SMELL;
THE BRAIN
& OUR
EMOTIONS

A smell can trigger emotional and physical reactions, for example think of when you smell delicious food you instantly start salivating and your stomach starts to gurgle in preparation for digestion.

Understanding smell is the most exciting aspect of aromatherapy. I believe olfaction (smell) plays a very important role in the efficacy of aromatherapy; so understanding the mechanisms of smell will help us further understand its effectiveness in treatments.

We smell odours with 400 active receptors at the top of our noses, which respond in different combinations to allow us to distinguish hundred of thousands, some have even

suggested a trillion different odours. Smell is the only sense in which the receptor nerve endings are in direct contact with the outside world. The olfactory nerve cells are the only type of nerve cell in the body that can repair themselves if damaged and have been used in a relatively new pioneering therapy, in which helped a paralyzed man to walk again.

Olfaction is completely unique from other senses and its neurological pathways, it's the only one that travels directly to the forebrain without first going through the thalamus nicknamed the 'waiting room', from the Greek translation, it is a part of the brain which gates all the other sensory inputs we have. For an example of this is if we focus on one sense like reading

a book or watching TV, we can blind out other senses, for example like not hear someone talking to use whilst we are doing one of these activities.

In addition smell has a direct effect on the Limbic system, a complex set of structures in the mid brain these include the hypothalamus, hippocampus, amygdala and cingulated cortex. It has been described as the "feeling and reacting brain".
The limbic System assigns emotional significance to everything we smell, see, hear, feel and taste. It is known as the seat of social and emotional intelligence and it is the brains anxiety "switch".

It is closely integrated with the immune system - our defence against disease, the endocrine system - hormone regulation and the autonomic nervous system - regulation of unconscious body processes like blood pressure, breathing, and it also regulates the functions of our internal organs such as the heart, stomach and intestines.

Olfactory perception virtually reverses the processing path that the other senses take. Olfactory neurons project straight into the frontal cortex, a region associated with organising and planning, where recognition of the odour occurs. There is another aspect to the sense of smell that differs from the other senses in terms of brain connections. Olfaction is the only sense that does not have a 'crossover' brain connection, so odours that enter the

left nostril are accessed by the left hemisphere and those entering the right the right hemisphere.

This too has implications for how odours interact with the brain; for example, it was found that if the left nostril was occluded, the sympathetic nervous system predominated, the sympathetic nervous system initiates our "flight or fright" response, helping avoid life threatening situations, the occlusion of the right nostril allowed predominance of the parasympathetic nervous system "Rest and Digest" responsible for rest and repair.

In very loose terms the left hemisphere is associated with logic and analysis and the right with more sensory and artistic orientation. This would also correspond with a study published in 1999 where researchers found that people were better at identifying odours with there left nostrils but that odours where perceived as more pleasant smelt through the right.

Although there is still so much we do not fully understand about olfaction- such as how odour molecules bind to the olfactory receptor cells, or indeed how olfactory signals are generated, or how odour is interpreted by the brain, or the many factors the affect sensitivity – what we do know that there is a direct link between odours and our brains.

Jennifer L. Pluznick Ph.d is a scientist and assistant professor of physiology at the Johns Hopkins School of medicine. Her research is focused on the role of sensory receptors in regulating renal and cardiovascular function.
Jennifer's Ted talk 'You smell with your body, not just your nose,' explains that you have olfactory receptors (smell sensors) "all over the body, some in some pretty unexpected places like muscle, kidneys, lungs, and blood vessels." She goes on to hypothesise their reason for being there is chemo detection (detecting chemicals relating to smell and taste), and as a tracking devise that could monitor these chemical concentrations in blood and tissues, "Why reinvent the wheel."

"One of the first examples of an olfactory receptor found outside the nose, showed that human sperm express an olfactory receptor and that sperm with this receptor will seek out the chemical that the receptor responds to, the receptors ligand," (a simplified explanation of how we think this works is a molecular chemical lock and Key, the key being the receptor and the ligand the lock, once attached together set of a chain of chemical reactions,) "that is the sperm will swim towards the ligand, this has intriguing implications, are sperm aided in finding the egg by sniffing out the area with the highest ligand concentration?
I like this example because it clearly demonstrates that an olfactory receptor primary job is to be a chemical sensor."

We are just beginning to understanding how smell affects our brains, this has been achieved through neuroimaging methods like MRI scans, with this relatively new knowledge some clinic's functional neurologists are using aromatherapy, to study the brains neuroplasticity, particularly with patients who have had stroke's or who are suffering from neurodegenerative disease's.

It is suggested that developing our olfactory (smell) perception many be better for our brains neuroplasticity than Sudoku! It is now apparent that smell dysfunction is an early indicator of neurodegenerative diseases such as Parkinson's and Alzheimer's.

They use attractive smells to activate serotonergic systems like the endorphin oxytocin the 'bonding hormone' particularly for children with developmental challenges, like autism.
In contrast, aversive smells activate the dopaminergic system, norepinergic system, and epinergic system.

These systems dictate our flight-or-flight response, as well as other important survival functions."

LAURA STANLEY