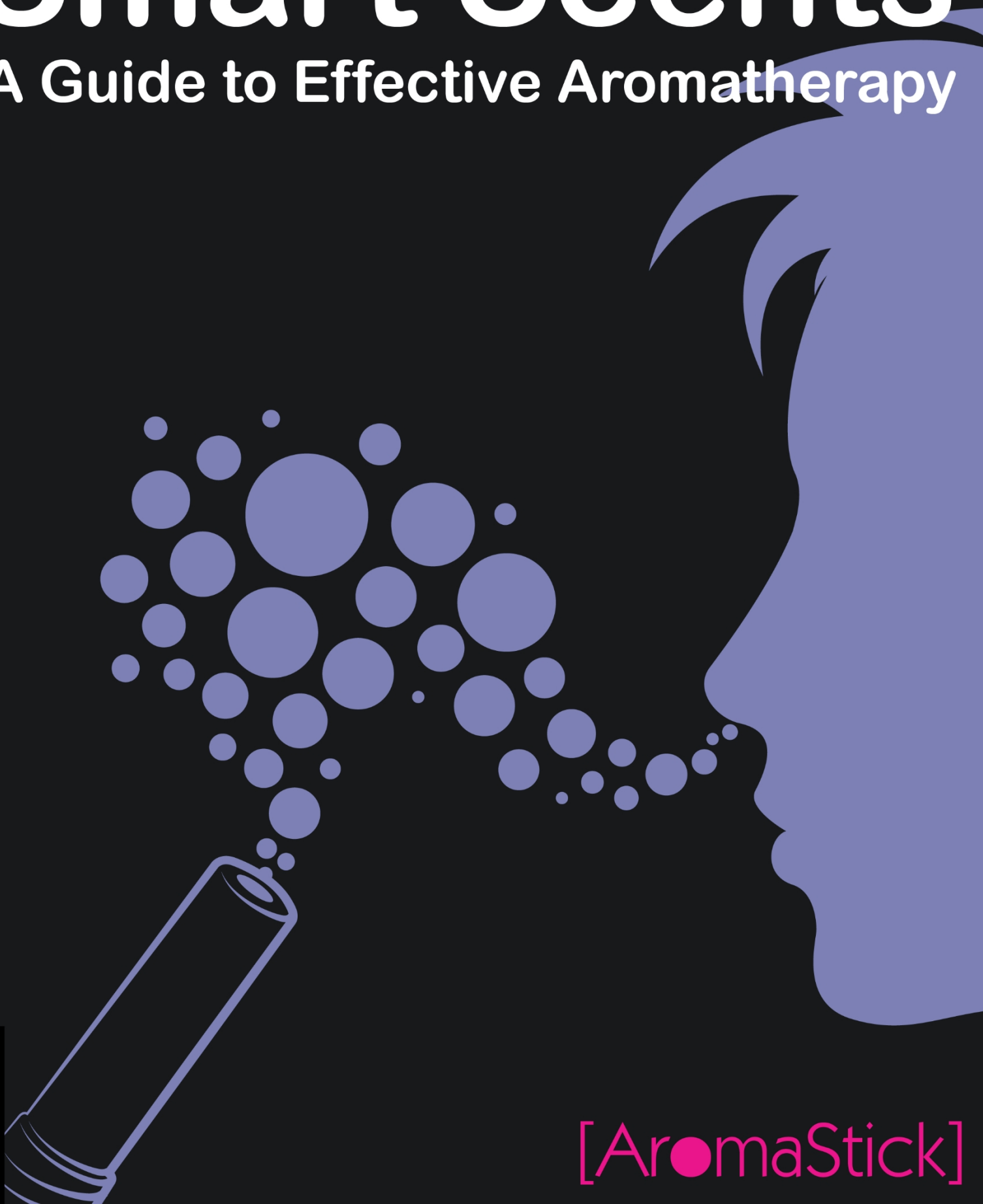
JÜRG SINGER & DR. RAINER SCHNEIDER

Smart Scents

A Guide to Effective Aromatherapy



[AromaStick]

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I. PREFACE

Considering the crucial role that scents play in our everyday lives, we do not always afford them the attention they deserve. However, this has not always been the case. The history of the human race shows just how much of an impact scents and the benefits associated with them have had on our daily lives. Scents have a longstanding tradition in medicine and have always formed an integral part of cultural and religious customs.

This changed with the advent of the Age of Enlightenment, which in many respects represented a turning point in human knowledge and understanding. One of the early protagonists of the Enlightenment was French philosopher René Descartes (1596-1650), who argued that our capacity for critical thinking provides irrefutable evidence for the fact that human thinking is in fact guided from within, rather than by outside influences. This change in thinking also meant that scents lost their significance, with the nose losing its position of dominance to the eye.

This fate was harsh and undeserved; olfaction, or the sense of smell, is a truly fascinating subject. Olfactory receptor genes make up approximately three percent of all genes in the human body, making them the largest known family of genes in the human genome (Boron & Boulpaep 2012). The human body contains millions of olfactory receptor cells and not only in the nose. They can be found in almost every organ within the body, including the skin, brain and gastrointestinal tract.

From an evolutionary standpoint, olfaction is the oldest of the senses, and is also the only sense to interact directly with the outside world, i.e. without prior "interpretation" by the brain. It is because of this direct contact with the outside world and all of its potential dangers that olfactory receptor cells are renewed approximately every 4-8 weeks.

This direct link to the brain also represents the fastest route for the transport of information. Its capacity is remarkable not merely because of the speed of information transfer, but because of the sheer volume of the information involved. Recent research into the olfactory capacity of human beings has exposed our previous estimates as woefully inadequate: quite in contrast to our previous estimate of 30,000, human beings are in fact capable of distinguishing between at least one trillion different scents (Bushdid et al. 2014). None of the other senses are capable of processing environmental information at anywhere near this degree of detail!

This would suggest that when it comes to olfaction, the question of *HOW* scent information reaches the body (scent reception and processing) is no less significant than the question of *WHAT* (scent molecule) this information is. This is the reason why AromaStick® decided to develop special nasal inhalers, and why we decided to write this e-book.

What makes the AromaStick® nasal inhaler so interesting is its mechanism of action. With each use, the nasal inhaler delivers a large dose of specially selected scents directly to where our sense of smell resides, which is in stark contrast to the way in which we experience scents that are present in ambient air or on our skin. Once the brain has evaluated the sensory stimuli present in the air, permanent exposure to the same scent will prompt the brain to categorize them as "background noise" and, therefore, as not requiring any further processing.

It was back in 2009 that Jürg Singer first had the idea of producing specially formulated aromatherapy inhalers. At the time, he was wondering how one might be able to achieve the challenging feat of producing an aromatherapy inhaler for use on-the-go that would contain 100% pure essential oils in an unadulterated form, i.e. without the addition of any artificial scents. Implementing this idea turned out to be a road littered with obstacles, not merely in terms of development and technological requirements, but also in terms of the information available, with many of the books on aromatherapy simply recycling and regurgitating the same material. This is why he decided to go back to the beginning and start from scratch, with an independent review of research data on essential oils and the effects of their inhalation on various different biological and psychological parameters. The result of this research was an aromatherapy inhaler stick specifically designed for use with essential oils. By this stage, the inhaler was patent pending and available in a wide variety of specialist formulations.

What was still missing, however, was the evidence to show that these nasal inhalers are suitable for their intended purpose. This is what prompted Jürg’s contact with Rainer Schneider, the owner of RECON, who had been a member of the German Medical Association’s working group "Placebo in Medicine".

In this e-book, we report the results of this research, and it is our hope that by doing so we will be able to inspire new developments in the field of aromatherapy. Above all, we would like to provide encouragement for further research and development that is targeted in such a way as to increase the level of acceptance of the work done in this field. It is important to keep traditions alive. However, from time to time, it is necessary to test traditional knowledge and assumptions and, while many of

our most long-standing traditional beliefs have been confirmed as correct by scientific research, others were proven to be faulty and should be discarded. This, too, is one of our aims in writing this e-book.

The development of the different AromaSticks was guided by the most recent scientific knowledge, with the inhaler's design allowing for both practical and convenient administration of the (aromatherapy) product. The different scents can be inhaled anytime and anywhere because of the targeted manner of administration, which means that others are unlikely to be affected in any way.

This e-book was never written for, nor intended to be used by, the aromatherapy novice, but was written for those with prior knowledge and expertise, those who already work in the field of aromatherapy, and those who wish to find out more about how to use scents correctly.

As our intention is to present the subject matter in a factual and objective manner, we have chosen a style of writing that is intentionally sober and refrains from any flowery and metaphorical descriptions of scents and their ascribed effects. This is also the reason why information regarding a product's potential effects will not include any claims that are merely based on popular opinion or folklore.

To a large degree, this book is about (clinical) evidence, which is why we chose to dedicate an entire chapter to this issue – we wanted to ensure that all of our readers, even those without a scientific background, would be able to understand and evaluate our findings.

We hope that you enjoy our e-book, and that you will find it a useful and informative read.

Jürg Singer & Dr. Rainer Schneider

II. DEFINITION OF TERMINOLOGY

The term aromatherapy is mired in misunderstanding, with its use often being determined by the characteristics of the intended target group, particularly when this is likely to draw attention to one's own aromatherapy products. It is commonly used as a generic term to describe the use of essential oils on the skin, for massage, or in the bath. An even more generous definition includes the use of essential oils applied directly to the tongue, and the addition of traces of essential oils to shower gels or hair care products. This absence of a clear definition results in confusion for the layperson. What is included in the term aromatherapy and what is not? A definition including anything that smells pleasantly may serve the interests of the vendor but is of no value to the customer.

As the term aromatherapy combines the concepts of scent (aroma) and treatment (therapy), one might argue that offering a combination of the two is sufficient justification for the claim that the application amounts to bona fide aromatherapy. However, this is not necessarily the case. For instance, the use of essential oils during massage is undoubtedly intended to improve well-being and hence constitutes a form of therapy. It is also correct that as part of this treatment, the massage therapist uses scents. However, the process has little – if anything – to do with aromatherapy. The same applies to shower gels, and products intended for application to the skin. Although characterized by a pleasant scent, the primary purpose of these products is a very different one. The intended effect is not related to the pleasant scent of the product but to very different and very specific factors. The purpose of massage therapy, for instance, is physical manipulation (such as pressure being applied to trigger points); the purpose of a shower product is cleansing; the purpose of a product that is applied to the skin is related to its active ingredient (e.g. methyl salicylate in wintergreen oil), which is selected to treat a specific condition (e.g. rheumatoid arthritis).

A precise definition of the term aromatherapy therefore appears helpful. A narrow definition of the term defines aromatherapy as the use of scents for the purpose of provoking a psychological or physical response. The crucial element of aromatherapy, thus, is the *functional aspect* of using scents (Buchbauer et al. 1993), i.e. it is the scent (aroma) that elicits a positive response, whereas the manner in which this response is achieved may be of secondary importance. If we accept this definition, we will also have to accept that any effect produced *must* be the result of not just the scent itself, but also of its method of administration, and that the process involved is very much

determined by the concept of concentration/air saturation of the scent in question (Tisserand & Young 2014)[1].

The faster a scent spreads and evaporates, the less intense will be the sense experience. It is also highly likely that it will have much less of an effect. However, given the fact that conscious perception plays a significant role in aromatherapy-induced effects, the method of administration is crucial in determining whether the treatment is capable of eliciting a meaningful physiological or psychological response.

Another physiological principle that is relevant in this respect is habituation. The body's perception of sensory stimuli is regulated in such a way as to ensure *negative* feedback between the intensity of a stimulus and the intensity of the response, meaning that repeated exposure to a stimulus of the same intensity will result in a gradual decrease in the intensity of the response. In other words, sustained exposure to a specific stimulus results in the intensity of the stimulus being perceived as reduced. This physiological phenomenon has an important biological function, as it allows an organism to remain receptive to new stimuli.

Another important phenomenon, however, is the fact that the intensity of the response is dependent upon the degree of neurological processing, with direct sensory processing linked to a stronger response. As we are capable of detecting relatively low levels of a scent, the issue of its potential volatility is irrelevant. It does make sense, however, to deliver these scents directly to where perception occurs, i.e. the nose.

The definition provided by Buchbauer et al. (1993) was crucial in guiding the development of the AromaStick® inhalers: when different inhalers produce different responses, this occurs as a direct result of each formulation containing a different combination of scents. The question of whether the different combinations are capable of producing a response at all, and if so to what degree, was tested under standardized conditions–the details of which will be discussed at a later stage. For now, let it suffice to say that our results support what we consider to be the correct interpretation of the term aromatherapy, namely that the inhalation of scents can elicit physiological processes that produce a beneficial biological effect.

1 The example of an ice pack may be useful in order to illustrate this point: an ice pack can only work once it has been applied correctly and is in direct contact with the skin. Were one to hold it at, say, 10 cm from the skin, one would be able to feel the cold but the cooling effect would be negligible and, therefore, useless.

III. INTRODUCTION

Working with scents is an art that dates back to before recorded history, with different combinations of resins, oils and fragrant plants being used in one form or another by the majority of civilizations– as part of ceremonies, celebrations and religious rituals, as well as for medical use. The therapeutic benefits of scents have been known for some time and, as a result, the term *aromatherapy* has become established in the fields of medicine and psychotherapy. Coined in 1936 by René-Maurice Gattefossé, the term is defined as the topical (local) or oral administration – or therapeutic inhalation – of essential oils to promote health, hygiene and psychological well-being.

All essential oils are derived from plants, which themselves are capable of synthesizing two different types of oils: plant oils and essential oils. While plant oils consist of fatty acids and glycerin, essential oils are volatile organic compounds that are responsible for a plant's scent and flavor. Generally speaking, essential oils allow plants to communicate, and are used either as chemical attractants that are targeted at insects, or as chemical messengers that are targeted at other plants of the same type. The term *essential* is used to indicate the very nature – or essence – of the plant itself.

Even in the times of Hippocrates (460-340 BC), aromatic plants were being used for medicinal purposes (see Dierbach 2013). The use of distilled oils can be traced back to the 10th Century AD and the development of the extraction process that is now known as distillation (Forbes 1970). It is estimated that of a total of 350,000 plant species that are believed to exist on our planet, approximately 17,500 are aromatic plants. Of these, approximately 400 are commercially processed for their aromatic raw materials. While essential oils are generally thought to have only limited toxic potential (Tisserand &Young 2014), some plants contain toxic aromatic compounds with highly specific therapeutic benefits. Some of the most effective antimicrobial substances we know are essential oils (extracted from e.g. eucalyptus and pepper weed). These can be used to kill viruses, bacteria, fungi, and tiny organisms such as lice (Tisserand & Young 2014).

Today, we might consider scents a luxury, simply because our awareness and conscious perception are more focused on our sense of hearing and our sight. As was mentioned above, however, the olfactory system plays a far more prominent role in the normal functioning of the human brain than we may think. The mammalian sense of smell represents an important part of neurosensory perception, and allows both us and other mammals to "probe" our chemical environment. Scents can trigger feelings of sympathy and antipathy, influence our mood and emotions, control our social

interactions and sexual behavior, trigger changes in our hormone levels, and act as chemical messengers.

In terms of its medical significance, however, aromatherapy continues to be seen as belonging predominantly to folklore. According to conventional medicine, there is a lack of (sound) scientific evidence to support claims that aromatherapy is effective in preventing and/or treating disease, and of course alternative medicine practitioners are likely to disagree with this assessment. Indeed, there are a number of interesting studies that effectively challenge this position. However, we do not wish to engage in the controversy that exists between conventional and alternative medicine. This is because there is no need for aromatherapy to engage in this controversy.

Let us briefly explain our reasoning. A disease, a condition, or "*simply*" the state of feeling unwell is all usually more than just the sum of individual symptoms. In order to make a person feel ill, the illness has to be consciously experienced by the affected person (after all, an unconscious person does not feel pain). In other words, signals from the body have to be interpreted in order for a person to be able to experience suffering. Thure von Uexküll, the founder of integrative medicine, recognized this and because of this severely criticized the prevailing medical doctrine, which was based on a purely mechanist view of human biology. As the founder of modern psychosomatic medicine, von Uexküll saw healing processes as consisting of an exchange of information (for a summary of these issues, please refer to Hontschik et al. 2013). According to this school of thought, the exchange of information and its interpretation form the building blocks of any type of healing process, and includes both within-system communication of biological systems (e.g. cell-to-cell communication) and between-system communication (e.g. the human sensory apparatus and physiological processes). This is also a good point at which to remind ourselves of the meaning of the term *information*. The term originally stems from the Latin word *informare*, which means "to fashion" or "to give shape (and order) to". Therefore, (new) order can only be created when information flows between (sub)systems.

In short, it is conscious awareness (the interpretation of symptoms) that creates suffering. This phenomenon explains, for instance, why a person in shock does not initially experience any pain from their injuries: stress hormones ensure that pain signals are blocked and cannot interact with the brain’s pain centers. However, as soon as the injured person becomes aware of a "deviation from the norm", i.e. a symptom, processes that are responsible for interpreting this information are triggered, producing affective reactions. Affective responses that enter our conscious awareness are then experienced or interpreted as emotions, thus prompting our brain (or more specifically, the self-

referential processing centers in the prefrontal cortex; see Schneider 2012) to search for and evaluate potential explanations for why the body produced specific physiological signals. The brain does this with a remarkable degree of "creativity" in order to produce explanations that agree with both the context and previous experience. Vice versa, emotions can produce highly specific responses within the autonomic nervous system, which in return trigger highly specific physiological responses.

What we are getting at is this: if feelings are both the cause and the effect of physiological changes within the body, then scents as mediators of these emotions are capable of producing distinct physiological and psychological changes. While the question of how scents manage to influence our emotions, actions, and behavioral responses remains largely unanswered, research efforts are increasing and new knowledge is becoming available. We know that, when scent molecules enter the body via the nose, they can either elicit a direct response in the brain, via olfactory receptors in the nose, or they can reach the lungs, where they are absorbed into the blood stream and transported to various organs and tissues within the body.

Furthermore, there is a direct link between scents and behavior. Scents can influence the autonomic nervous system, neurophysiological processes, and the neuroendocrine system (hormones, neurotransmitters, and neuromodulators). Scents can also influence the physiology of our skin, an organ that acts as an important interface between “outside” and “inside”(Angelucci et al. 2014; Kiecolt-Glaser et al. 2008; Strous & Schoenfeld 2006; Tanida et al. 2008).

The nose is not the only part of our bodies to contain olfactory receptors, and it is not the only part of our bodies to treat scent signals as information. Research studies have shown that olfactory receptors can be found in the liver, heart and prostate, as well as in the skin and even the gastrointestinal tract, with the latter of course providing a possible explanation for the fact that herbs and spices can have such a pronounced effect on a person's digestion. One of the reasons why our organs can detect scents is that this enables them to distinguish between harmful and beneficial chemical substances.

For instance, our gastrointestinal tract needs to be able to eliminate toxic substances and pathogens as quickly as possible, and a network of neurons allows it to respond through reflex actions such as diarrhea and vomiting (Brand 2006; Blackshaw et al. 2007; Sternini et al. 2008). Once again, it is our evolutionary history that provides an explanation: living creatures were able to detect smells before they were ever able to see or hear which suggests that – rather than (hedonistic) extravagance – the ability to detect smells was used as a means of communication and a strategy for survival. This is also likely to be one of the reasons why the large variety of olfactory receptor neurons that are found in

the nose are organized into such a complex network, and why this network of neurons contains such an enormous variety of receptor proteins (GPCR: G protein-coupled receptors) which, in humans, are encoded by a total of over 350 genes (Borin & Boulpaep 2011; Feldmesser et al. 2006; Fleischer et al. 2009).

We know today that when organisms coexist in groups, their growth and development are largely mediated via the use of signs or symbols (Greek: semeion). Thure von Uexküll was – as previously mentioned – one of the researchers who called attention to these issues, and it was he who coined the term *biosemiotics*. According to biosemiotics, molecules are used as signs; they act as signals and messengers, as well as carriers of information or as information storage, and occur in solid, liquid or gaseous form (Witzany 2006). This sign-based communication is possible because the molecules that combine to make up different scents are themselves capable of interacting with the receptors that modulate the release of neurotransmitters (Sergeeva et al. 2010), thus effectively becoming themselves like messengers in signal transmission!

Having already digressed far enough from our topic, we will not go into any further detail at this point in time. We do believe, however, that our little journey was necessary in order to elucidate the theoretical and practical aspects that afford scents such a significant role in health and well-being. There may still be skepticism among conventional medical practitioners as to whether this role is relevant in a clinical sense. It is certainly not for us to make this call – and we are not here to produce the clinical evidence to prove this. We simply intend to investigate the question as to whether scents can play a meaningful role in our day-to-day lives, and how they need to be used in order to provide a benefit to us. In order to be able to make a determination in this regard, it is necessary to first understand a few of the criteria and factors that determine the quality and success of aromatherapy.