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# IN THIS ISSUE

## Articles Highlighted

### The Antennal Olfactory System of the Common Bed Bug

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The temporary ectoparasite on humans, *Cimex lectularius*, is currently reinvading the developed countries due to reduced use of organochlorine insecticides and increased international travel. Like other haematophagous arthropods the bed bug uses olfaction for host seeking which critically involves the terminal antennal segments. Each antenna contains only 44 individually recognizable *sensilla* that can be accessed with recording electrodes. Harraca et al. correlated morphology mapping with an electrophysiological characterization of the olfactory sensory neurons housed in each specific *sensillum*. They found that all 9 grooved peg *sensilla* responded dose-dependently to ammonia, whereas various other compounds elicited responses from the 6 smooth peg *sensilla*. Based on their responses to ~30 stimuli, cluster analysis grouped the latter into 3 functional classes. This work forms the basis for behavioral studies that could lead to an environmentally sustainable control of this blood-sucking pest.

### Scent-Marking in an Old World Monkey

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Old World monkeys and apes are believed to depend less on olfactory senses relative to other sensory modalities than other mammals including primates. This belief is based on observations pointing to a little developed olfactory system in catarrhines characterized, for example, by a severe loss of genes for odorant receptors and the presence of a vestigial vomeronasal organ. Unlike most Old World monkeys, mandrills possess a sternal gland that produces a secretion that both, males and females, rub vigorously against tree trunks and branches. This scent-marking behavior suggests that olfactory cues take part in the social communication in this species. Setchell et al. determined the volatile chemical components of mandrill sternal glands and compared the scent gland secretions with features of the signaler. The authors identified 97 volatile chemicals in the secretion, mainly hydrocarbons that have also been found in odor profiles of other mammals. Many compounds were shared among mandrill samples suggesting that differences in volatile profiles may depend more on their relative concentration than on the absence or presence. The volatile profiles distinguished between adult males and females and were similar in females and young males. They also contained information about male rank. In addition, samples differentiated between alpha and nonalpha males. Differences in odor profiles were accentuated by scent-marking behavior and secretion production. Thus, the data suggest that a volatile profile that signals sex, age, and rank together with increased production of secretion and motivation to mark in high-ranking males generates a potent signal of the presence of a dominant, adult male. Such signals would persist in the environment of this species, the dense tropical rainforest of Africa, and could avoid aggression between rivals and attract females.

### Identification of Tmem16b, a $Ca^{2+}$-Activated Chloride Channel, in Cilia of Olfactory Sensory Neurons

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A $Ca^{2+}$-activated chloride current is crucially involved in the transduction cascade of odorants in order to depolarize olfactory sensory neurons. Whereas the physiological properties of this chloride conductance have been described by electrophysiological methods, the molecular identity of the $Ca^{2+}$-activated chloride channel mediating this current, however, remained elusive for a long time. Very recent evidence suggested Tmem16b to be the missing ion channel, yet its presence in the ciliary membrane of olfactory sensory neurons has not been demonstrated. Rasche et al. now performed a quantitative proteomics investigation into the plasma and ciliary membrane proteins of olfactory sensory neurons that led to the reliable identification of 1453 and 818 polypeptides, respectively, among which they found Tmem16b. It was 2-fold more abundant than the cyclic nucleotide-gated channel. In situ hybridization with olfactory sensory epithelium and reverse transcriptase-polymerase chain reaction amplification using cells purified from olfactory marker protein–green fluorescence protein mice verified the expression of Tmem16b in mature sensory neurons. Next, the authors raised a specific anti-Tmem16b antiserum and demonstrated that, within the nasal epithelium, Tmem16b was only present in the sensory part where it was highly enriched in the cilia of sensory neurons. The detection of other Tmem family members with similar abundance in olfactory sensory neuron membranes raises the possibility that Tmem16b forms complexes that may explain notable differences in the biophysical properties of the native $Ca^{2+}$-activated chloride channel and heterologously expressed Tmem16b.

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