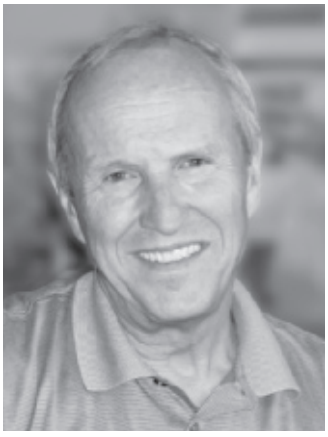

Dear Readers,

Smell and taste, once known as the "lower senses," long led a shadowy existence in the field of sensory physiology, while sight and hearing, the "higher senses," basked in the limelight of research. It was only with the advent of molecular biology that the "chemical senses," as smell and taste are now called, were awakened from their slumbers. Especially the discovery of olfactory receptors by Nobel Prize winners Linda Buck and Richard Axel in 1991 made the sense of smell one of the most exciting fields in neurobiology.

In principle, the chemical senses always follow the same signal chain: a stimulus molecule bonds with a specific receptor integrated into the wall of a sensory cell. This action triggers a cascade effect, generating a neuronal signal that, in turn, is processed by nerve cells along the chain and conducted to the brain. The resulting perception is swiftly followed by recognition, reaction and emotion.

We perceive the scents of flowers and fruit as a pleasant sensation, but are repelled by rancid odors. The close link between smell and taste is an indicator that, in the course of evolution, smells served as signals to keep us safe from substances that might harm us. It is estimated that 70 percent of taste is actually based on olfactory sensations – just consider how food loses its flavor when we suffer from a cold.

However, odors are also important signals when it comes to choosing a partner. The classic experiments with butterflies carried out by Dietrich Schneider and Karl-Ernst Kaißling at the Max Planck Institute for Behavioral Physiology, and the synthesis of pheromones by Adolf Butenandt offer some impressive examples.

As for the issue of "smell," the Max Plank Society has since dedicated three new departments to this subject. We focus on them in this issue of MaxPlanckResearch. The group headed by Bill Hansson is using some elegant genetic and optical methods to investigate how odors are processed in the brains of insects. Peter Mombaerts and his staff are studying the sense of smell in mice: how are the thousand or so different olfactory receptors in the mucous membrane of the nose distributed, and how do the nerve pathways in the brain interconnect? Benjamin Kaupp and his department at the caesar research center are addressing the role of smell in choosing a partner at its most elemental level: namely how sperm "sniff out" an egg cell.

Olfactory perception has become a new focal point of biomedical research at the Max Planck Society. The appointment of Gilles Laurent to the Max Planck Institute for Brain Research adds further emphasis to this research path: Laurent is seeking to decipher the code of olfactory perception in the brain.

I hope that this initial "taste" of the olfactory world will enable you to appreciate at least some of the fascination this research holds.

Heinz Wäßle,
Emeritus Director at the Max Planck Institute
for Brain Research

Photo: Private