SMELLSCAPES:
THE LOSS OF SMELL IN A VISUAL CULTURE

SUSANA CÁMARA LERET

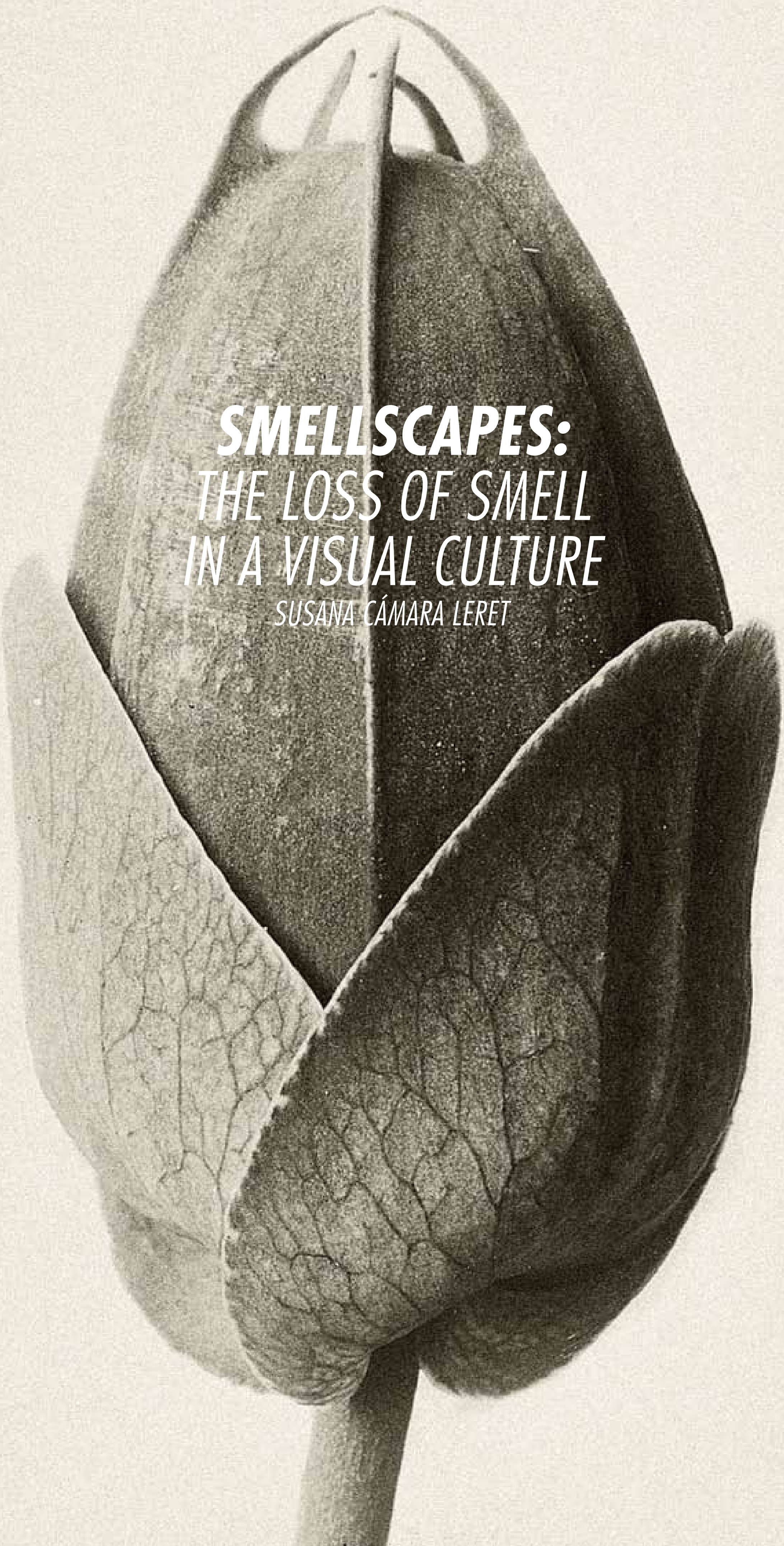

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Fig. 1 *Smell can provide a new understanding of nature*

ACKNOWLEDGEMENTS

I would like to thank the following people for their support and guidance throughout the project:

Rodrigo Camara Leret; Maria Luisa Leret Verdu from the Department of Physiology (Animal Physiology II) University Complutense of Madrid, Spain; Jan Frits Veldkamp PhD from the National Herbarium of the Netherlands; Frans Krens PhD and Maarten A. Jongsma PhD from Plant Breeding International, Wageningen University and Research Center, The Netherlands; Yehuda Shoenfeld, Head of Department of Medicine B and Center for Autoimmune Diseases, Sheba Medical Center, Tel-Aviv, Israel; Professor Fabrizio Benedetti from the Department of Neuroscience, University of Turin Medical School, Italy; Andrea Evers, Investigator Clinical Psychology at the Medisch Centrum Radboud Universiteit Nijmegen, The Netherlands; Dirk Hermans from the Center for the Psychology of Learning and Experimental Psychopathology, University of Leuven, Belgium; Professor Berry M. Spruijt, Ethology and Welfare, Department of Biology, Faculty of Beta Sciences, University of Utrecht, The Netherlands.

Fig. 2 Thymus vulgaris: *Plants' scents have been traditionally employed for medicinal purposes*

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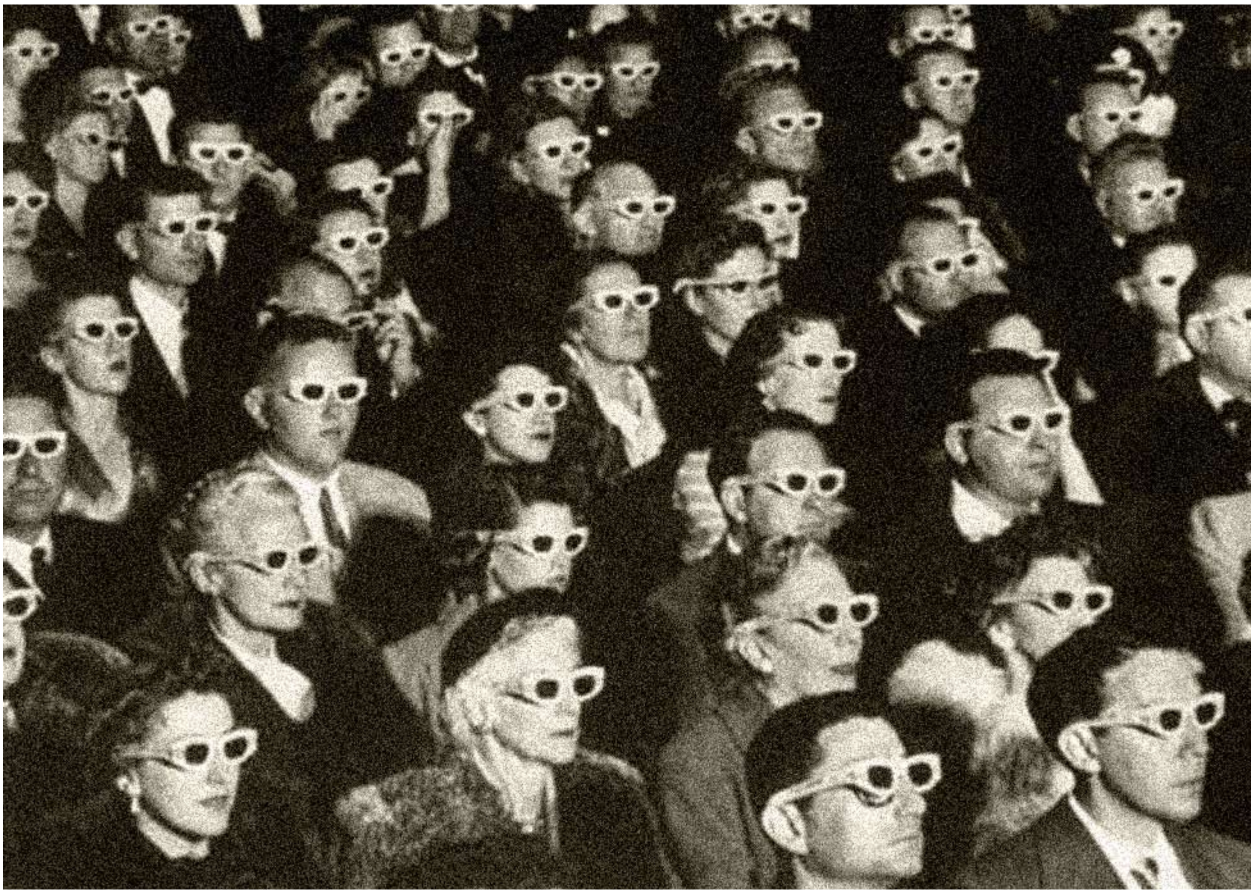

Fig. 3 *We live in a predominantly visual culture*

Fig. 4 *Our sense of smell has been culturally undervalued*

INTRODUCTION

The prevalence of a visual culture is our inheritance of a long ongoing biological and sociocultural process. As cultural and social ideologies evolved, so did our relationship and notion of our natural environment. By considering the interdependence of the binomial natural-artificial, and consequently nature-man, we are confronted with the question of how changes in one sphere can affect processes in the other, and vice versa.

Smell has been undervalued throughout history, due to both biological and cultural motives. Humans have lost smell, possibly due to our development of trichromatic vision and our less dependency on our chemical sense for survival, yet we have also negated it culturally, and underestimated it in relation to our other senses. This has had its repercussions on our concept of nature and our gradual domestication of it. As a result, the chemical relationship we share with our natural environment has been overlooked and its potentials unexplored. Our sense of smell has unique functions which could be used to our advantage, whilst offering us new experiences. Nature possesses intricate chemical tools, which could aid in this endeavor. What would the design implications of this chemical relationship with our environment be?

Fig. 5 Tests for vision prevail over tests for smell.

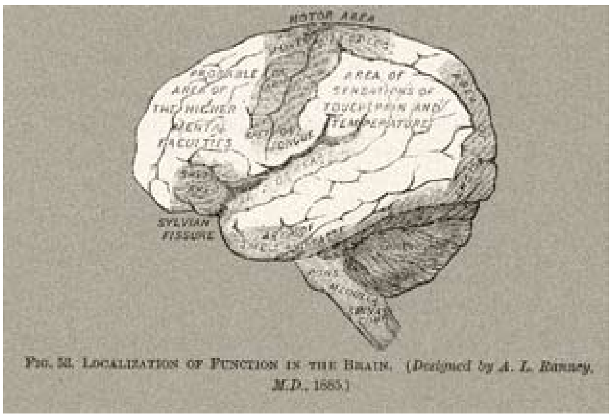

Fig. 6 19th Century illustration of brain function

Fig. 5 Tests for vision prevail over tests for smell.

The development of colour vision made our reliance on chemical signals unnecessary. Today tests for visual deficiencies, such as the Ishihara test for colour blindness, prevail over smell deficiency tests.

Fig. 6 19th Century Illustration of brain anatomy

Our sense of smell and its functions are commonly overlooked.

1. THE LOSS OF SMELL

EVOLUTION – VISION – MATING – OLFACTORY SYSTEM – MAMMALS– UNDERESTIMATED – CULTURE – VALUE – SYNTHETIC SMELLS

I. AN EVOLUTIONARY PERSPECTIVE

Smell was probably relegated to a secondary role throughout evolution, due to our decreasing dependency on it. When our ancestors developed trichromatic vision, their need for chemical sensors decreased. Our spectral sensitivity provided us with further information about our environment, helping to detect the boundaries of objects and their distance in relation to us. For example, our ability to discern ripe fruit due to its contrast against the surrounding foliage, was not possible for dichromatic animals, with less sensitivity in the red, yellow and green regions of the visual spectrum.[1] Because trichromacy is not universal in the animal kingdom, this evolutionary mutation could have meant an advantage in our ancestor's survival, thus favouring it genetically.

The development of colour vision also made the reliance on chemical signals in reproduction unnecessary. Insect mating for example, functions through the use of pheromones, yet the newly perceived visual signals (such as sexual swelling) were more explicit, and more easily detectable than air transmitted molecules. This could have lead to our replacement of a more chemical based system in our ancestor's social reproductive activities, for a "vision-based signaling sensory mechanism."[2] Yet remnants of our previous abilities can still be found our vestigial vomeronasal organs found in our nasal cavities, which were once used to detect pheromones. Present aesthetic interventions on the human physiognomy such as nasal plastic surgery, might threaten its very future existence.[3] This last point illustrates the extent to which our sense of smell and its functions are widely misunderstood and ignored.

The olfactory system has generated a large number of individual receptor genes, which constitute the largest gene super-family in the vertebrate genome. Humans have about 900 olfactory receptor genes, but around 63% of these are non-coding, called pseudo-genes, due to evolutionary mutations:

"In common with other apes and Old World monkeys, humans have a degraded sense of

smell. About 60% of the thousand or so mammalian olfactory receptor genes in people don't function or contribute to our sense of smell (...) However in mice and dogs, which lack a trichromatic vision but have a more sensitive nose, only 20% of olfactory genes don't work."*[4]

Despite our high percentage of pseudo-genes, we still have 300 active olfactory receptor genes, whilst the visual system needs only two genes to detect the colour spectrum.[5] According to Leslie Vosshall, Head of the Laboratory of Neurogenetics and Behavior at Rockefeller University, the human nose can still detect about 10,000 different odours, in comparison to insects, which can only perceive those essential for their own survival. Could we maybe be undervaluing our sense of smell, unaware of its great potential and functions?

II. THE SOCIOCULTURAL DEVALUATION OF SMELL

Historically, speaking, this seems to be the case, since smell is not only a biological experience and western culture has long since underestimated smell:

"The current low status of smell in the West is a result of the revaluation of the senses by philosophers and scientists of the 18th and 19th centuries (...) By the early 19th century, the use of aromatics for medicinal purposes had been largely discredited by sceptical scientists, in favour of chemical medicaments (...) the influence of aromaphobic scientists, philosophers and moralists was widespread."[6]

Regarded as primitive, the sense of smell was of low esteem in relation to vision, which stood as a symbol of rationality and a civilised, scientific thinking. Often seen as a vehicle of contamination, smell ranks low in the hierarchy of the senses. So low that the best smell " is not a good smell but no smell at all."[7]As Michel de Montaigne observed:

" The sweetness even of the purest breath has nothing more excellent about it than to be without any odour that offends us."[8]

Yet this aversion towards olfaction is not common to other non-Western cultures, where smell is highly valued. The Ongee of the Andaman islands, for example, organise their universe in relation to smell, their calendar being structured in relation to the odours of flowers, which bloom at different times of the year.[9]

Our discrimination of smell versus the other senses has had its consequences and its negative connotations have impeded a deeper understanding of the importance of chemical signalling. Little investigation has been done on the potentials of smell and we know less about it than our other senses. Whereas ants communicate and organise their complex societies with odours and pheromones we chose to live in a chemical haze, polluted by strong synthetic smells, which are often employed to mask natural scents.[10] The predominance of a western visual culture has reinforced this situation. Market pulses thrive to enhance the visual image,

* This percentage varies in different sources between 60% and 63%.

Fig. 7 *Smell is not only a biological experience – it is also cultural*

suppressing natural odors, which have in some cases even acquired negative connotations. This might be perhaps our inheritance of the18th century's puritanist mentality, and according to Freud: This "organic repression of man's pleasure in smell" might have resulted in "his susceptibility to nervous disease."[11]

	PENCIL SHAVINGS	SHAVING CREAM	VINEGAR	BODY CREAM	CINNAMON	LEMON	COFFEE
MALE 28 BRITISH	X	SHAMPOO	VINEGAR	BODY CREAM	CINNAMON	LEMON	COFFEE
MALE 29 MEXICAN	PENCIL SHAVINGS	SHAMPOO / SOAP	BREAD WITH SOMETHING LIKE VINEGAR	BODY CREAM	CINNAMON	LEMON (ARTIFICIAL)	COFFEE
MALE 22 BELGIAN	PENCIL SHAVINGS	VERY SOAPY WHITE GRANDMOTHER	VINEGAR FARM MANUER PIG LIKE / ACID	WASHING POWDER	ARMANI PRIVEE PERFUME	CITRUS	COFFEE
MALE 28 CHINESE	PENCIL / WOOD	SOAP	PRUNES RAISINS	FLOWER SHAMPOO	CINNAMON	ORANGE SKIN	COFFEE
FEMALE 26 CHINESE	RUBBER	SHAMPOO	VINEGAR	PERFUME	CINNAMON	LEMON	COFFEE

Fig. 8 *Results from Smell Identification Test*

Fig. 8 *Results from Smell Identification Test*

These results from a pilot smell identification test show the extent to which smell lacks attention in our society. We are not used to the direct identification of odours, in the absence of sight.

Fig. 9 *Olfaction needs training too*

Studies show that olfaction can improve with training. Such is the case for perfumers.

Fig. 9 *Olfaction needs training too*

Fig. 10 The great rose is an example of man's careful breeding of nature

2. MAN & NATURE

ENVIRONMENT – ARTIFACT – MODIFICATIONS – BREEDING – COLOUR – GENETICS – ROSA – TULIP MANIA – VIRUS – ORDER – PRESERVATION – WILDNESS

MAN'S DOMESTICATION OF THE NATURAL

Few people know that butterflies are scented. Their fragrances can vary from flower-like aromas like jasmine, to spices like lemon or cinnamon. They can smell of vanilla or chocolate, yet also unpleasantly like vinegar or urine. Still, throughout history we have persisted on collecting these insects for purely visual motives, when apparently it is possible to smell them and release them unharmed. This fact goes to illustrate how our interaction with our natural environment has been greatly mediated by the visual realm.

Today, human manipulation of nature has resulted in a loss of attributes in some natural species. When humans invented agriculture, approximately 10,000 years ago, by harvesting and cultivating specific plants to produce food, the selection criteria eventually played a determining role in the evolution of those species.[12] Could artificial selection be paramount today in deciding the fate of certain species in the plant world? The term alludes to 'artifact: standing for a thing reflecting human will'. This could explain why our genetic manipulation of flowers has resulted in unpredicted gene silencing and paradoxically in the loss of scent of some of them.

The effects of our underestimation of smell can thus be seen, yet not smelled, in genome modifications of certain plant species and cultivars. Plant breeders for example, might have accidentally damaged the genes encoding the enzymes that produce scent compounds, and genetic changes have probably favoured the "pigment pathway at the expense of scent."[13] As John Dolan, a long-time rose breeder and consultant in California stated:

"We have twenty-six different characteristics to consider in making a rose (...) Roses per bush, vase life, color, form, thorns and so on. In the marketplace, all these things trump scent."[14]

Today we find different methods employed in the breeding of flowers, from transgenic processes where foreign genes with a desired trait are inserted into a recipient plant, to cisgenesis, which employs genes from sexually compatible plants, and to breeding methods which do not fall under current GMO regulations. Yet what new scent phenotypes could result from a shift in our selection criteria? Presently, we find few records of scent-directed initiatives:

"Colour is the most important determining trait in flowers. For many important ornamentals not the entire spectrum of colours is available (...) True blue is lacking in many important species, such as rose, chrysanthemum, gerbera and carnation, but also bright yellow is not present in the variety range of many species (...) Genetic manipulation opens up possibilities for the molecular breeder to expand the color range within a species or cultivar."[15]

According to Robert Raguso, a scent biologist from the University of South Carolina, this is a human bias, due to which "scent is either ignored or treated as insolubly complex."[16] Even so, it is also important to note the influence the market holds in this scenario where the great rose is not only an example of man's careful breeding of nature but also of economic repercussions, with its loss of scent due to market demands. Since 1993, the EU imports of fresh cut flowers have been dominated by 'Rosa' (the genus of roses). Between the years 2004 and 2008, imports of Rosa increased by 7.6% annually and today, the EU is the world's leading importer of flowers, with imports amounting to 3.5 billion euros in 2008. The Netherlands is the leading importer of cut flowers from outside the EU along with the main supplier to other EU member states.[17]

Perhaps we could trace the origins of present Dutch bulb trade, back to the tulip craze. This "tulip mania" which struck the country in the 17th century, further accounts for man's insistence on domesticating the natural. The unpredictable chromatic variations in the colour of tulips' petals' (as a result of the action of a virus which caused the pigment in its petals to 'break'), boomed the market prices of individuals containing such colour breaks. Explanations for this phenomenon vary, yet a possible reason for this frenzy could lie in the fact that a tulip, amongst other flowers, stands for a visual delight, seemingly proper to the Dutch Calvinist society of the time.

" (...) a tailored, somewhat austere blossom; inviting neither touch nor smell, the flower asks to admire it from a distance. The fact that [the tulip] has no detectable scent is fitting: this is an experience designed strictly for the delectation of the eye."[18]

A symbol of rationality, the visual symbiology of a tulip stands for order, as opposed to scented flowers, which excite our primitive senses:

"To lean in and inhale the breath of a rose or peony is momentarily to leave our rational selves behind, to be transported as only a haunting fragrance can transport us (...) Such flowers propose a dream of abandon instead of form."[19]

Thoreau once wrote "In wildness is the preservation of the world" and a century later Wendell Berry wrote "In human culture is the preservation of wildness."[20] But can a human culture based on the discrimination of the senses and the negation of smell truly preserve wildness?


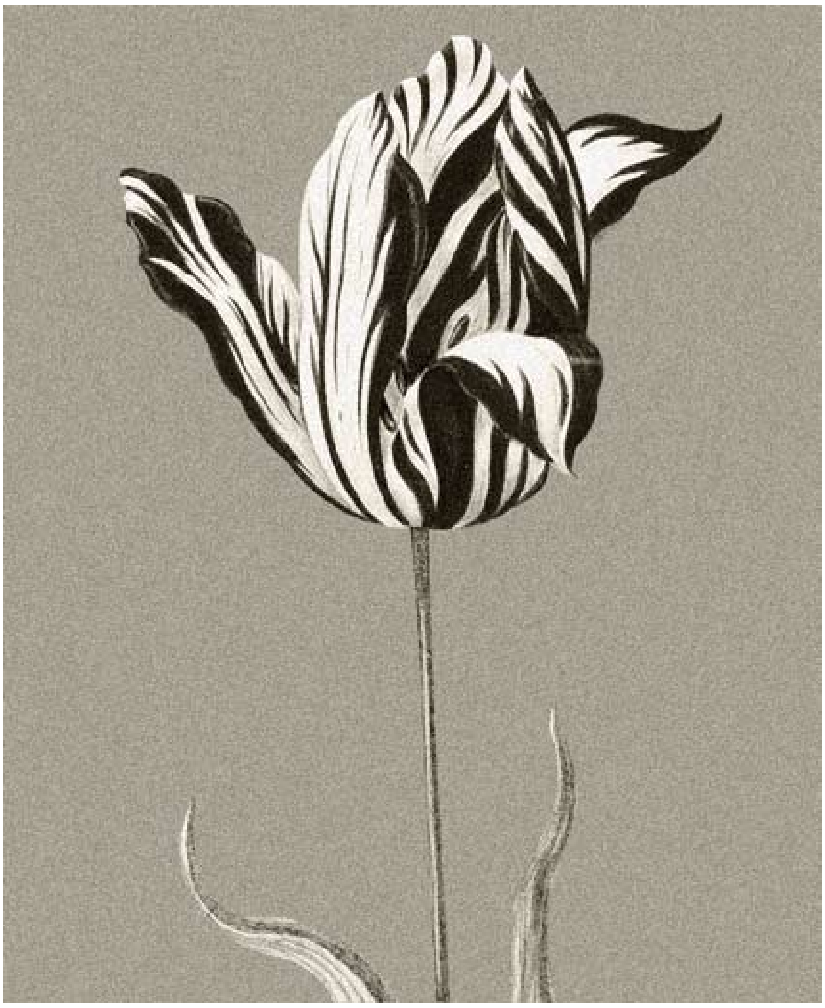

Fig 11 *Illustrations of Semper Augustus tulips*
During the Tulip Mania, Semper Augustus individuals boomed market prices.

Fig. 12 Bee attracted to Lavender

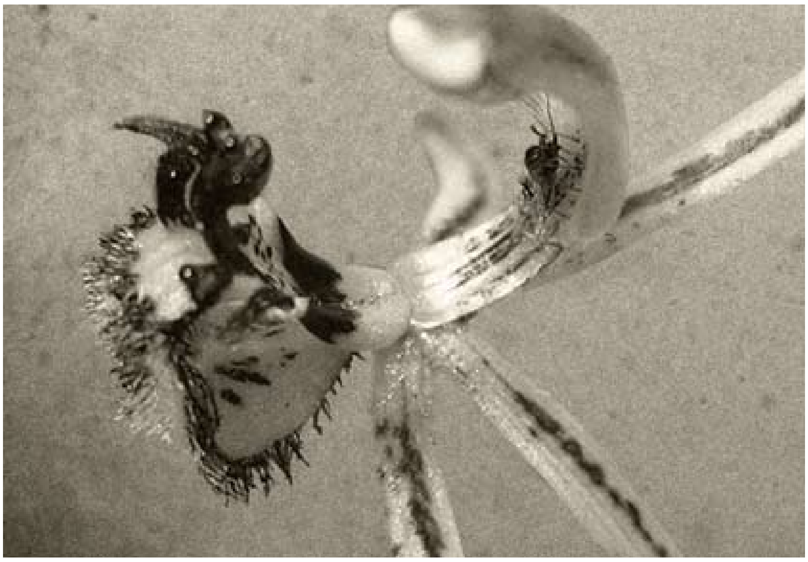

Fig. 13 Australian Orchid

Fig. 12 Bee attracted to Lavender
Plants share a chemical relationship with their environment, attracting potential pollinators through their scents to ensure reproduction.

Fig. 13 Australian Orchid
The Australian Orchid releases a perfume similar to a female wasp's pheromone, luring the males into its pollination.

Fig. 14 Dead Horse Arum
The scent of the Dead Horse Arum resembles that of rotting flesh, attracting flies.

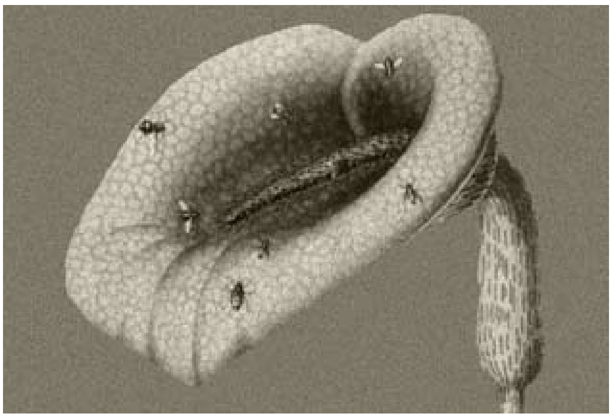

Fig. 14 Dead Horse Arum

3. THE IMPORTANCE OF SMELL

NATURE – CHEMICAL COMPOUNDS – ODOUR & TIME – COMMUNICATION – POLLINATION – SIGNAL – WARNING – EMOTIONS – MEMORY – EXPERIENCE – ILLNESS – SUBSTITUTE

I. SCENT IN NATURE: THE CHEMICAL TRIGGERS.

"What's in a name? That which we call a rose
by any other name would smell as sweet."[21]
- William Shakespeare

Odours are perceptions, not things in the world. The fact that a molecule of phenylethyl alcohol smells like a rose is a function of our brain. [22] But regardless of our sociocultural complexes, scent is of great importance in nature. In many species the chemical compounds released by plants work as a defense mechanism, or as an attraction mechanism for reproductive purposes. Floral scent initially evolved "by borrowing fragrances from other parts of the plant."[23] Many of the scent compounds found in what we now regard as pleasant fragrances once started out as plant defences:

"...compounds called terpenes that give juniper, oregano and basil foliage their characteristic odours drive herbivores away from the stems of some plants but attract pollinators to the flowers of others. Other terpenes that are antibacterial agents for trees also turn up in flowers – for example piney pinene in columbine and citrusy limonene in lavender (...) In nearly all plants salicylic acid turns on cellular defences against viruses. Add a methyl group to it and you get wintergreen, part of the fragrance of jasmine."[24]

The chemical complexity of the scent depends on the species. Snapdragons and petunias can release blends of seven to ten compounds while some orchids might secrete scents with around one-hundred. Snapdragons even function around the clock, releasing most of their odour between 9 a.m. and 4 p.m., in synchrony with bees' work hours. This accounts for the intricate, chemical relationship established between plants and their environment: a chemical communication with their potential pollinators. Some flowers, such as the Australian orchid or the bumblebee orchid, release chemicals that are virtually equal to those released by female wasps and bees, in order to attract the males. The dead horse arum, goes as far as to mimic the putrid flesh of sea gulls, not only visually but also in its smell to attract pollinating flies. The biggest flower in the world, called the amorphophallus titanium, can reach a height of 2,74 meters and flowers once for three days, every three years, and interestingly enough, it possesses an intense smell of rotten fish.[25]

II. THE PRIMITIVE HUMAN SENSE OF SMELL

SMELL AS A RECOGNITION MECHANISM

The word scent derives from the French ‘sentir’ which in turn comes from the latin ‘sentire’ and ultimately means to perceive or experience in relation to sentiments and thoughts. Thus, the etymology of the word acknowledges the primitive nature of smell, as a means of recognition and communication. Smell is a chemical sense, the other being taste, which is approximately 75% smell. But unlike taste, smell can “signal over long distances.”[26] Through our sense of smell, we sample our environment for information, though the majority of the time we might not be aware of it.

“...the fatigue symptoms characteristic of sick-building syndrome are a survival reflex inherited from our evolutionary ancestors. This reflex causes us to feel tired, and therefore to avoid venturing out, when our olfactory receptors signal that the air is contaminated.”[27]

We are constantly testing the quality of the air we breathe, for example, using smell as a warning mechanism to alert us of possible dangers (such as smoke, or other harmful agents). We use our sense of smell as a detection mechanism for food or the presence of other individuals. In this respect, smell has a recognition function since we all have our own unique smell and can recognise and be recognised by others.[28] Our own smell derives from our apocrine glands, which secrete compounds that are odourless, but become scented through the action of bacteria. This is the reason why everyone has a unique smell, except for identical twins.

Our sweat also secretes a chemical signal which can communicate emotion, which explains why we can smell fear. A study done by Karl Grammer in Vienna, showed that women are capable of detecting fear in the armpit secretions of people who had watched a terrifying film. Another study by Martha McClintock showed that we also secrete compounds that transmit information about our mood to others.

***Fig. 15** Except for identical twins, everyone has their own, unique smell*

SMELL AND ITS RELATION TO MEMORY

As our sense of smell is linked to our limbic system, its effects sometimes act on an unconscious level. The limbic system, situated beneath the cerebral cortex, deals with emotions, motivation and the association of emotions with memory. The olfactory system has more direct contact with our external environment than our other senses, since it directly projects into the brain through the olfactory bulb, while the auditory and visual information reach the orbitofrontal cortex after significant processing. This anatomical and functional proximity to the limbic system, in comparison with our other sensory modalities, explains why smell has a unique privilege to the subconscious. This is also why we respond in an involuntary way to smell.

"The limbic system is increasingly recognised to be crucial in determining and regulating the entire emotional 'tone'. Excitation of this, by whatever means, produces heightened emotionalism and an intensification of the senses. It also has a lot to do with the formation of memories and this is the reason that smell and memory are so intimately linked."[29]

Odour-cued memories have been rated as more pleasant and their emotional potency is linked to the activation of the amygdala. Studies suggest that the amygdala-hippocampal complex may be involved in a particular olfactory memory system. And although we must first remember a smell before we can clearly identify it, smell memory is said to fade away less rapidly than other sensory related memories. Literature has long used this associative emotional power of smell as a tool for describing strong sentimental recollections. In The Remembrance of Things Past, Proust describes such an emotional upheaval, triggered by the taste and smell of a madeleine. He then notes that:

"When nothing else subsists from the past (...) after the people are dead, after the things are broken and scattered (...) the smell and taste of things remain poised a long time, like souls (...) bearing resiliently, on tiny and almost impalpable drops of their essence, the immense edifice of memory."[30]

The so-called 'Proust effect' is a reference to the evocative power of scent. This is why a long-forgotten odour can revive a specific memory or a past experienced moment. But with the loss of specific scents, we are also faced with the loss of memories and experiences. Avery Gilbert wonders about this entire 'smellscape' which can "fade away with the changing of times and the closing of a beloved's place."[31] Andy Warhol knew of this smell-memory effect. Apparently he would wear a cologne until he developed a strong emotional link with it, after which he would retire it to his personal smell museum, for his personal enjoyment.

This association between smell and memory means that smell can be linked to a particular experience. If we smell something before a negative experience, that smell will be linked to that particular experience. But the same is true for positive and pleasant experiences. This is probably why people have such an aversion towards the smell of hospitals, since unpleasant medical treatments, or surgery, can be associated with the pain or trauma. On the other hand, this associative power of smell could be used for positive, therapeutic practices, redefining the mind-body interdependency.

	TIME NO. 1	TIME NO. 2	GENERAL COMMENTS AND OBSERVATIONS
MALE 28 BRITISH	00: 00: 14: 57	00: 00: 59: 43	Lotion described as shower gel, a clean smell: something fragrant yet neutral but artificial. Opening second nostril did not allow to smell better."When you breathe out you smell it immediately...at a point it is not so noticeable." After a while subject remarked that although the odour was hard to distinguish he could still 'feel' it (irritation).
MALE 29 MEXICAN	00: 00: 10: 52	00: 00: 20: 48	It was not wasier to detect the second smellonce they let go of the nostril. it was not difficult to detect the second smell after the first. Only observation is that the smell diminished. Mixture did not influence perception. Coffee predominant smell. Memories: lotion reminded of his mother. coffee reminded him of his kitchen in the morning.
MALE 22 BELGIAN	00: 01: 29: 93	00: 01: 30: 07	(subject had a cold and left nostril clogged) When the second smell was supplied subject remarked that the 1st smell was still in 'there'."When you exhale it's still in the nose"
MALE 28 CHINESE	00: 00: 07: 65	00: 00: 11: 35	When released nostril you could smell the odour once again. Not difficult to distinguish the second smell initially smell just faded. There was an initial mixture
FEMALE 26 CHINESE	00: 01: 03: 98	00: 02: 19: 24	It feels like smell is around nose. "I have to really think if the smell is still there or if i just remember the smell". The second smell was mixed with the first. Smelled coffee right away. Easily detected the second smell can still be felt tickling the nose. Nostrils feel different afterwards (olfactory irritation).

Fig 16 Results from *Olfactory Adaptation Test*

This pilot test was done to test how we adapt to odours. Subjects were exposed to two different smells, first whilst pinching one nostril shut, and then to the second smell alone whilst smelling freely.

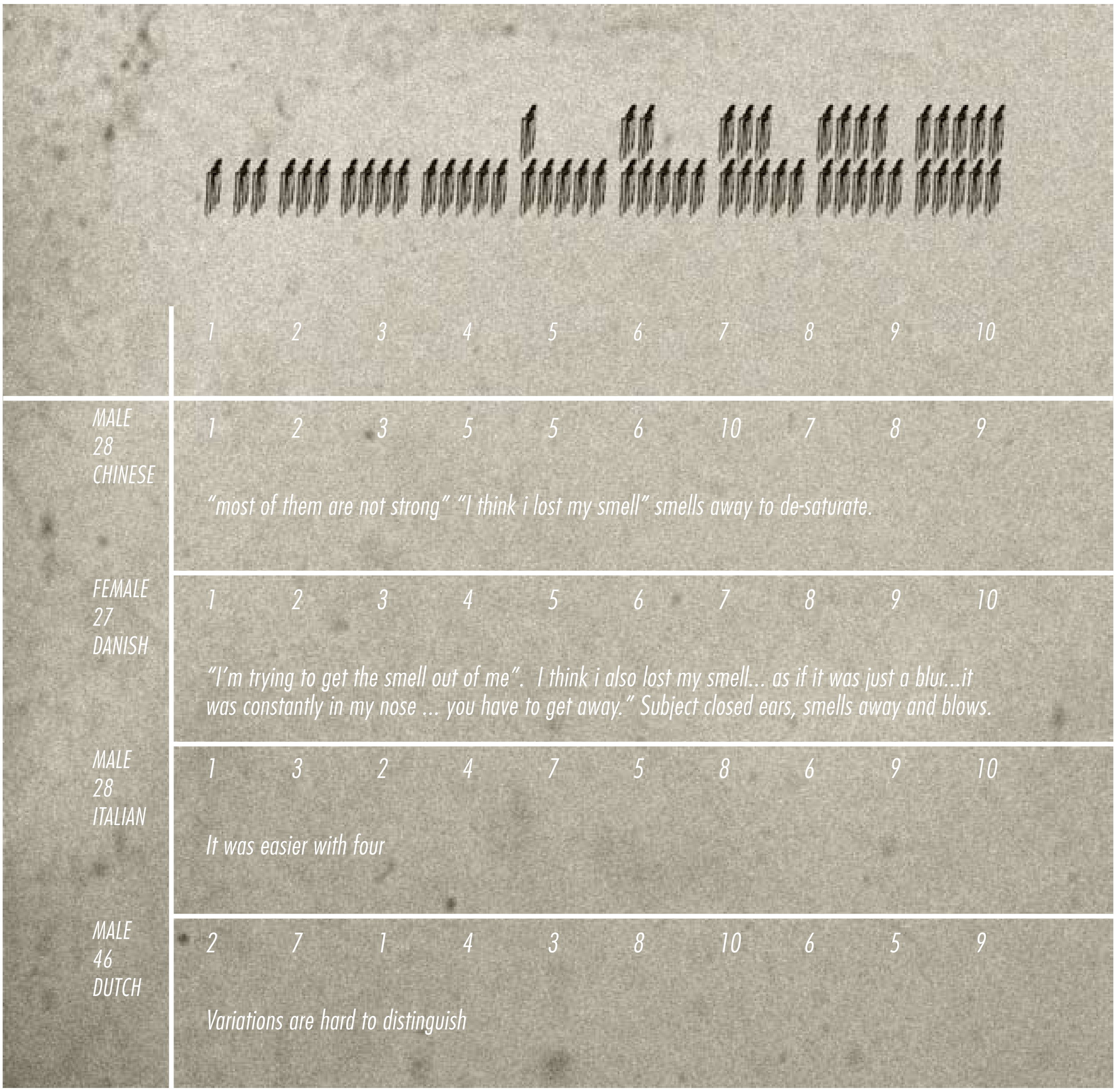

Fig. 17 *Results from Smell Discrimmination Test*

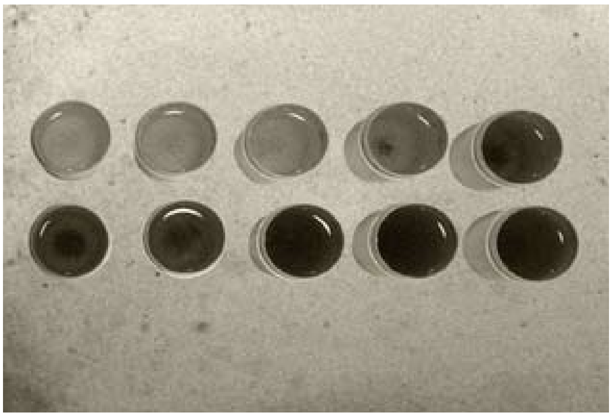

Fig. 18 *We distinguish smells as strong or weak*

Fig. 17 *Results from Smell Discrimmination Test*

Results from a pilot smell discrimmination test which show how little we are accustomed to identifying variations in odour intensity.

Fig. 18 *We distinquish smells as strong or weak*

We have difficulties detecting nuances in odour intensity, and generally rate odours as strong or weak, pleasant or unpleasant.

SMELL AND ITS EFFECTS ON MOOD AND BEHAVIOUR

The human perception of odour is defined by the pleasantness-unpleasantness dimension.[32] The effects of smell on mood and behaviour have been recorded in several studies[33], where positive 'hedonic' odours, have been shown to improve emotional and physical health, reducing stress and anxiety whilst increasing alertness. The anatomical overlap of the olfactory and limbic systems could account for this hedonic aspect of odour:

"Amygdalar activity depends on the hedonic properties of odorants, and unpleasant odour increases rCBF (regional cortical blood flow) in the left amygdala. Thus distinct neurochemical changes in selected brain areas occur as a result of exposure to different odours."[34]

Studies have shown that smell can be put to therapeutic advantage, and deficits in our olfactory functions have even been proven as a sign of illness, such as in schizophrenia, depression, anxiety and extreme migraines. We smell different when we are ill and some illnesses can even be diagnosed by their associated smell (such as acetone and diabetes).[35] Many interactions exist between the immune and the olfactory system, and when immunological function (autoimmunity) is impaired, olfaction can also be affected.[36] Even so, the analysis of olfactory ability is not yet implemented by clinicians in both diagnosis and treatment, being overlooked by both patients and their clinicians.[37]

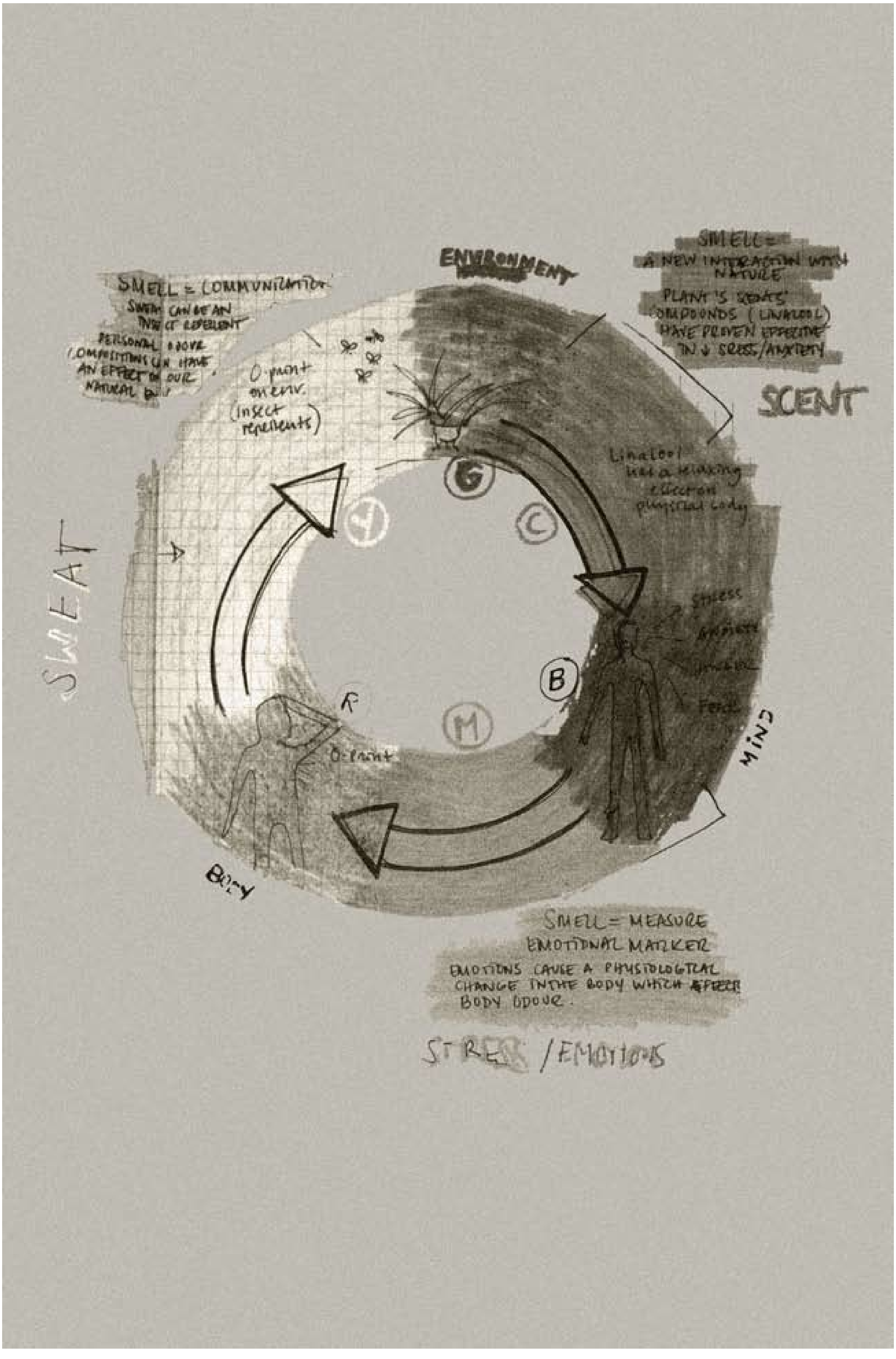

Fig. 19 *Smell can provide relevant information about ourselves and our environment*

Fig. 20 Mapping out smell's relevance

Fig. 21 Drugs like Prozac could be replaced by placebos

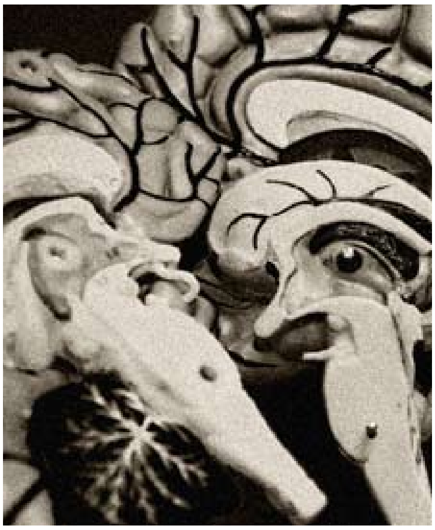

Fig. 22 Our natural painkillers

Fig. 21 Drugs like Prozac could be replaced by placebos

The compound linalool found in the scents of certain plants such as Rosemarinus officinalis, Melissa officinalis and Lemon grass, reduces anxiety and aggressive behaviour in both mice and men.

Fig. 22 Our natural painkillers

By using placebos the brain is triggered into releasing its own painkillers known as endorphins.

4. THE NOCEBO & PLACEBO EFFECT

NOCEBO – EXPERIENCE – ODOURS EXPECTATIONS – BELIEF SYSTEM – SELF-HEALING – ANTICIPATION – ENDORPHINS – SUBTRACTIVE

I. THE NOCEBO EFFECT : BELIEVING TRUMPS SMELLING

Our experiences with odours can thus exert a significant influence on the way our brain processes them.[38]As Dr. Monique Smeets from Utrecht University points out, most odours acquire meaning by learning and thus through association odour becomes paired with memory.[39] This is the case since our senses are manipulable and affected by our beliefs. Tests show that odours can elicit behaviour[40] and implicit associations to certain smells can even cause physical illness[41].Thus, odour aversions can be created through experiences, and smells associated with trauma can leave a strong imprint. Our brain shapes our perception of smell since the cerebellum monitors our sensory input (odor strength) in order to control a motor action (inhalation).

This mental aspect in our perception of smells is linked to several olfactory phenomenons such as olfactory adaptation and olfactory suggestion. The first one alludes to the capability we have of adapting to odours, which is influenced by several factors such as time of exposure, odour strength an odour specificity. Long- term adaptation is the reason why some jobs are bearable by some people, such as pig-farming, with a constant exposure to strong and unpleasant odours. Adaptation also gives us the capabitlity of eventually detecting small nuances in smells, essential in the job of a perfumer. Olfactory suggestion, on the other hand, alludes to our mental expectancies of smells:

“(...) just expecting a smell can trigger odor perception (...) Expectations alter the perception of actual odors (...) odors we think are benign fade from awareness, while hazardous ones hold our attention and stay strong.”[42]

Both aspects of smell are related to the ‘sick building syndrome’, because the nose and brain constanty reshape our olfactory awareness of the environment. Because of this, our perception of smells can have extreme physical consequences on the body’s physical health and smells perceived as harmful can cause illness. This is the case of sufferers from Multiple

Fig. 23 *Linalool has been proven to reduce anxiety*

Fig. 23 *Linalool has been proven to reduce anxiety*

The compound linalool found in the scents of certain plants such as Rosemarinus officinalis, Melissa officinalis and Lemon grass, reduces anxiety and aggressive behaviour in both mice and men.

Fig. 24 *Odours can influence behaviour*

A test done in Nijmegen University proved that our odour associations can elicit behaviour. Being exposed to the smell of lemon - considered as a clean scent - subjects cleaned more regularly after themselves, whilst eating crumbly crackers.

Fig. 24 *Odours can influence behaviour*

Fig. 25 *What happens when we react in an extreme manner with our chemical self?*

Chemical Sensitivity (MCS) also known as Ideopathic Environmental Intolerance (IEI). MCS seems to be one of the only illness where the patient diagnoses their own condition. Our associatons to smells can thus have great consequences: if you tell someone that a smell is harmful, their perception of that smell will effectively change.[43]

“IEI (ideopathis environmental intolerance) sufferers are no more sensitive to odour than anyone else (...) a patient’s brain intuits harm from a sensory message that causes no alarm in a healthy person (...) We sometimes create odour aversions in a misguided attempt to avoid truly bad smells (...) All it takes is a single episode of physical distress to turn an odour into a trigger for illness. Symptom learning works better with malodors than with pleasant, fresh scent.”[44]

This nocebo* effect of smells can also spread from one odour to another, which is known as stimulus generalisation. The propagation to related odours can happen up to a week after the initial event. In the movie Safe by Todd Haynes[45], this chain-reaction effect is clearly shown in the main character played by Julianne Moore when an initial exposure to car pollution triggers a series of consequent physical adversities to other odours. With the tag line: “In the 21st century... Nobody will be safe”, what the movie illustrates, by depicting this ‘sociogenic illness’, is how our perceptions and beliefs in relation to odours can eclipse the very act of smelling.

II. THE PLACEBO EFFECT: SMELL-MEMORY

The placebo effect works on the promise of treatment and the belief system of the recipient. Expectations of pain and relief constitute a primary component, which then orchestrate the brain and body’s responses accordingly. Fabrizio Benedetti, from the University of Turin has discovered many of the biochemical reactions involved in this mechanism, revealing a series of self-healing processes. The effect is found to be successful mainly in disorders which have in common their engagement in:

“ (...) higher cortical centers that generate beliefs and expectations, interpret social cues and anticipate rewards. So do chronic pain, sexual dysfunction, Parkinson’s and many other ailments that respond robustly to placebo treatment.”[46]

Michel de Montaigne, in an early allusion to placebos, wrote in 1572 that the mere sight of medicine could be operative.[47] The potential of the brain’s own “centralised network for healing,” has even overtaken drugs like Prozac, and has revolutionised the practice of pharmacology in the past decade:

“From 2001 to 2006, the percentage of new products cut from development after Phase II clinical trials, when drugs are first tested against placebo, rose by 20%. The failure rate in more extensive Phase III trials increased by 11%, mainly due to surprisingly poor showings against placebo.”[48]

The placebo effect is caused by the physical reaction of the brain under a treatment which

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* The opposite of the placebo effect. A psychological or psychosomatic factor that engenders or exacerbates an illness.

is believed to cure, releasing endorphins which are the body's own, natural painkillers. In a study done by the University of Michigan, it was found that the participants:

"showed a increase in the activation of their mu opioid endorphin system after they were told that the"medicine" was coming and the placebo was given. The most pronounced differences were seen in four areas of the brain known to be involved in complex responses to, and processing of, pain."[49]

In this respect, smells linked to experiences and memory can also exert a great influence in this self-healing processes. The potential of smell to work on another level from the verbal, the unconscious, could be used for therapeutic advantage in the treatment of illnesses.
Its effects on mood and behaviour make smell reactions uncontrolable. Because it is an automatic process, we react in an emotional manner to odours. Clinical studies show proof of the healing potency of smell through its associational link to past experiences:

"Insulin was injected into healthy male volunteers once a day for four days and their blood glucose was measured (it fell). At the same time, they were exposed to smell. On the fifth day they were just given the smell, and, their blood glucose fell."[50]

Thus, by associating smell with a positive healing treatment and then reinforcing this connection, smell has been proven to be capable of substituting for the treatment. This means that this smell-memory effect could possibly be thought of as a placebo. In this respect, smell could redefine medical experiences. Could we use smell as a placebo, replacing our ingestion of pills?

CONCLUSION

This first half of the project aims to analyse the underlying processes which conform our chemical sense of smell, commonly eclipsed by the predominance of the visual in our society. The goal was not only to analyse cultural and social conventions in relation to smell, but also to explore the inner workings of our chemical sense, along with its relevance in nature. Surprisingly, smell's unique functions have been found at the core of a complex interdependancy with our immediate surroundings.

Throughout this project, I found that the smell-memory effect could function as a placebo, and odours could be used to trigger physical reactions in the body. This means that smell not only affects our emotions, but also manages numerous cognitive processes and subsequent physical reactions in our bodies. It's intrinsic link to memory and its associative power, can be used to create new learning procedures, redefining the mind-body binome. This power of smell could change the way we address health as a whole, along with existing practices in clinical therapy.

By addressing smell and it's importance, I believe we also gain a different perception of our natural environment, which could eventually lead to a new interaction with it. Our present intervention with nature, is mostly aimed at a visual delectation. By proposing this chemical exchange with our surroundings, we can question our inherited perception of nature, and redefine our role amongst other species. A new dialogue is insinuated in this context, which brings into question what we have built around us.

How can the shift from a visually-mediated cultural practice into a chemical one, change existing systems and processes?

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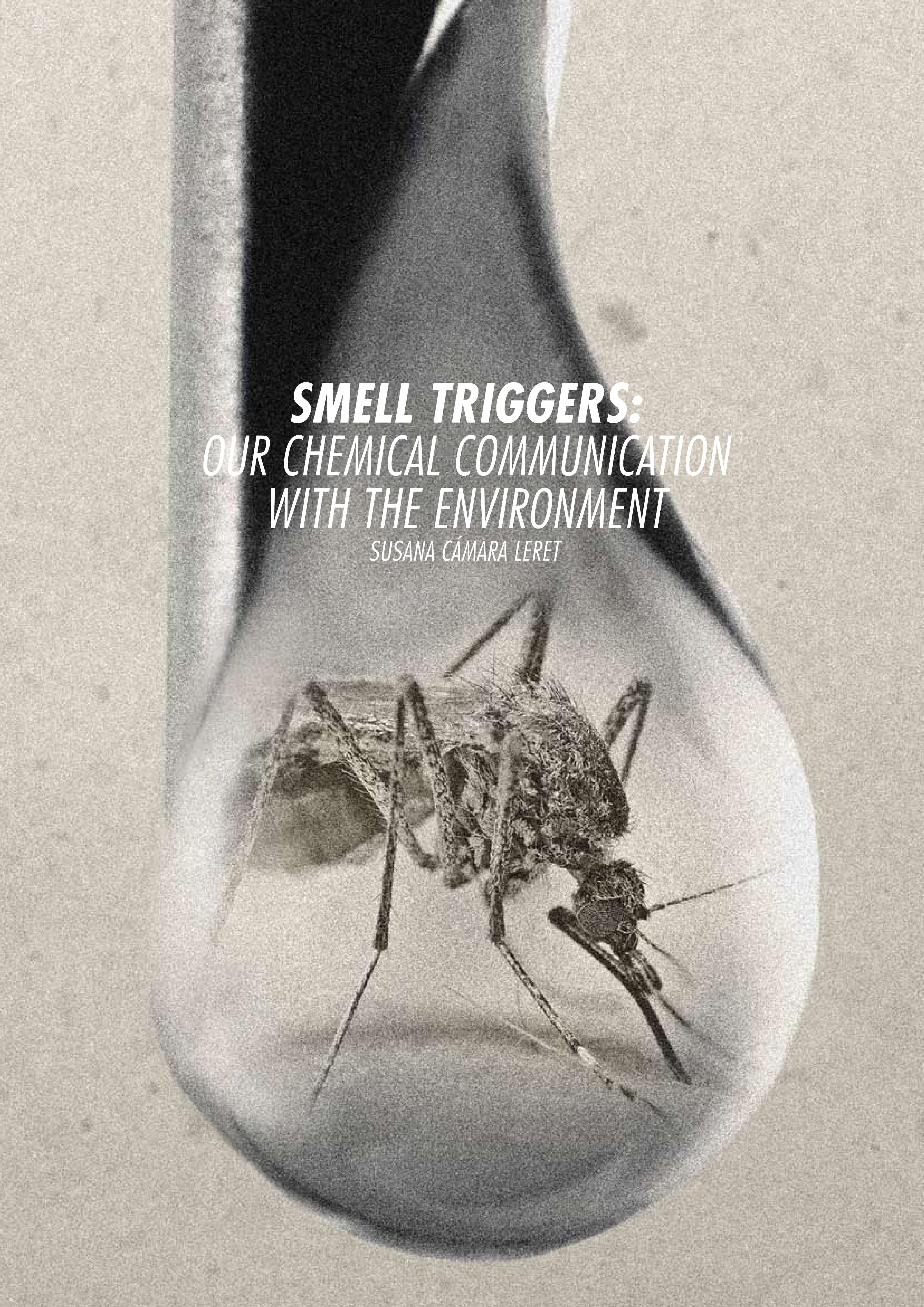
SMELL TRIGGERS:
OUR CHEMICAL COMMUNICATION WITH THE ENVIRONMENT

SUSANA CÁMARA LERET



SMELL TRIGGERS:
OUR CHEMICAL COMMUNICATION WITH THE ENVIRONMENT

SUSANA CÁMARA LERET

In memory of Gabriel Leret Ruíz & Carmen Verdú Salinas

***Fig. 1** Chemical signalling surrounds us*

ACKNOWLEDGEMENTS

I would like to thank the following people for their support and guidance throughout the project:

Maria Luisa Leret Verdu from the Department of Physiology (Animal Physiology II) University Complutense of Madrid, Spain; Jan Frits Veldkamp PhD from the National Herbarium of the Netherlands; Maarten A. Jongsma PhD from Plant Breeding International, Wageningen University and Research Center, The Netherlands; Gary Beauchamp, Director of The Monell Chemical Senses Center in Philapdelphia, U.S.A.; Andrea Evers, Investigator Clinical Psychology at the Medisch Centrum Radboud Universiteit Nijmegen, The Netherlands; Monique Smeets from the Department of Clinical Psychology, Utrecht University, The Netherlands; Patricia Bulsing, Unilever, The Netherlands. I especially would like to thank my family for their encouragement and reassurance and my brother Rodrigo Cámara Leret for his never-ending advice.

Fig. 2 *Natural translators*

CONTENTS

Fig. 3 Sweat is a source of information

INTRODUCTION

During the first half of this project I approached the topic of smell from an initial observation: we are losing smell. The repercussions of our lack of esteem towards our chemical sense quickly became apparent in our interventions with nature. In the age of biotechnology, not only are we losing out, but we are depriving some natural species of an essential tool which enables them to communicate with their surroundings. Paradoxically, smell is commonly regarded as a mere agent for the achievement of a heightened, sensorial experience. Nevertheless, it belongs to some of the most complex processes I could have ever imagined to encounter.

The second half of this study, aims to communicate this complexity of smell. Because smell is information, I aimed to envision just what kind of new interactions we could engage in.

The possibilities are many...

Fig. 4 Towards a chemical communication

HYPOTHESIS

We live in a highly visual society ruled by data and probability, yet research shows that our chemical sense of smell can provide a renewed understanding of our body and nature. Through a multidisciplinary practice, design can confront scientific data and research from the fields of biology, neuroscience, psychology and the visual arts, in order to speculate future possibilities. By considering smell as a marker for medical information we encounter a different type of communicative exchange between us and our environment.

In the context of healthcare, what are the design implications of our chemical relationship with our environment?

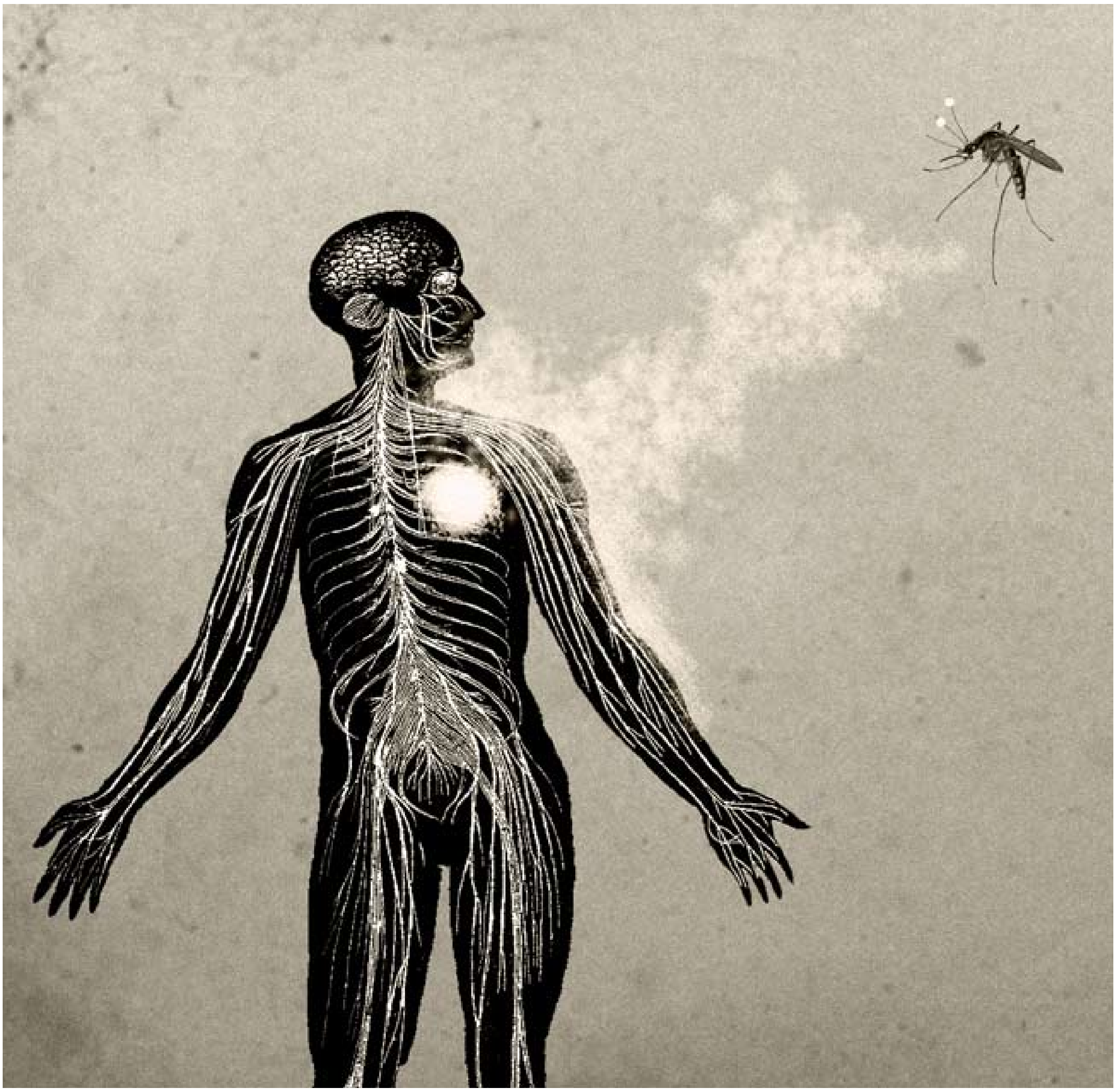


Fig. 5 Exchanging relevant information

Fig. 6 Changing our perception of nature

Fig. 5 Communicating chemically

Our body odour constantly communicates with our surroundings.

Fig. 6 Changing our perception of nature

Signals we emit through our sweat are perceived by insects such as mosquitoes.

1. WE SMELL

ODOURTYPES – IDENTITY – GENETICS – BIOMARKER – SURVEILLANCE – HEALTH – CHEMICAL INFORMATION

I. ODOUR – IDENTITY

"There is a general and universal system of chemical communication in which all living things are involved. The result is a coordinated ecological mechanism for the regulation of who goes where, and how many can afford to do so."[1]
- William Shakespeare

Humans have a unique odourprint, similar to fingerprints: we all have our own smell. This personal odourtype information is transmitted through body fluids such as sweat and urine, which contain chemical molecules called volatile organic compounds (VOCs).[2] The use of smell as a biomarker could lead to new ways of approaching identity and health, along with promoting a new understanding of our bodies and our constant interaction with our environment.

Our odour is composed of various VOCs such as alcohols, ketones, aldehydes, esters and hydrocarbons, amongst other substances. Studies show that our personal smell is genetically determined. This primary odour remains stable and constant over time[3] regardless of diet and other external factors. As scientists claim, each of the 6.7 billion people on Earth has a unique body odour[4] : our own chemical signature.

It has been suggested that individual identification might be one of the most important messages used in vertebrate chemical communication.[5] Body odour contains relevant information about an individual and people can distinguish the scent of others, especially if they are unrelated and have different diets. Odourtypes apparently vary by gender, as shown in a recent study, which found that men smell of cheese while women smell of grapefruit or onions.[6] But they can also reflect age, as Dr. Preti from the Monell Chemical Senses Center in Philadelphia discovered. Aldehyde nonanal, with an unpleasant greasy and grassy odour, was proven to increase with aging, being characteristic of the middle-aged and elderly's odours.[7]

"*An individual's odourtype is determined in part by genes in a genomic region called the major histocompatibility complex (MHC), which plays a role in the immune system and are found in most vertebrates, our odour is a source of identity.*"[8]

Different body parts produce different smells due to the different types of bacteria we contain, different amounts of oxygen available and our different types of skin glands and secretions. According to Dr. Preti:

"All of these go into creating different groups of volatiles that influence the odourprint that are emanating from you (...) [Odourprints are] a group of molecules present in certain ratios that might be quantitatively different for each individual on the planet (...)[9]

In this respect, odourprints are seen by researchers as similar to facial features in the sense that no single or individual measurement on a face can be used by itself to recognise an individual. We all have our own personal chemical pattern composition.

II. ODOUR – SURVEILLANCE

The idea of an individual and personal body odour is nothing new. The Stasi secret police in Communist East Germany started researching scent analysis in 1970. This was depicted in the Oscar winning film The Lives of Others, centered on a Stasi surveillance officer.[10] They collected hundreds of scent samples from critics of the regime, which were then stored in air-tight containers:

"*The Stasi stole items of clothing from the regime's opponents at their place of work or where they played sport, or they would take the odor sample from chairs they had sat on in the pub or during an interrogation.*"[11]

Currently, research into scent analysis is growing. In 2007 Der Spiegel magazine revealed that German authorities had collected scent samples from activists in advance of the G8 summit, to prevent these from possibly interfering with it. Dr. Kenneth G. Furton, from Florida International University, is working with the Netherlands National Police Agency on the search for detectable odourprint patterns emitted by people. The U.S. also seems to be looking into new olfactory detection mechanisms[12] and the Pentagon appears to be financing research at Darpa – Defense Advanced Research Projects Agency – to develop detectors which could potentially detect the scents of enemies in collaboration with smell-research institutes such as The Monell Chemical Senses Center. According to Gary Beauchamp, a behavioural biologist and director of this institution who is working on the Darpa project, it should be possible to:

"*(...) recognize how old someone is, what their gender is, and what illnesses they have (...) We need a big leap in technology to create sensors that can do the same thing. But there is a lot of work being done on this now. The time has come for this technology(...)*"[13]

A technology that could consist in the employment and training of insects, which are being studied as possible detecting agents:

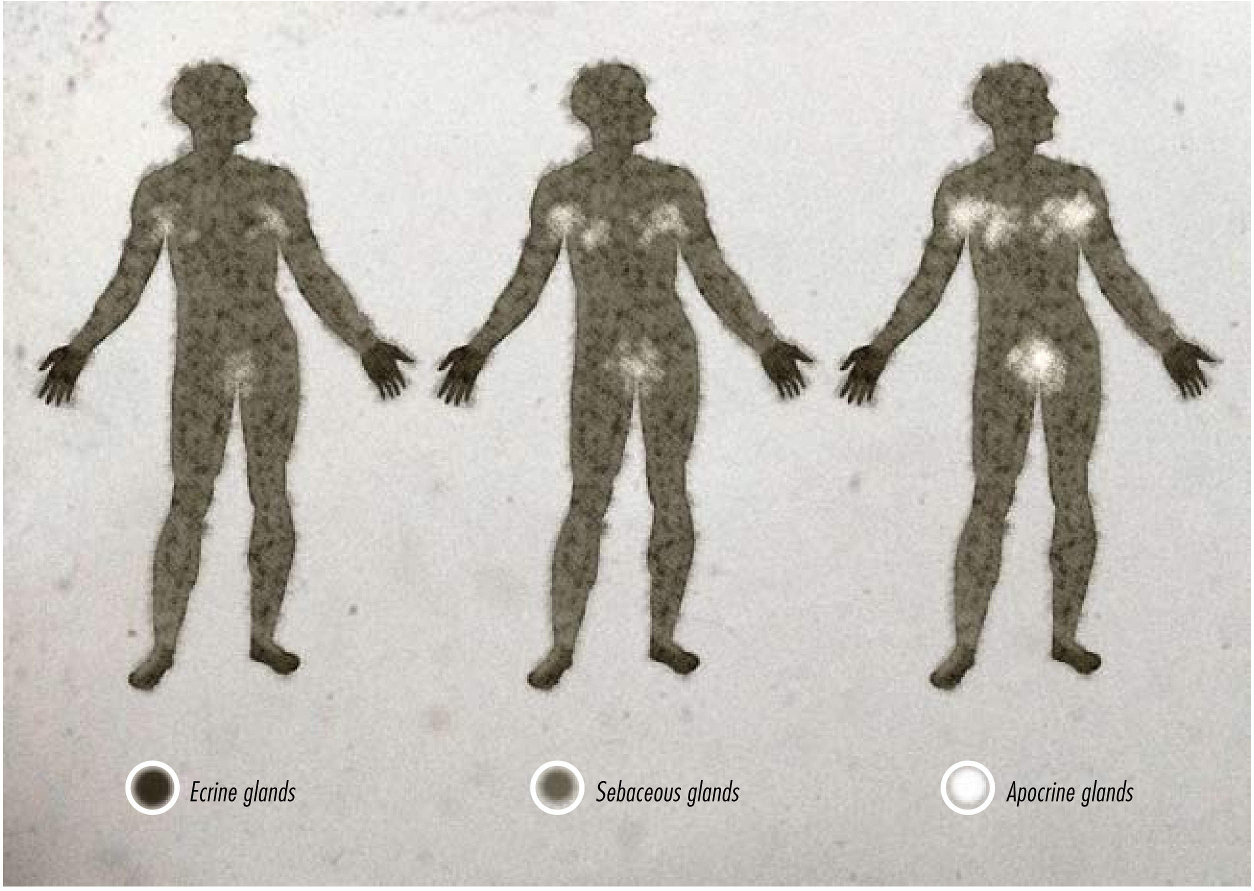


Fig. 7 Body odour is genetically determined

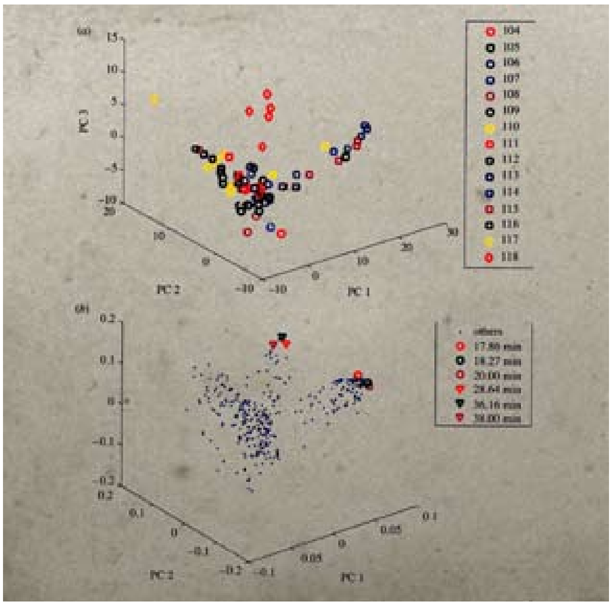


Fig. 8 We each have an individual odourprint

Fig. 7 Body odour is genetically determined

Generally, asians have less apocrine glands than caucasians and africans. Africans tend to have more and larger apocrine glands than asians or caucasians.

Fig. 8 We each have an individual odourprint

An example from a recent study which shows individual markers in the analysis of personal scent samples.

Fig. 9 Control through odour

Fig. 10 Surveillance Agents

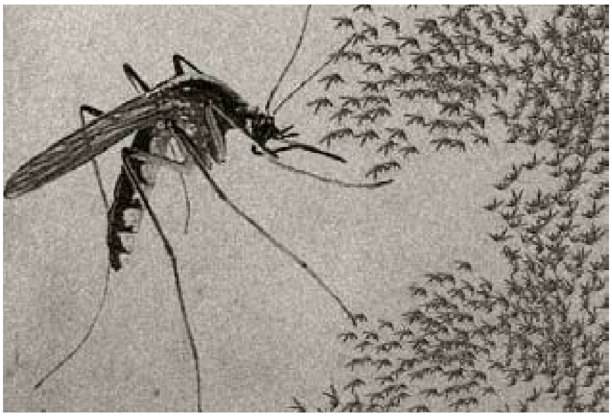


Fig. 11 Biological Sensors

Fig. 9 Control through odour
Stasi glass jars used to store sweat samples from regime oposers.

Fig. 10 Surveillance Agents
Studies are looking into the use of animals as scent control agents.

Fig. 11 Biological Sensors
Insects such as mosquitoes possess exemplary olfactory capabilities.

"*The Home Office is known to have funded at least one study into the feasibility of releasing swarms of trained bees to search out target odours. The US has similar plans for moths, bees, wasps and cockroaches, and Russia has cross-bred jackals with dogs for an enhanced sense of smell. Even yeast has been genetically manipulated to react to molecules of interest to the security services. Companies across the globe are designing and touting "electronic noses", machines that seek to mimic the mammalian sensory apparatus, in an attempt to satisfy new security demands.*"[14]

The use of insects as biological sensors points towards a new interaction with our environment, no longer mediated by the visual sphere. These odour detection 'tools' would enable states to obtain information from individuals beyond the range of the human senses. The advantage of using smell versus other biomarkers is that smell can be recognised from a distance and it can also linger in an area. In the age of biotechnology, how could we employ these natural sensors to obtain further relevant information about ourselves?

III. ODOUR – HEALTH

Our body odour is more than just a stench which we must mask with synthetic smells to achieve social acceptance. It is a source of information and can serve as an alert mechanism, due to smell's intrinsic link with our immune system. Our body smell contains relevant medical information about ourselves.

In 1974 Lewis Thomas speculated that the genes and cell-surface proteins of the immune's system's major histocompatibility complex (MHC) could maybe be the source of individual odour profiles. One theory is that different MHCs lead to different microflora, which influence the mix of different body odour chemicals.[15] This link to immunity could be the reason why smell is a potential biomarker for disease.[16]

The literature already shows that the detection of breast cancer through breath is possible.[17] In this respect, not only can odourprints be used to detect individuals, but body odour differences could also determine disease.[18] Scientists are now busy seeking the smell signatures of diseases such as cancer and diabetes and some psychosomatic illnesses such as depression[19]:

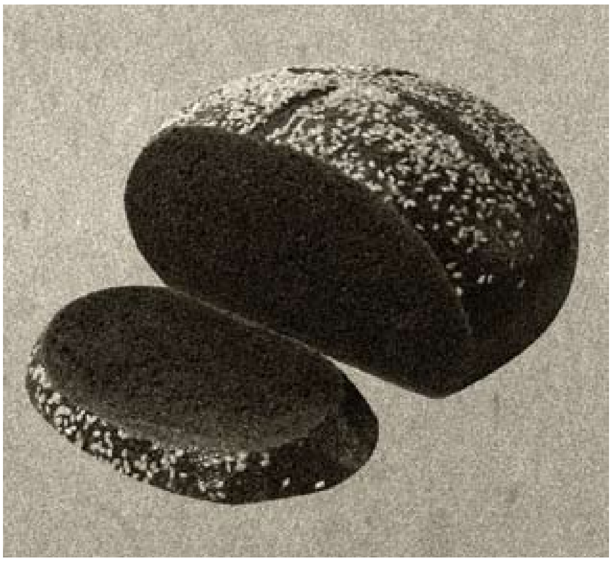
"*(...) some medical researchers insist they can identify certain disease patterns by differences in the smell of stool, vomit and bodily gases (...) Already, specially trained service dogs can alert their owner to an approaching seizure.*"[20]
Nevertheless the link between smell and disease is nothing new. Physicians once tasted a patient's urine to diagnose disease. Diabetes mellitus means 'passing through sweet', which might be due to the fact that it was once diagnosed by the sweetness of a patient's urine and thus for centuries the disease was referred to as 'pissing evil'.[21] Records show that the use of odour in disease diagnosis was already present in Hindu and Arab medicine:

"*Nearly two centuries ago, one of the originators of Hindu medicine, Susruta Smhita, claimed that 'by the sense of smell we can recognize the peculiar perspiration of many diseases, which has an important bearing on their identification'.*[22] *One thousand years ago,* *the Arabian physician Avicenna observed that an individual's urine odour changed during sickness.*"[23]

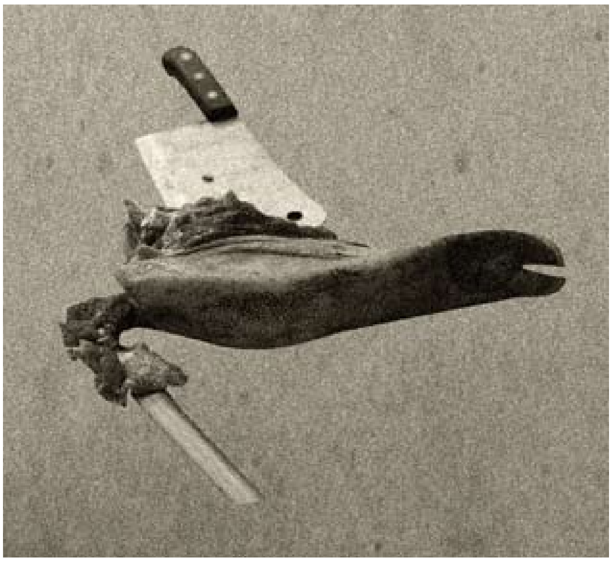
Today, developments in sensor technology are under way, focused on the production of devices known as electronic noses, with the intention of the detection of microbial infections. It is well known that microorganisms produce a range of volatile compounds, which is partly why odour varies as a result of infections. Dr. Dustin Penn mentions that it is surprising that these chemical signals have not received more attention as potential disease indicators[24], yet current investigations show that there is increasing interest in determining if body odour can be used to diagnose disease, or altered to reduce the risk of contracting disease.[25]

The area surrounding an object or person in which their odour can be analysed is termed headspace. Analysis of these human secretions are being studied to discern which compounds constitute an attraction to disease vectors, such as for example mosquitoes. It is known that these insects are more attracted to some individuals than others, due to their chemical odour composition. What if we could use our chemical exchange with these biological sensors for a beneficial outcome?

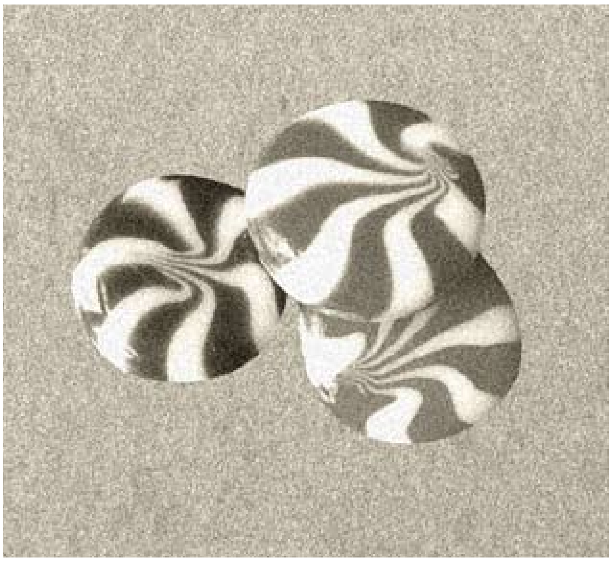
TUBERCULOSIS - *Stale beer*



TYPHOID - *Freshly baked brown bread*

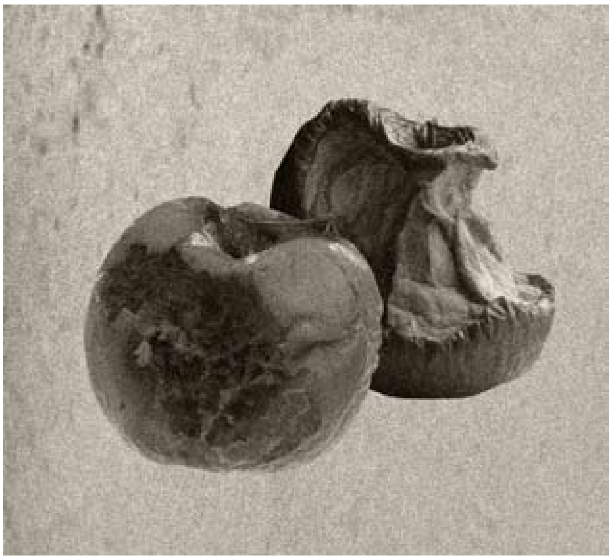


YELLOW FEVER - *Butcher shop*



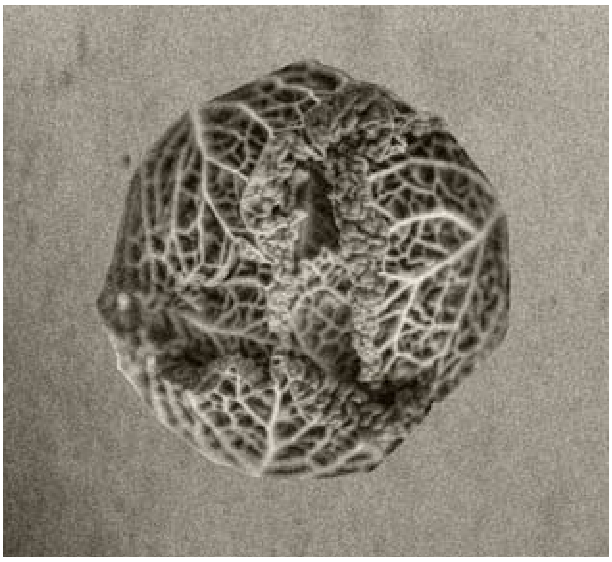
DIPHTHERIA - *Sweetish*

Fig. 12 Infectious Diseases and their characteristic odour



DIABETIC KETOSIS - *Decomposing apples*

INABILITY TO METABOLISE HEXANOIC ACIDS - *Sweaty feet*



INABILITY TO METABOLISE METHIONINE - *Boiled cabbage*

DEFECTIVE METABOLISM OF AMINO ACIDS - *Maple syrup*

Fig. 13 Noninfectious Diseases and their characteristic odour

2. CHEMICAL COMMUNICATION

CHEMICAL SIGNALS – SPECIES – COMMUNICATION – MICROBES – QUORUM SENSING – MOSQUITOES – FLYING SYRINGES

I. NATURE'S CHEMICAL SENSING

The notion of chemosensory identity sustains the fact that species communicate chemically, with the aim of fulfilling different objectives. Chemical signals between the sexes for example, are employed to attract and select potential mates[26] by bacteria, fungi, protists, plants and animals:

"*There is an enormous diversity of mechanisms mediating chemical communication (...) Single-celled organisms and the gametes of multicelled organisms use chemical signals to locate and recognize their mates (...) Male mammals display their scent for females using complex mixtures of odorants secreted by a diversity of androgen-dependent scent glands (...)*"[27]

Chemical signals can communicate the presence of food for many species. Some insects such as cockroaches, crickets and locusts can even differentiate food types using scent cues.[28]
The Kenyan jumping spider E. Culicivora feeds indirectly on blood. It is a mosquito eating predator and it's food source consists mainly of the mosquito species Anopheles gambiae, the main vector of malaria. A study recently showed that both sexes of this species became more attractive once having fed on female blood-carrying mosquitoes.[29]

These chemical signals can also advertise health or genetic attributes, in aims of measuring genetic compatibility. Female house mice, for example, are attracted to the urine of male mice, which serve as scent markers. A study found that females were capable of distinguishing between the urines of parasitised and unparasitised males[30] and were more attracted to those uninfected males. The odour of those infected individuals simply lost its attractiveness. In this respect, there are many ways in which an individual's odour might signal infection:

"*First, infection might change the composition of commensal microbes that play an important role in shaping an individual's odor (...) Second, infection might also trigger* *immunological responses that alter an individual's odor (...) Third, activation of the immune system probably alters the excretion of other metabolic by-products from the, endocrine system. For example, infected individuals have high concentrations of plasma corticosterone14 and low concentrations of androgens, hormones suspected to control the production of 'alarm odors' and 'sex pheromones', respectively*"[31]

In the race for survival and reproduction, chemical signals support relevant information on who the best suited mate is, but they can also function as an alert mechanism to avoid disease contraction.

II. OUR CHEMICAL BODY

We are constantly engaging in a chemical communication with our environment. Our bodies smell and by doing so we release relevant information about ourselves. Some of this information is released in the form of volatiles and some is even detectable by the human nose. Other signals are only perceivable by biological antennae.

Bacteria communicate using chemical signals, by releasing and receiving signalling molecules in what is known as quorum sensing. They don't just communicate amongst themselves but also interact with signals sent by their human host:

"*Many species of bacteria have been shown to be in constant communication with each other (...) bacteria not only receive signals from each other, but also intercept them from the cells of their plant or animal hosts, including us (...)*"[32]

The microbiologist Steve Atkinson, from the University of Nottingham in the UK, notes that it's about "*signal production, interception – and maybe even coercion of the host to do something that it wouldn't normally do*".[33] According to Atkinson, our cells might even exploit the same signalling system to supervise our body's microbes. These are constantly engaged in a chemical communication and are present all over our body: in our mouths, in our noses and on our skin, whilst engaged in conversation with us.

Through a chemical signalling procedure, some body secretions inevitably communicate a source for food to some insects such as mosquitoes. The smelly chemicals some people secrete, such as lactic acid and nonanal[34], are specially attractive to these insects whilst others simply fail to attract. It is the female mosquitoes which require blood for reproduction, since they need proteins contained in blood to produce eggs, while male mosquitoes tend to feed on nectar. These insects are commonly regarded as a threat to humans since they are carriers of important diseases such as malaria, dengue, and west nile virus.

Research is under way to determine which human odorants can fail to attract these insects, in order to produce more effective insect repellents. James Logan, from the University of Aberdeen in the UK, isolated the most potent repellent chemicals, by strapping electrodes to the antennae of female mosquitoes and analysing their responses to several compounds:

Fig. 14 *Flying Syringes*
Scientists are currently genetically modifying mosquitoes in aims of using their feeding mechanism to deliver vaccines.

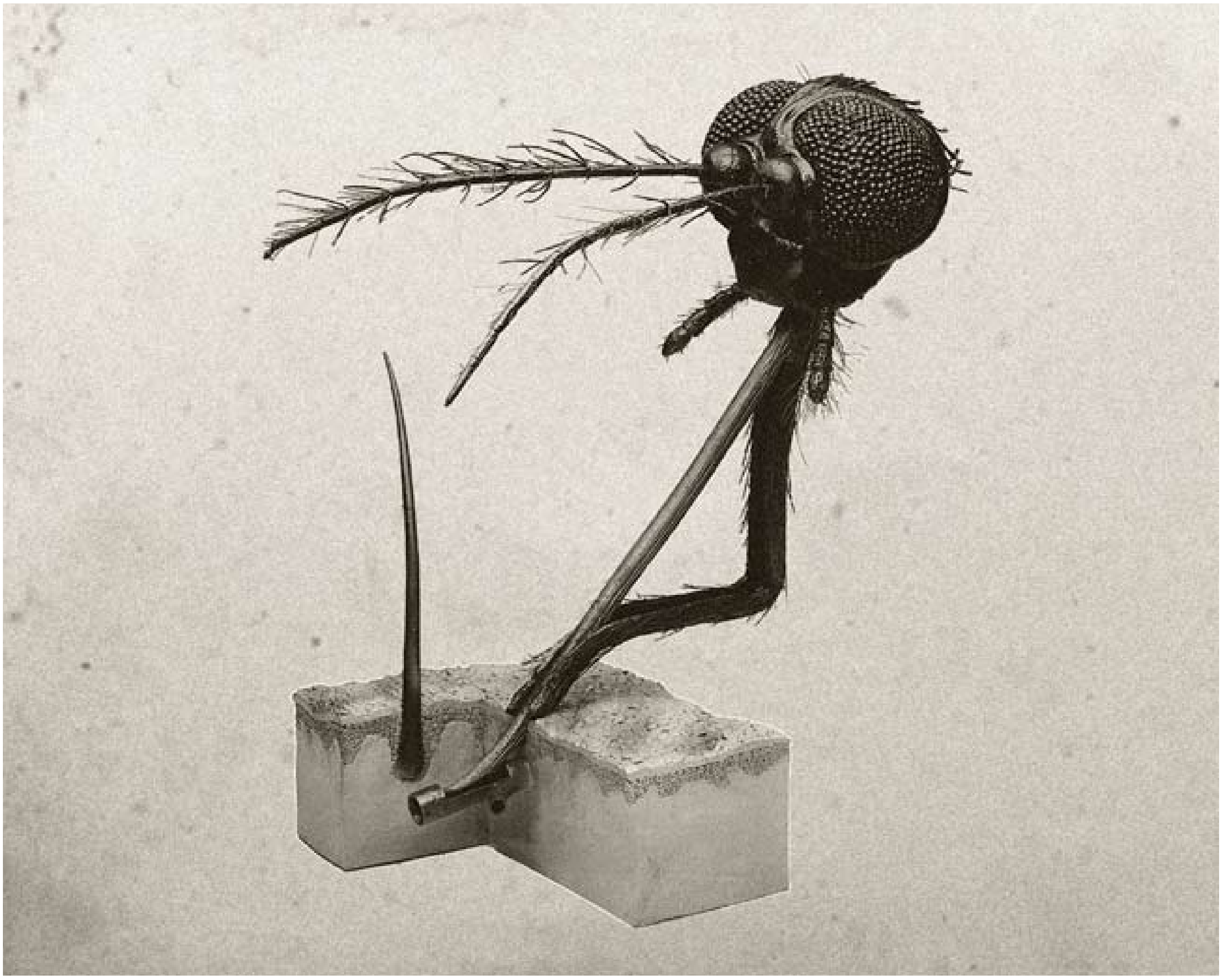


Fig. 15 *Mosquitoes 'fish' into our skin whilst searching for a blood meal*

"*Logan will not divulge the names of the chemicals until they are patented. But he does reveal that although the scent of the chemicals is normally undetectable by humans, they have a fruity smell when highly concentrated.*"[35]

Yet science is also searching in the opposing direction, with the intention of utilising these insects as cure propagators. A Japanese group of researchers is looking into the genetic manipulation of these insects to turn them into 'flying syringes'. When mosquitoes bite us, they inject a saliva through a parallel yet separate channel, to that which they extract blood with. This saliva presents properties which prevent the blood from clotting. The Japanese researchers are looking into adding an antigen in the mosquito's saliva to trigger an immune response in the insect's host. Thus they found that:

"*(...) they attached SP15, a candidate vaccine against leishmaniasis, a parasitic disease spread by sand flies that can cause skin sores and organ damage. Sure enough, the mosquitoes produced SP15 in their saliva, the team reports in the current issue of Insect Molecular Biology. And when the insects were allowed to feast on mice, the mice developed antibodies against SP15.*"[36]

CONCLUSION

The chemical communication occurring between the different natural kingdoms, in a cross-signalling manner, alludes to a greater interdependency than we had imagined amongst different species. This link to our environment implies that we can no longer conceive of ourselves as human beings isolated from all other organisms, but of another active agent in a chemically-interdependent ecosystem. By addressing smell as information we are confronted with a new perception of the human body, engaged in a constant exchange with its surroundings. Our body odour is commonly regarded negatively as something offensive which we must mask. In this new context, its importance as a source of information is affirmed, questioning popular beliefs on bodily smells. The notion of cross-kingdom signalling bears many implications in relation to smell and our health. From this perspective, our body's chemical imbalance - disease - can be considered as a communicational problem and tackled through communicative strategies.

New ways of measuring health are possible which emerge from this new dialogue with nature. In this respect, it is necessary to rethink existing systems and processes concerning healthcare, by taking into account these future possibilities.

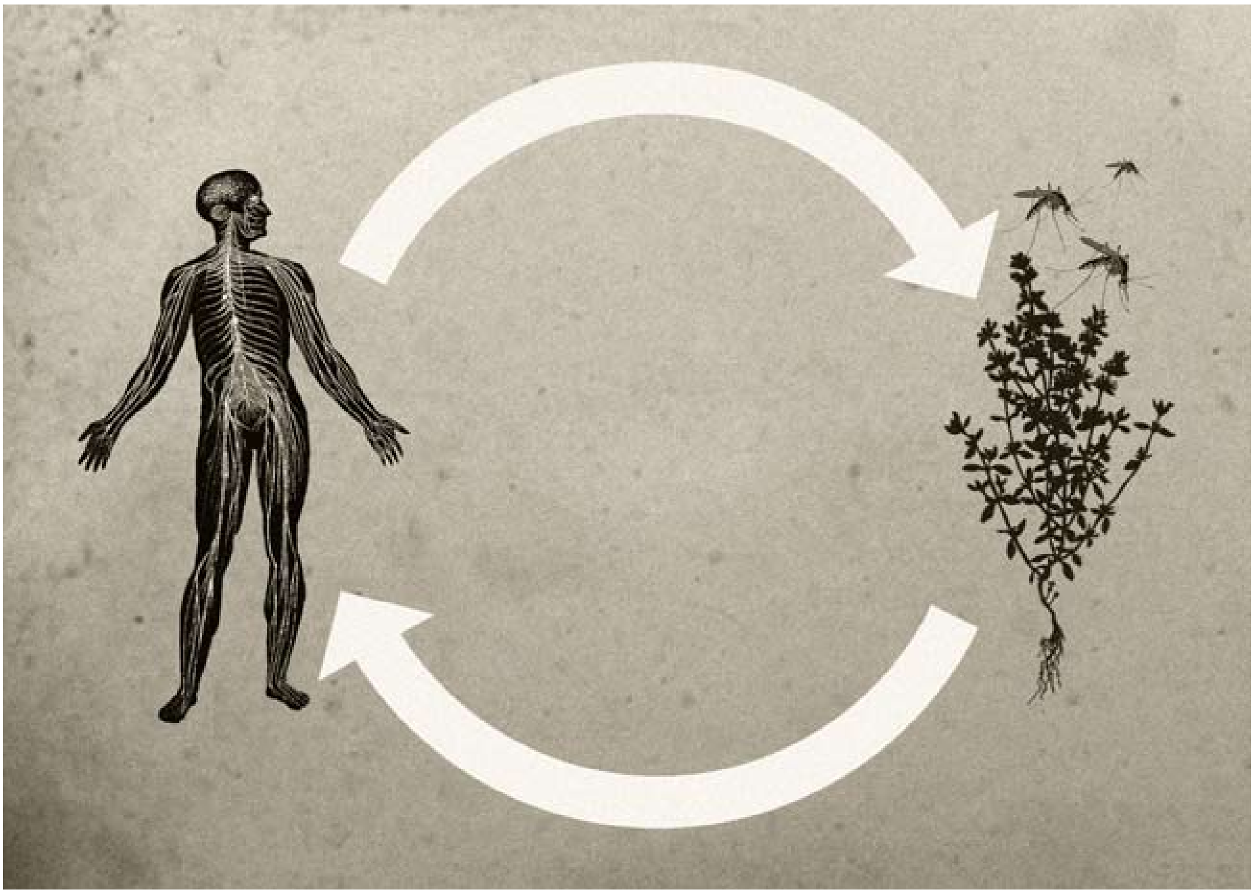


Fig. 16 *Our chemical interdependency with our natural environment*

Fig. 17 *A new approach to healthcare by considering the potentials of smell*

PROPOSAL

Scientific findings show that our body odour can transmit relevant information regarding our personal health. When we suffer from cardiac illnesses, the acidic levels in our blood rise. These chemical signals are clearly understood by insects such as mosquitoes, who are especially attracted to lactic acid. In this context of chemical exchange, disease becomes a communication problem and its prevention a communicative strategy. This means the concept of health can be readdressed as a dialogue between our body's emission of information, due to a chemical balance / imbalance, and the translation of this information by biological sensors.

I. THE DESIGN IMPLICATIONS

A SPECULATIVE SCENARIO

The genetic modification of mosquitoes already can allow the possibility of turning these insects into 'health vectors'. Our body odour varies with illnesses and individuals with specific ailments secrete particular compounds through their sweat. These variations could be a signal for GM mosquitoes to come to our aid. Our chemical attractants, would incite mosquitoes to a meal whilst allowing them to diagnose us. By communicating chemically, nature in turn, would diagnose us.

The use of a communicative strategy to deal with healthcare implies that health as such is thought through a preventive action. Currently we wait to get ill before we seek treatment. The use of smell as information and advances in biotechnology propose a new scenario, where mosquitoes would function as health surveillors.

DESIGN AS AN INTERMEDIARY

Design surrounds us in our everyday lives, subtly shaping the way we interact with our surroundings and others. It also reflects existing popular beliefs. Mosquitoes, for example, are often seen as a threat to humans, and existing designs in relation to these insects consist of barriers – both physical and chemical – to impede our contact with them. Working amongst the context of this new communicational exchange with mosquitoes, design must allow new forms of interaction, by working as an intermediary in this system and thus allowing these insects to cohabit with us.

II. CONTEXT OF HEALTHCARE: DIAGNOSING THROUGH SMELL

In order to understand the information exudated through smell, design must visualise our body's chemical signals. This implies a translation between the senses of smell and vision:

We communicate to mosquitoes via smell – Mosquitoes communicate to us via the visual.

By perceiving mosquitoes as biological sensors, and allowing their normal insect behaviour, new diagnostic processes are created. Design facilitates a chemical dialogue with these insects, by mediating two interactions:

1. A PLATFORM FOR A CHEMICAL DIALOGUE
HUMAN BODY ODOUR – MOSQUITOES

HOW DO WE FACILITATE A COMMUNICATION BETWEEN HUMANS AND MOSQUITOES?

This implies a landscaping problem since in order for a dialogue to exist, mosquitoes must coexist with humans. The creation of new habitats and ecosystems where these insects can exist is necessary. Mosquitoes need certain elements in order to grow and live, such as stagnant water, grasses, shrubs, etc. In this scenario water filtering systems in the urban landscape are designed to create incubating posts for these insects. Street sewers designed to reutilise waste water, allow a new habitat for mosquitoes to coexist with us. These become 'health posts' along the city, strategically implemented by the public healthcare system, covering the necessary distances for the mosquitoes to effectively diagnose us.

2. NEW DIAGNOSTIC DEVICES
CHEMICAL SIGNS – VISUAL TRANSLATION

HOW MIGHT WE CREATE A VISUAL SIGN FROM ODOUR?

The mosquito bite becomes the translation between the chemical information our body releases and the visual signs necessary for its understanding. A new system of diagnosis and healthcare based on prevention, instead of treatment, is necessary for the optimal functioning of these biological sensors:

The GM mosquitoes react upon nuances in our body smell which point to illness. These are equipped with a solution in their saliva which reacts to an excess of acidity in our blood, causing a slight colouring in the bite. Our skin becomes a diagnostic kit, where the contact between our chemical balance – imbalance and the injected solution, allows for a visualisation of a health condition.

For the implementation of this diagnostic process, the public healthcare system carries Diagnostic Campaigns throughout the year, pre-warning citizens through mail. On set dates, GM mosquito eggs are inserted into the GM-incubators. These are incapable of reproducing, living for a maximum of two weeks, during which individuals will be diagnosed. In health pamphlets and brochures, relevant information will be distributed to the public, regarding necessary actions, should they be diagnosed.

ILLUSTRATIONS

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