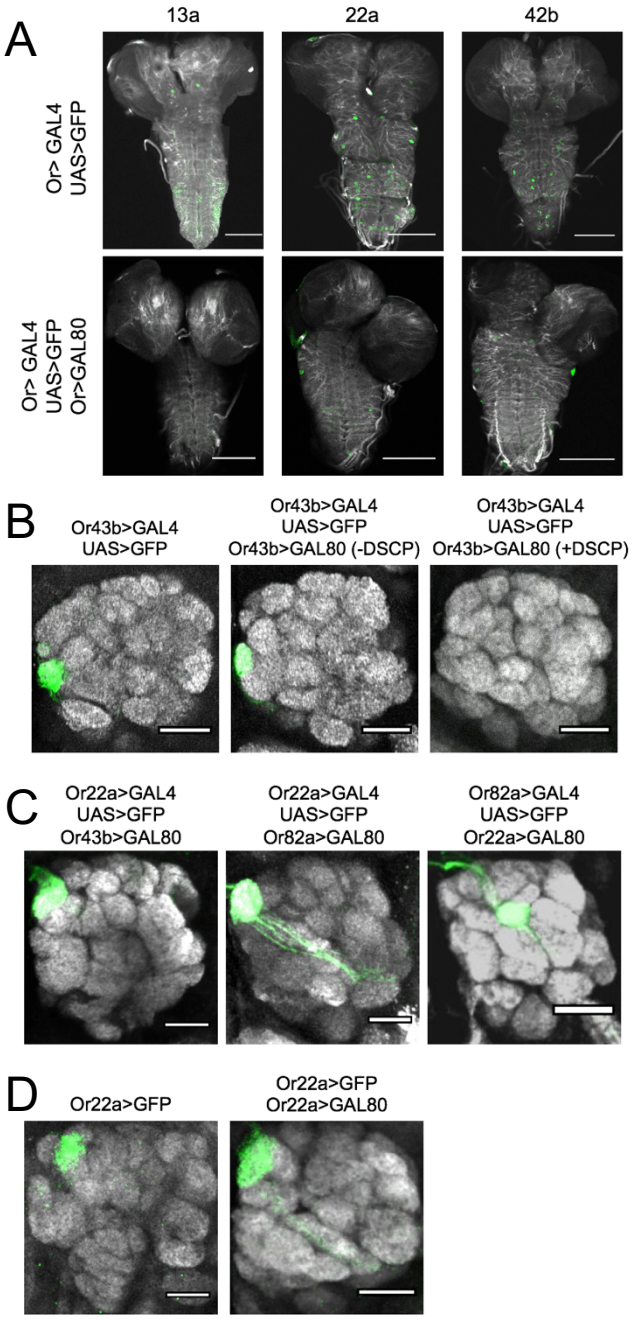

Figure S1 GAL80 Efficacy and Specificity. a) **GAL80 reduces GAL4 expression in larvae**. Brains are immunostained with anti-neuroglian (grey) and anti-GFP (green). Scale bars indicate 100μm. Or13a, Or22a, and Or42b are examples of odorant receptors expressed in larvae. *OR-GAL4, UAS-GFP* genotypes give GFP expression patterns specific to the odorant receptor expression pattern. When the *Or-GAL80* is added, there is some reduction of GFP expression, but it is not entirely eliminated. b) **DSCP required in destination vector for effective GAL80 expression**. Antennal lobes are oriented and stained as described in Figure 3. Scale bars indicate 20μm. OSNs expressing Odorant Receptor 43b (Or43b) are shown as an example of an *Or-GAL80* made with a vector that does not contain DSCP. DSCP is a powerful promoter, and it was removed from the pBP-GAL80uW-6 destination vector so that no aberrant expression of the GAL80 would be present. However, without the DSCP, the OR promoter itself was insufficient to eliminate GAL4 activity in both glomeruli targeted by the Or43b-GAL4. When flies were made using a vector with DSCP added back, the GAL80 expression was sufficient to eliminate the GAL4 activity. c) **DSCP does not affect specificity**. In each of the three examples above, GAL4 is active as indicated by the expression of *UAS-GFP* in the specific glomerulus of the antennal lobe that corresponds to the *OrX-GAL4*. Nonspecific *OrY-GAL80*s do not eliminate the GAL4 activity, despite containing the promoter DSCP. d) **GAL80 only effects GAL4-generated expression**. When an *Or22a-GFP* construct is used to express GFP, instead of the GAL4/UAS system, *Or22a-GAL80* does not interfere with GFP expression.

Receptor	Gene location	PCR Size (bp)	Primer	Primer Sequence 5'-->3'	Tm (C)	Primer Length	Primer Location
Or7a	X: 8,164,266- 8,165,708 [-]	1291	Or7aP_right	GCTGATGGACTTTTGACGCCTGGGAATATTCGAATGGC	65.2	38	X: 8,165,710- 8,165,747
			Or7aP_left	CACCGGACACCGCATCCCGATCAAGACACACG	66.2	32	X: 8,167,000- 8,166,969
Or9a	X: 10,458,186- 10,459,676 [-]	1074	Or9aP_right	GCGGACTGTACAGTCGTTGGGTTCTTATACTTTCCAC	65.3	37	X: 10,459,686- 10,459,722
			Or9aP_left	CACCCGGTCTTCGATAACAGAAGGGTATGCCAGTCGTTGC	64.6	40	X: 10,460,759- 10,460,720
Or10a	X: 11,413,467- 11,417,422 [-]	5241	Or10aP_right	GATGGATATAACTATGTGAACGACATCCTGGCAAGGAATACTC	62.1	43	X: 11,417,404- 11,417,446
			Or10aP_left	CACCGCTGTTTGCTCGGCTCGTCAGGTCG	64.8	29	X: 11,422,644- 11,422,616
Or13a	X: 15,974,425- 15,976,706 [+]	1132	Or13aP_right	GACTATCTGATAAATGCCACAGCACTAGGTACATCTTAAGGC	62.6	42	X: 15,974,424- 15,974,383
			Or13aP_left	CACCCAATCCCGGCCATCCCATCCCATACC	65.2	30	X: 15,973,293- 15,973,322
Or19a	X: 20,141,819- 20,143,188 [-]	4814	Or19aP_right	GGTTGTTCGCCTCTTTGAAGCAGCTCTCCG	65.4	30	X: 20,143,189- 20,143,218
			Or19aP_left	CACCGAATTCCCCTCTACCCCGCATCCAC	65.7	29	X: 20,148,002- 20,147,974
Or22a	2L: 1520613-1522151 [+]	5293	Or22aP_right	CTTGTCCGTGGCTTTGTTTGAATATTTGCTTGAGCTGGG	65	39	2L: 1,520,612- 1,520,574
			Or22aP_left	CACCGCCAGCGGGGTTGAAGGATGGAATGTG G	58.4	32	2L: 1,515,324- 1,515,351
Or22b	2L: 1,522,697- 1,524,257 [+]	1304	Or22bP_right	CGTCCGTGGCTCTTTTTGATTATTTGCTTGAGCTGG	64	36	2L: 1,522,700- 1,522,665
			Or22bP_left	CACCGCTCACCGAGTGCATTCGGGATCATCGATTGC	65.2	36	2L: 1,521,397- 1,521,432
Or33c	2L: 11,937,969- 11,939,202 [+]	1895	Or33cP_right	GTTCACCTAATGCACATTTCCCAGCAAGGCTGGAG	64.8	35	2L: 11,937,967- 11,937,933
			Or33cP_left	CACCCGCAGTAAATTGATGGGCGTAACGATGTGGGAC	65.4	37	2L: 11,936,073- 11,936,109
Or35a	2L: 15,622,068- 15,623,558 [-]	2522	Or35aP_right	GGAGTGAAGACTGTTGAATAATGGCTGCTCTCCTCCG	65	37	2L: 15,623,562- 15,623,598
			Or35aP_left	CACCGACGGCCAACCAAGGAAAAGAAGAAGCGAC	63.1	34	2L: 15,626,083- 15,626,050
Or42a	2R: 5,791,441- 5,792,967 [-]	1276	Or42aP_right	GCACTCTAATTTCAACAATTGAACTAAAGCACCGTCTGCAATG	62.7	43	2R: 5,792,971- 5,793,013
			Or42aP_left	CACCGGACTTTTAGCTCTTGGTACCCCGGTAC	66	32	2R: 5,794,246- 5,794,215
Or42b	2R: 5,797,195- 5,798,512 [-]	5340	Or42bP_right	CGGCGTTATTGTGCGCACTGCTCTGG	65.4	26	2R: 5,798,515- 5,798,540
			Or42bP_left	CACCGCCAGAGGATGCGTGTGTGTCTGTGAGTC	62.4	33	2R: 5,803,854- 5,803,822
Or43b	2R: 7,920,835- 7,922,604 [-]	486	Or43bP_right	CGAATGTTTAAGGCTATAATATAACTGGCGATAGGAGGAGCTCGG	64.6	45	2R: 7,922,553- 7,922,597
			Or43bP_left	CACCGCTGTAGCTGTAGGGCAGACTGAATTTGTCCGTTCAC	65.4	41	2R: 7,923,038- 7,922,998
Or47a	2R: 11,250,368- 11,251,913 [+]	5591	Or47aP_right	GTCGACAAGGGTTAATTCGGCCTCACACTAAGTCAAG	65.2	37	2R: 11,250,377- 11,250,341
			Or47aP_left	CACCGCCGTTGGTTCGGCATCAGGAGCAG	65	29	2R: 11,244,787- 11,244,815
Or56a	2R: 19,769,461-19,771,233 [-]	5289	Or56a_right	GTTAAACTGTTTAGCGTTAACCATATTCAAGGGTC	59.6	35	2R: 19,771,234- 19,771,268
			Or56a_left	CACCGGGCTGTTTTTCGACTGCTTCTGCTGGTGAC	65.2	35	2R: 19,776,522- 19,776,492
Or59b	2R: 23,470,165..23,471,775 [-]	650	Or59bP_right	CCCACTGACCGGTGGTCGGTG	65.4	21	2R: 23,471,715- 23,471,735
			Or59bP_left	CACCGGCGAGAAGTTCTTCAGTGACAGGAGCAATGGC	64.6	37	2R: 23,472,364- 23,472,328
Or59c	2R: 23,472,300..23,473,753 [-]	2094	Or59cP_right	GCAGGCGCTTGAAGAAGAACTTGGTCATCTTTGCG	65.4	35	2R: 23,473,576- 23,473,610
			Or59cP_left	CACCGCCTGACGACGACTTTCAAGACAAGAACAGCCATCG	63.9	40	2R: 23,475,669- 23,475,630
Or67a	3L: 9,529,067..9,531,386 [+]	1564	Or67aP_right	CACTTTCAATATGGTTTGAATAAACACTGATTGATACAGGAAAG	58.8	44	3L: 9,529,900- 9,529,857
			Or67aP_left	CACCGCTCGCAAATTCAGTACCACACGCCACTTCC	65.8	35	3L: 9,528,337- 9,528,371
Or67d	3L: 10,273,204..10,274,624 [+]	5129	Or67dP_right	GTTTGTTAGCTATGCAACTTAAAGGAGAACTGTTTTTTAATTGTC	60.1	45	3L: 10,273,202- 10,273,158
			Or67dP_left	CACCGCGACAGGACAACCCGCAGCAGAAG	65	29	3L: 10,268,074- 10,268,102
Or71a	3L: 15,076,907..15,078,447 [-]	4059	Or71aP_right	GCACAAGTCCAAGCTCGGATTATTAAAGTCCGATTTTGGAGC	64.9	42	3L: 15,078,449- 15,078,490
			Or71aP_left	CACCGTGGAGATGTCACGGAGGGATGAGTTGATTGCC	63.6	37	3L: 15,082,507- 15,082,471
Or82a	3R: 82694-84166 [+]	1423	Or82aP_right	GACCCCACTTTCTAGAACATGAAAGGATTGCGCTGCTAACG	65.6	41	3R: 82,693- 82,653
			Or82aP_left	CACCGGATCGCACACGGGCAATGCATAC	65.8	28	3R: 81,271- 81,298
Orco	3R: 5,407,183..5,412,406 [-]	5058	OrcoP_right	CCTGTTGAGCGGCGGAAATTGCACGAC	65.3	27	3R: 5,409,924- 5,409,950
			OrcoP_left	CACCGCCTATGTCCTGGCTGCTCCTCATTCCC	63.1	32	3R: 5,414,981- 5,414,950
Or85a	3R: 8,321,747..8,323,054 [+]	2503	Or85aP_right	GAAAGTTTAGAGGTTTCGATTGACTTGAACTTTGTCACCTGAAG	62.8	44	3R: 8,321,742- 8,321,699
			Or85aP_left	CACCGACCACCCCGAACTCAAAACGCAAACAATCCG	66.2	36	3R: 8,319,240- 8,319,275
Or85b	3R: 8,510,077..8,511,358 [-]	2657	Or85bP_right	CCTTTAGTTGGTCGGAACTGAGGTAGAGAAGTGTCCTTTCTG	66	42	3R: 8,511,359- 8,511,400
			Or85bP_left	CACCGTTCGTTTGCTTTTGACCCGCTTGGTTCGC	65.9	34	3R: 8,514,015- 8,513,982
Or85c	3R: 8,511,734..8,513,022 [-]	4822	Or85cP_right	CCGACGTGAAAATAATCCAATAAGTGATGGTCGGAATTC	61.9	39	3R: 8,513,026- 8,513,064
			Or85cP_left	CACCGCGGAGACCCATGGTTCCAGTGATGTAGC	64	33	3R: 8,517,847- 8,517,815
Gr21a	2L: 780,482..782,885 [+]	1756	Gr21aP_right	CGTGCGATCGAGGAAAGTCATACGGCTTCC	65.2	30	2L: 781,296- 781,267
			Gr21aP_left	CACCCGAGTCATCCCCTGCTTAAGGCGCAG	65.6	30	2L: 779,541- 779,570

Table S1 PCR Primers: The primer sets used to generate the PCR products for odorant receptor promoters. Promoter locations were chosen based on the work of Couto et al (2005). Promoters were created so their orientation to the *GAL80* gene in the destination vector matched their orientation to the *OR* gene on the chromosome. "Right" primers indicate those closest to the start codon of the gene. "Left" primers are on the far end of the promoter and have an added CACC to the 5' end for insertion into a pENTR/D-TOPO entry vector.

Sequencing Primers for OR Promoters	
Attr_Forward	5'-ggcgtatcacgaggccctttcgtcttcaag-3'
Attr_Reverse	5'-cggtgtgcctaggcatcagtggttgaacc-3'
Or10a_seq1	5'-cgtctggacgggcagacggtc-3'
Or10a_seq2	5'-cgctgcggtcatcaccccactcc-3'
Or10a_seq3	5'-cggtgggaaattagagtatacaccgacacgagtgc-3'
Or10a_seq4	5'-cgcattcgcattcggtttcagtttcagtttcaggcc-3'
Or10a_seq5	5'-cgtgttgcgtgttaagcagtgggtgtgc-3'
Or10a_seq6	5'-ggtcgcactcgaaaacgcaaactcgaactc-3'
Or19a_seq1	5'-gcaggtcgctagtactaggcggtacctg-3'
Or19a_seq2	5'-cgagaatcttgacttctgctggctgcgtgg-3'
Or19a_seq3	5'-cgtctagtcgaaggggtttggcaaaagcg-3'
Or19a_seq4	5'-ggcattcggtgtatggagttcagcggagac-3'
Or19a_seq5	5'-gctgaagccatgtcaacctgctcggattctcag-3'
Or22a_seq1	5'-ggacagcaaaccacacccgaaggacc-3'
Or22a_seq2	5'-ccttcgacttgaacgatttggccatgtcagtccag-3'
Or22a_seq3	5'-cgagggcaaaggacgctccagttgtg-3'
Or22a_seq4	5'-gcgtgcgtaccaatccatttgtcatcagatcgc-3'
Or22a_seq5	5'-cgcagcgggtccctcgatcaactc-3'
Or33c_seq1	5'-gcctggtttccatacgatgtgcaggccac-3'
Or35a_seq1	5'-ggcacagtttcgggccgtgctacag-3'
Or35a_seq2	5'-ggattgtcgggattttgcagagcggagtgg-3'
Or42b_seq1	5'-ggcgaccaaaggagcaagtgacaacaagaagtgc-3'
Or42b_seq2	5'-ccgtctcaatgtattgctcgggttctaccg-3'
Or42b_seq3	5'-gccgaacaactgcagctcattgacacaaccg-3'
Or42b_seq4	5'-ccggctgtacgcttgcttgtctgtgtg-3'
Or42b_seq5	5'-gcgcgctccgaaaatgtgtgtaagctactgc-3'
Or47a_seq1	5'-ggggtcagggccttagaacttctcttctgcaag-3'
Or47a_seq2	5'-ccgcagctttggttccaaaagttacagttgcac-3'
Or47a_seq3	5'-ccatacaaatcagtaggcgtgttatttcttgactcgcacg-3'
Or47a_seq4	5'-cgacctgtcacttagctgccgatgcac-3'
Or47a_seq5	5'-gggagcgaaccatgccaacgatggag-3'
Or47a_seq6	5'-cgcccacacaagcttatttcactcttcaaccgtctg-3'
Or56a_seq1	5'-cggttgttctcgctgcctgggcttc-3'
Or56a_seq2	5'-cgatttcgcccttaaccaccggtaaactgg-3'
Or56a_seq3	5'-ggacgcttcgtgttggctgtttcacttctg-3'
Or56a_seq4	5'-ccggctgctccttctttcaaccacacg-3'
Or56a_seq5	5'-ggagtcagaccacacgagctctcgatgg-3'
Or59c_seq1	5'-cggaggagcgcatcgaggatgacacg-3'
Or59c_seq2	5'-ccagtgtggcacgtgcaatgtgccac-3'
Or67d_seq1	5'-gctgctgatttcgctctctggcctgccaacttatgc-3'
Or67d_seq2	5'-ccccaaactgctgagaaaccacaggcatgac-3'
Or67d_seq3	5'-ccaccgcccaactgcggatgtcc-3'
Or67d_seq4	5'-ggtcacatgacggtcctggcagttcctag-3'
Or67d_seq5	5'-cggaatgccacgcactttccactggaagaag-3'
Or71a_seq1	5'-gctgagctgcttctgagtcccagtcacagg-3'
Or71a_seq2	5'-ggacatcgccaccgagttggagcag-3'
Or71a_seq3	5'-cggggcactatttgttgttcttttgtgcgacacc-3'
Or71a_seq4	5'-cgatctctcccgatcccatgcgctctctc-3'
Or85a_seq1	5'-ggagtcatcggcagcggggataccg-3'
Orco_seq1	5'-gcacgtgagttgctgaagctgccagatgg-3'
Orco_seq2	5'-cgtgctgcagttctgggaaagggagcag-3'
Orco_seq3	5'-cgcacactatgaaaccgaatgtggcacacac-3'
Orco_seq4	5'-ggctgcagggctcacgatgtccg-3'
Orco_seq5	5'-gcctaccgaaattcagtgcctatgagaactgagaacg-3'
Or85a_seq2	5'-cgtggtacctggccaggatcttggacac-3'
Or85b_seq1	5'-ggatgggaatcgtgattgcgtttgcctaggc-3'
Or85b_seq2	5'-cggttggataggtatctgcgatcttgttcacg-3'
Or85c_seq1	5'-ccagcgtccttttgctccagctcctg-3'
Or85c_seq2	5'-ggttgtcccgctttctttggggttcaattggc-3'
Or85c_seq3	5'-gggaccagcagcgtacattgatgcatatcctgc-3'
Or85c_seq4	5'-ccagattcttgtcggccggatgttgtaggc-3'
Or85c_seq5	5'-ccacataccacactcactcccacatccacacc-3'

Table S2 Sequencing Primers: Smaller OR promoters could be sequenced in the pBP-GAL80uW-6 destination vector using Attr_for and Attr_rev primers. Primers used to sequence larger promoters are identified by OR name in bold.