoke of having his face licked by calves, lambs, goats and pigs as he slept.[39] And the 1867

[37] Karl Ove Knausgård (2012). *A Death in the Family: My Struggle Book 1,* translated by Don Bartlett.
[38] Halldór Laxness (2008 [1934-35]). *Independent People.* Translated from the Icelandic by J.A. Thompson.
[39] Arne Lie Christensen (1995). *Den norske byggeskikken. Hus og bolig på landsbygda fra middelalderen til vår egen tid*.

volume of the journal *Fjeld og Hav* reports that the people of Setesdal, southern Norway, wandered around "among pigs, rams, chickens, cats, dogs and ducks upon an indescribable floor, whose surface would have sufficed to fill a quite large field with plentiful manure, and an incredible atmosphere, composed of the thickest and most repulsive odours that can emerge from the human and animal world that the new Noah has gathered in his ark."[40]

Back on Iceland, the Scottish geologist Sir George Mackenzie – otherwise known as a matter-of-fact man of science who smelted his mother's diamonds with iron to form steel – spoke of the nauseating conditions he encountered during a stay there in 1810:

> The thick turf walls, the earthen floors kept continually damp and filthy, the personal uncleanliness of the inhabitants, all unite in causing a smell insupportable to a stranger… it is wonderful how any thing in the human form can breathe in them.[41]

But the large and poverty-stricken family at Summerhouses was used to it. They registered only the sporadic smells of cooking – especially frying fish – of the turf and cow-dung cake that burned alternately in the hearth, and of the occasional visitor who smoked a pipe.

> A smell like meadow-sweet, only much more delicious; there is another world in a sweet smell, and the fragrance remained to live and talk when the visitor himself had gone.[42]

The Home

Whether it's a cave in a mountain or a structure built of turf, timber or bricks, the essential task of the home is to protect us from the threats of the outside world – from heat, cold, rain, wind and robbers. For most people, home represents the safe corner of our lives, the very navel of existence.[43] Yet we constantly set out on new adventures and voyages of discovery. And when we come back, our sense of vision already recognises the façade of the house from a long way off, and our hearing, the

[40] Cited in Arne Lie Christensen (1995). *Den norske byggeskikken. Hus og bolig på landsbygda fra middelalderen til vår eg en tid*.
[41] George Steuart Mackenzie (1811). *Travels in the Island of Iceland, During the Summer of the Year MDCCCX*.
[42] Halldór Laxness (2008 [1934-35]). *Independent People.* Translated from the Icelandic by J.A. Thompson. s284
[43] Gaston Bachelard (1964). *The poetics of space.*

creak of the front door. But only our sense of smell can bring us inside it all and give us that absolute and reassuring feeling of having come home.

The foundations of the smell of home are laid by the smell of the neighbourhood – the smell of place – from industry, motor traffic, agriculture, forest and sea. It seeps in through cracks, and through windows and doors as they are opened and closed. Once inside the house, it is further acted upon by the smells of the materials used to build and equip it, both the fresh and the faded – the calciferous concrete, the timber, the bedclothes, the paint, the glue and the plastic materials. The whole medley is rounded off with the smell of the inhabitants themselves and of their activities.

"It is conceivable that it was all to do with habit," Knausgård suggests.

> […] using the same soaps, the same detergents, the same perfumes and aftershave lotions, cooking the same food in the same way, coming home from the same job and doing the same things in the afternoons and evenings. If you worked on cars, there would be traces of oil and white spirit, metal and exhaust fumes in the smell, if you collected old books, there would be traces of yellowing paper and old leather in the smell.[44]

The smells of a house vary from one room to another, from the introductory smells of damp outerwear and shoes in the hallway through the sharp tang of the wood-burning stove in the living room and the rich food aromas in the kitchen, all the way in to the dry scent of bedclothes in the bedroom. Then it's downstairs to the cellar: "This was where they had stored the crates of apples, pears, and plums in the autumn," Knausgård says of his grandparents, "and combined with the stench of old brick and earth, their exhalations lay like a sub-smell in the house, to which all the others were added and with which they contrasted.[45]

The Echo of the House

Porous material in the panelled ceilings, walls, carpets, books and furnishings absorb and temporarily store the smells, like a kind of memory. The capacity is greatest in products made of natural organic materials, such as timber, paper, turf, wool and cotton, but mineral products with rich pore

[44] Karl Ove Knausgård (2012). *A Death in the Family: My Struggle Book 1,* translated by Don Bartlett.
[45] Ibid.

structures, such as plaster, lime and clay, also play an active role.[46] Depending on shifts in atmospheric humidity and temperature, the smells will gradually be fed back into the room, like a long-drawn-out echo of the life of the home. This process is quick for light and volatile substances, whereas heavier and less water-soluble molecules may linger for a long time – like the tar substances in tobacco smoke, lard from cooking and above all the powerful acid compounds in human sweat. In his autobiographical novel *The Notebooks of Malte Laurids Brigges* the Austro-German writer Rainer Marie Rilke describes the emanations of a torn-down house on a rainy Paris street just before the turn of the twentieth century:

> […] a stubborn, sluggish, musty air which no wind had yet scattered. There the noons lingered, and the illnesses, and the exhalations, and the smoke of many years, and the sweat that trickles down from armpits and makes clothing heavy, and the stale breath of mouths, and the oily smell of sweltering feet. There the pungent odour of urine lingered, and the odour of soot, the grey odour of potatoes, and the heavy, sickening stench of rancid grease. The sweet smell of neglected infants lingered there, the smell of frightened schoolchildren, and the stuffiness from the beds of pubescent boys.[47]

When the internal surfaces of a house are painted with modern vapour-proof paint – often based on acrylic and other plastics – the flow of information is cut off, for a few weeks at least. Sticky organic molecules in the air of the rooms will quickly respond by forming a film on top of the material. This, combined with high humidity, will provide ideal growing conditions for fungi and microbes, and the already poor smell circulation may become worse than ever.

Bacteria also ensure that the smell of the house changes when new inhabitants move in, no matter how old and aromatic the house might already be. Admittedly, the lingering historical and material components will continue their long-drawn-out processes, but the smell of the new residents will soon set its seal on the place. Every single one of us carries around our own unique

[46] Bjørn Berge (2009). *The Ecology of Building Materials.*
[47] Rainer Marie Rilke (2011 [1910]). *The Notebooks of Malte Laurids Brigge*. Translated by Stephen Mitchell.

bacterial culture, as unique as a fingerprint. This will not only affect the body odour secretions, but will also quickly challenge the other sources of odour in the house. The entire bacterial flora will have been replaced within 24 hours of the new inhabitants moving in.[48] And even an otherwise anonymous hotel room will acquire your smell.

Identity

No matter how exclusive or brutal it is, the smell of your home is the one your visitor will always associate with you. If the guest has come from a long way off, it will also be the smell of an unknown culture, like the stench of cod-liver oil and sour earth in the Icelandic peasant's house, the emanations of unwashed wool and goat's milk in a Mongolian yurt, of walls plastered with cow dung among the people of the African savannas, and of the untanned sealskin on the internal walls of the Inuits' igloos. And if, along the way, you have recognised a smell that reminds you even slightly of your own, that will almost certainly have brought you consolation and joy.

Here's what happened some years ago at our architects' office in Lista. We were all men, all full-grown adults, and these facts were reflected in the smell of our only sporadically cleaned toilet – ingrained, cloying, with a sour hint of ammonia. For various reasons, the kindergarten next door to our office had to borrow our loo for a few days. I can't deny we felt a kind of shame as we listened to the children coming up the stairs in groups, until the moment when we suddenly heard one little girl joyfully exclaim: "Oh! It smells so nice in here – Just like home."

Midden

Humanity came into being around the campfire. We have used fire for heating and cooking since the days of the Neanderthals, across cultures and continents. The open campfire stimulates all our senses, with its flickering flames, its crackle and sputter, its intense heat and most of all with its smell, that peppery tang of oil and metal. Our blood pressure drops and the conversation grows quieter. Gathering around the fire brings the flock together.

[48] Rachel Ehrenberg (2015). "Urban microbes come out of the shadows". *Nature,* Vol. 522, Issue 7557.

Some years ago, archaeologists conducted a dig at the Stone Age settlement of Vistehola, a cave in a shale knoll a few hundred metres above the shoreline in Jæren, Western Norway. It faces south, offering good visibility, and looks like the perfect residence for early Stone Age hunters. With a depth of eight to nine metres and room for 10 to 15 inhabitants, it's almost the Stone Age equivalent of a mansion. The archaeologists were initially astonished by the odd acoustics, which required you to whisper to be understood at all. But the really big surprise lay hidden in a heap of refuse – a midden – just inside the opening. In addition to bones, shells, and food and flint waste, they found the remains of a fifteen-year-old boy. He had been placed on the pile along with the rest of the refuse eight thousand years earlier.[49]

The cave-dwellers must have been highly aware of the child's process of decay. After a short time, the body's own enzymes kick-started the decomposition of the tissue, giving access to fungi and bacteria. A few days later, swarms of flies and beetles came and laid eggs that quickly hatched into myriads of hungry larvae, and soon the flesh decomposed.

The whole process was accompanied by an ever-intensifying, cloying stench that would be appalling by our standards. But we cannot take it for granted that the Stone Age people experienced it that way. They probably did not. They were used to the smell of death. And in their day-to-day life they used food preparation and conservation methods based on putrefaction – for trout, oysters or puffins. A study which shows that European children up to the age of five display no response whatsoever to the smell of putrefaction suggests that this is a culturally acquired aversion.[50]

It may be that burial in the midden, surrounded by his own kin, was seen as an ideal departure from this earthly life. And perhaps for those left behind, the corpse stench of a brother, mother or grandfather, mingled with animal fat, leather and wet rock, epitomised the safe embrace of the home. Like the smell of the campfire, it brought the flock together, only this time in death.

[49] Sveinung Bang-Andersen (1983). *Svarthåla på Viste – boplass i 6000 år.* AmS-Småtrykk.
[50] Rachel Herz (2012). *That's Disgusting: Unraveling the Mysteries of Repulsion.*

DEATH

Odorant	Gross Formula	Molecular Mass [u]	Boiling Point [°C]	Odour Detection Threshold [ppb]
Cadaverine	$C_5H_{14}N_2$	102	179	0,56
Putrescine	$C_4H_{12}N_2$	88	158	0,4

There's little insight to be gained from a chunk of meat in an airtight jam jar no matter how thick its rind of fat. Even after a few days, the best you can hope for is a faint, nauseating whiff of the cheesemongers. Things only start happening when you add a few tablespoons of soil, after which you'll soon pick up a whiff of what most of us think of as the smell of death. Created when the bacteria in the soil break down proteins, fats and carbohydrates in the meat, we experience it as sharp and intense, yet also thin and cold.

The dominant odorants in the mixture are the nitrogen compounds *cadaverine* and *putrescine*, whose names speak for themselves. Cadaverine results from the decomposition of lysin, the amino acid we obtain primarily through food – especially meat, fish and dairy products – whereas putrescine is produced by the decomposition of arginine, the amino acid produced by the body itself.

While putrescine contributes a sharp, ammonia-like note, cadaverine is responsible for an intensely cloying smell – which many would describe as slightly chemical – with a hint of overripe fruit and rotten cabbage.

Although these odorants aren't especially volatile, both have low odour detection thresholds and their stink – as most people would call it – is penetrating, and detectable at a considerable distance.

Cadaverine and putrescene can be found in bad breath, too, especially among meat-eaters with a casual approach to oral hygiene. These odorants also contribute to the fishy tang in the vaginal discharge of a woman with a bacterial infection, and are contained, albeit in lower concentrations, in the smell of sperm.