*Targeted deletion of olfactory receptors*

Olfactory receptor mutant lines were generated by Wellgenetics Inc. using CRISPR/Cas9-mediated genome editing (Kondo & Ueda, 2013). The donor, gRNAs and hs-Cas9 plasmids were injected into embryos of the control strain *w1118*. F1 flies carrying the selection marker (3xP3-RFP) were validated by genomic PCR and DNA sequencing. The 3xP3-RFP cassette can be excised by the Cre recombinase. Sequence information on the gRNAs and homologous arms for individual olfactory receptors was provided below.

*Or7a/CG10759*

The upstream and downstream gRNA sequences were CATGGCGGTGAGCACTCGTG[TGG] and ATCTCGGCGAGCGATTCAAC[AGG], respectively. The upstream homology arm was -960 nt to -7 nt from the start codon of *Or7a* (forward oligo: 5’- TGTATGTATGCCACGTACACAG; reverse oligo: 5’- TGGACTTTTGACGCCTGGG). The downstream homology arm was +4 nt to +1,033 nt from the stop codon of *Or7a* (forward oligo: 5’- AGACCATTTATCGTTGATGCAC; reverse oligo: 5’- ATGCGACTTTGCCTCCTTTT). A 1,449-bp fragment of *Or7a* (-6 nt to +1,443 nt from the start codon) was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or22a/CG12193*

The upstream and downstream gRNA sequences were CACCCGATCCAAGTAAATGA[AGG] and GGTAATTAAGCAATTTAACT[TGG], respectively. The upstream homology arm was -1,043 nt to -13 nt from the start codon of *Or22a* (forward oligo: 5’- ACGAAGGTCCTTTTGTGTGC; reverse oligo: 5’- CCGTGGCTTTGTTTG AATATTTG). The downstream homology arm was +4 nt to +993 nt from the stop codon of *Or22a* (forward oligo: 5’- GTTGAGAGGGACGAGCTCT; reverse oligo: 5’- CATGTTAACGCCAATCTGGA). A 1,444-bp fragment of *Or22a* (from -5 nt to +1,439 nt from the start codon) was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or43a/CG1854*

The upstream and downstream gRNA sequences were TGCAGTTCGTCTACCTGCTG[CGG] and ACCATGCTGCGTGGCGTCAC[CGG], respectively. The upstream homology arm was +151 nt to +1,186 nt from the start codon of *Or43a* (forward oligo: 5’-TCATTGGTTGCTGGGAAAA; reverse oligo: 5’-CAGGTAGACGAACTGCATCAGA). The downstream homology arm was +20 nt to +1,013 nt from the stop codon of *Or43a* (forward oligo: 5’-AACCGGAGTATCCCCTTCC; reverse oligo: 5’-TGCAGTCGTCCTTCTTTGAA). A 1,540-bp fragment of *Or43a* (+151 nt to +1690 nt from the start codon) was deleted and replaced by the 3xP3-RFP cassette.

*Or47a/CG13225*

The upstream and downstream gRNA sequences were GAAGAGCACCATTG CCCTTC[TGG] and CATGGAGGCCTTCTCATCGG[TGG], respectively. The upstream homology arm was -1,027 nt to -10 nt from the start codon of *Or47a* (forward oligo: 5’-CAGACATGCCAAGATCGAAA; reverse oligo: 5’-GGTTAATTCGGCCTC ACACTA). The downstream homology arm was +13 nt to +1,019 nt from the stop codon of *Or47a* (forward oligo: 5’-GACCACAAGGCTTTGGATTGA; reverse oligo: 5’-CCCGATGGCTCCTATCAGTA). A 1,363-bp fragment of *Or47a* (-9 nt to +1,354 nt from the start codon) was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or56a/CG12501*

The upstream and downstream gRNA sequences were ACCATTGGAAGTATCGCAGG[TGG] and GGCTTTCCCTCTAATACAAG[TGG], respectively. The upstream homology arm was -1,010 nt to -9 nt from the start codon of *Or56a* (forward oligo: 5’-AGCTTGTGGAGCATTTCCAT; reverse oligo: 5’-GTTTAGCGTTAACCATATTCAAGG). The downstream homology arm was +4 nt to +1037 nt from the stop codon of *Or56a* (forward oligo: 5’-AGGGAAAGCCTTTTCTTCAGG; reverse oligo: 5’-AAGTGAACCACCAACCCTTTT). A 1,781-bp fragment of *Or56a* (from -8 nt to +1,773 nt from the start codon) was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or59b/CG3569*

The upstream and downstream gRNA sequences were ACCTTCTCGGTCAACGGAG C[CGG] and TTGCGGGGGCTCATGGGTGC[AGG], respectively. The upstream homology arm was -1,045 nt to -6 nt from the start codon of *Or59b* (forward oligo: 5’- GACCCATCCTGTCGATCACT; reverse oligo: 5’- CACTGACCGGTGGTCGGT). The downstream homology arm was +45 nt to +1,127 nt from the stop codon of *Or59b* (forward oligo: 5’- GAGCCCCCGCAAAAAAGAG; reverse oligo: 5’- AGCTGCAATTGTTTAGACAGG). A 1,356-bp fragment of *Or59b* (-6 nt to +1,350 nt from the start codon) was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or65a/CG32401*

The gRNA sequence was TTTCCGCTCACTCCGCAGCT[CGG]. The upstream homology arm was -1,072 nt to +3 nt from the start codon of *Or65a* (forward oligo: 5’- TGCCACATCCAAGTCCAGTA; reverse oligo: 5’- CATCTTTCAATCCGATCCAA). The downstream homology arm was +45 nt to +1129 nt from the start codon of Or65a (forward oligo: 5’- ATTGTTTGGACCGTTTTTCG; reverse oligo: 5’- CGACTTGGGGATTCTTCTTG). A 41-bp fragment of *Or65a* (from +4 nt to +44 nt from the start codon) was deleted and replaced by the LexA::P65/3xP3-RFP cassette. The insertion also generated a null *Or65a* allele.

*Ir75b/CG42643 & Ir75c/CG42642*

The upstream and downstream gRNA sequences were AAGCCGTCAAGATGACTAGT[TGG] and GCATTGAGGTGAGCAGTCCA[AGG], respectively. The upstream homology arm was -1,043 nt to -4 nt from the start codon of *Ir75c* (forward oligo: 5’-CGTGTTACCCGTTCTTTAAGGT; reverse oligo: 5’-GACGGCTTTCTTCGATTTTG). The downstream homology arm was +33 nt to +1,057 nt from the stop codon of *Ir75b* (forward oligo: 5’-ACAAGCAATTTCGGCCAAT; reverse oligo: 5’-AGGTGGAACCCGAATCTAGC). A 4,794-bp fragment of *Ir75c and Ir75b* (-3 nt to +4,791 nt from the start codon of *Ir75c*)was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or82a/CG31519*

The upstream and downstream gRNA sequences were TGTTCTAGAAACTGGGGTCA[TGG] and TATGACGAACTGCCCCATAA[CGG], respectively. The upstream homology arm was -506 nt to -12 nt from the start codon of *Or82a* (forward oligo: 5’-CAGTTAAGAGGTTTTGGTACATC; reverse oligo: 5’-CTAGAACATGAA AGGATTGCGC). The downstream homology arm was -531 nt to +97 from the stop codon of *Or82a* (forward oligo: 5’-CTCCTTGCAGGTTGGCGT; reverse oligo: 5’-CAGCAACACGTAAACTGTAACC). A 950-bp fragment of *Or82a* (-11 nt to +939 nt from the start codon) was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or85a/CG7454*

The upstream and downstream gRNA sequences were CGAAATAAGGATCCAAGGAC[TGG] and CAAGTCCATCTCATTTACAA[TGG], respectively. The upstream homology arm was -1,043 nt to -13 nt from the start codon of *Or85a* (forward oligo: 5’- GGGTAGTATGGAGCCCGTTT; reverse oligo: 5’- AGAGGTTTCGATTGACTTGAAC). The downstream homology arm was +6 nt to +1,006 nt from the stop codon of *Or85a* (forward oligo: 5’- CGGTTTAGTGCCACAAATTTGA; reverse oligo: 5’- CATAATCCGCATTCCAAACC). A 1,322-bp fragment of *Or85a* (from -12 nt to +1,310 nt from the start codon) was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or85b/CG11735 & Or85c/CG17911*

The upstream and downstream gRNA sequences were AGCCGTATACGATTGACTCG[CGG] and AGGAATTGAGGGATCTTCCC[TGG], respectively. The upstream homology arm was -1,021 nt to -17 nt from the start codon of *Or85c* (forward oligo: 5’- CATGCGTGATAAATGGCAAA; reverse oligo: 5’- AATCCAATAAGTGATGGTCGGA). The downstream homology arm was +13 nt to +1,039 nt from the stop codon of *Or85b* (forward oligo: 5’- GGGAAGATCCCTCAATTCCTA; reverse oligo: 5’- GCACATTGGGAGCTTTGTAA). A 2,971-bp fragment of *Or85b* and *Or85c* (-16 nt to +2,955 nt from the start codon of *Or85c*) was deleted and replaced by the LexA::P65/3xP3-RFP cassette.

*Or88a/CG14360*

The gRNA sequence was CTTGGATCGGGAGTGTCCGC[GGG]. The upstream homology arm was -656 nt to +327 nt from the start codon of *Or88a* (forward oligo: 5’-CGCCAACGTGAACTAAAACC; reverse oligo: 5’-GTTAACAAACTCAACGATTTCCT). The downstream homology arm was +369 nt to +1,347 nt from the start codon of *Or88a* (forward oligo: 5’-GGACATGCAAATGGATGAGAC; reverse oligo: 5’-AGGCCAGCTGCATTATCTGT). The T2A-LexA::P65/3xP3-RFP cassette was inserted immediately after N109 of *Or88a*, which created a 41-bp deletion (+328 nt to +368 nt from ATG of *Or88a*). The insertion also generated a null *Or88a* allele.