Olfaction is the process of smelling.

The skeletal system helps give shape to the soft tissue of the nasal cavity while the nervous system processes odors that enter the nasal cavity.
Olfaction begins when molecules called odorants enter the nasal cavity during inhalation.

Factoid!
The word “olfaction” comes from the Latin noun *olfactus*, which means “to smell” or “get the smell of.”
The inside of the nasal cavity is lined with cilia — tiny, hairlike projections on cell surfaces.

The cilia are part of the olfactory epithelium, a layer of tissue made up of cells specialized for absorption, secretion, and/or acting as a barrier.

**Factoid!**
Humans have about 6 million olfactory receptors in our noses, while dogs have around 300 million.
Once inhaled, odorants dissolve into the mucus coating the inside of the nasal cavity. They then bind to the cilia of the epithelium, activating specialized neurons called olfactory receptors.

Different odorant molecules activate different receptor cells.

**Factoid!**
Unlike most neurons, olfactory receptors are replaced every 40-60 days by basal cells (neural stem cells) in the epithelium.
Olfactory signals travel from the receptors to the olfactory bulbs, the termina (ends) of the olfactory nerve.

Inside the olfactory bulbs are ball-like structures called olfactory glomeruli which serve as the point where olfactory signals are transferred from receptor neurons to the olfactory nerves that travel up to the brain.
The olfactory bulbs rest upon the cribiform plate of the ethmoid, a spongy, cubed bone that gives shape to part of the roof of the nose.

The ethmoid has numerous foramina (tiny holes), which allow for the passage of the sensory fibers of the olfactory nerve.
The olfactory nerves don’t cross.

This means that, in contrast to most other sensory/motor pathways, the connectivity between the olfactory nerves and the brain is ipsilateral - the left olfactory nerve sends information to the left side of the brain.

**Factoid!**
The technical term for the crossing of neural fibers is **decussation**.
The olfactory signal’s destinations in the brain include the primary olfactory cortex (a region of the temporal lobe of the brain) and structures in the limbic system.

**Factoid!**
Although the thalamus (a structure of the limbic system) processes other sensory information, it doesn’t receive olfactory information directly.
Aside from receiving sensory information, the limbic system processes a wide range of emotions and contributes to the processing of memory.

The hippocampus and the amygdala are especially important in forming new memories.
CRANIAL NERVES

The olfactory nerve is only one of a series of 12 nerve pairs called the cranial nerves. Several of these, like the vagus nerve, are also ipsilateral. The vagus nerve innervates the heart, lungs, and stomach.

Check out our eBook on the cranial nerves for more information!

Factoid!
The vagus nerve’s name comes from the Latin adjective *vagus*, meaning “roving” or “wandering”.
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