

# Talking Scents

By Steve Herman

**T**here are two particularly obvious signs that a place is unclean: it looks dirty or it smells bad. If it smells bad, it is more likely to receive immediate attention. There is perhaps nothing that provokes the instantaneous feeling of disgust quite as powerfully as a foul odor. If a refrigerator smells of rotten food, our immediate reaction is to toss the food and clean the refrigerator. Our refined olfactory senses have evolved over the millennia to warn us of the dangers inherent in certain odors.

The power of smells is great: Skunks use it as their primary defense mechanism (and an extremely efficient mechanism it is!). The U.S. Department of Defense is currently funding research to identify the worst possible odors, to use them against unruly crowds or terrorists. Biometric studies have been funded to establish a personal identification system based on body scent. But as important as the sense of smell is to the way the world works, it is still under-appreciated.

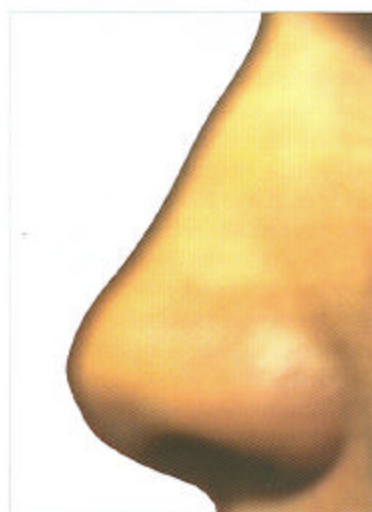
## Olfactory Facts

Smell has long been our least understood sense. Although every school child learns how vision and hearing work, information on odor reception remains sketchy for most. But that may be changing. With the discovery of the odor receptor gene family in 1991, scientists have filled in most of the missing pieces, explaining how an odorless molecule triggers a sensation deep in our brain. The details can be daunting, involving a host of chemical and biological processes, but the essential chain of events is easy enough to follow.

There are about 400 genes that express odor receptors, telling the body to manufacture the proteins

that end up in the business part of the nose. Since we can discriminate over 10,000 odors but only have some 400 receptors, some combination response is needed.

The odor receptor protein is similar to many other chemical sensors



in our body, such as those responding to hormones and those used in vision. The odorant molecule interacts with these proteins, sending a nerve impulse to the olfactory bulb behind our eyes. There is amplification, much like how a transistor amplifies an electric current, then the signal goes to the brain.

The part of the brain in charge of smell decoding is called the limbic system, which also happens to be the seat of our emotions. Residing as it does in the limbic system, smell is inherently more emotional than our other senses, and therefore, more involved in some aspects necessary for our survival.

Our nose tells us when a bathroom is dirty, and this knowledge makes us more likely to avoid it. (Unless, of course, it is our job to clean it, in which case we simply

hold our nose and deal with the problem.)

## Taking the Offensive

Unpleasant odors can be functionally divided into two categories: those resulting from specific malodor molecules and those resulting from organic decay. Control of these odors is crucial to maintaining a sanitary and pleasant environment, and the methods of treating them are quite different.

**Malodor.** A common characteristic of many disagreeable smells is the presence of sulfur, nitrogen, or halogens. Most of these types of smells can be masked, reacted with, or encapsulated. Ionization is also effective.

Masking with a strong perfume is the oldest method, extending well back in history and culminating in the court of the French kings at Versailles. It is much wiser to use smaller amounts of fragrance containing aromatic chemicals that can react with malodors, such as a mixture of citral, eugenol, coumarin, and helional; fragrances containing specific aldehydes; or a combination of musk, citrus, and mint.

Specialty chemicals have long been available with malodor counteractant claims. Since these compounds claim to destroy bad odors, one might assume they would also destroy the perfumes used in most cleaning products, but that is not necessarily the case. Since malodors have chemical structures quite different from the typical chemistry found in fragrances, it is quite possible to attack one and not the other.

Malodors can be trapped in special cavity-containing molecules such as cyclodextrin or zeolites. Since these structures physically encapsulate rather than chemically



react with molecules, it is possible to neutralize malodors and fragrance materials.

**Organic decomposition.** The best prevention for smell emanating from organic decomposition is maintaining a clean area and using commonly available disinfectants. Even here, however, fragrance materials can be helpful. Many aroma chemicals have antibacterial properties, and while not as effective as the actives typically found in U.S. Environmental Protection Agency-registered formulas, they do enhance efficacy.

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#### **Smelling and Selling**

Along with enhancing the clean feel of an area, fragrance can add psychological benefits, conveying a feeling of spaciousness, stimulation, or relaxation. The fragrance industry has coined the word "aromascience" to describe temporary effects on the brain triggered by olfactory stimulation. Meanwhile, advertisers have much abused the word "aromatherapy" in their marketing campaigns, but fragrances do have scientifically documented influences on mood, alertness, and a variety of other mental states. The direct link of the olfactory bulb to the limbic system makes these effects almost self-evident.

The world of fragrance is vast and fascinating, ranging from the romance of folklore and Chanel No. 5 to toilet bowl cleaners and cutting edge science. For those in the cleaning industry, it is a valuable component of current products and a fertile opportunity for developing better products in the future. **17**



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