

Figure S2. EAG responses of locust antennae to different concentrations of 14 compounds. n = 11–12. Mean EAG responses to the applied doses of the same odor compound were compared by ANOVA and Tukey's HSD test ($\alpha = 0.05$). *, $p < 0.05$. **, $p < 0.01$. ***, $p < 0.001$. ****, $p < 0.0001$.

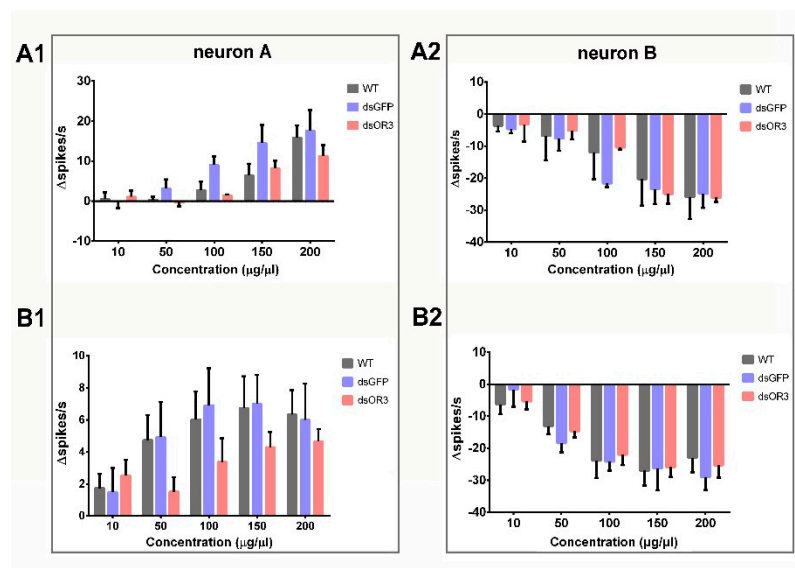


Figure S3. Comparison of the number of neuron A and B spikes housed in trichoid sensillum in WT, dsGFP, and dsOR3 locusts in response to 3-heptanone (A) and 3-nonanone (B) at different dosages after RNAi. (A–B): Ordinary one-way ANOVA. Tukey's multiple comparisons test. Error bar: S.E.M. n=5–9.

Table S1. Characteristics of all chemicals used.

Odor name	CAS No.	Solvent	Purity
2,4,5-trimethyl thiazole	13623-11-3	mineral oil	98%
2,5-dimethylpyrazine	123-32-0	mineral oil	98%
2-heptanone	110-43-0	mineral oil	98%
2-isobutylthiazole	18140-74-9	mineral oil	99%
2-isobutyl-3-methoxy-pyrazine	24683-00-9	mineral oil	99%
2-octanone	111-13-7	mineral oil	98%
3-heptanone	106-35-4	mineral oil	98%
3-nonanone	925-78-0	mineral oil	99%
3-octanone	106-68-3	mineral oil	98%
4,5-dimethylthiazole	3581-91-7	mineral oil	97%
benzyl alcohol	100-51-6	mineral oil	99%
butyl acetate	123-86-4	mineral oil	99.7%
butyl butyrate	109-21-7	mineral oil	98%
ethyl butyrate	105-54-4	mineral oil	99%
hexanal	66-25-1	mineral oil	98%
hexyl acetate	142-92-7	mineral oil	99%
pentyl acetate	628-63-7	mineral oil	98%
pentyl propionate	674-54-4	mineral oil	99%
trans-2-hexenyl acetate	2497-18-9	mineral oil	98%

Table S2. The primers used in experiments.

Primers	Sequences
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<i>LmigOR3</i> –probe–s (WM–FISH)	TGCTTCTCCGTGTTCAACTG
<i>LmigOR3</i> –probe–as (WM–FISH)	TGCACAAACCTGCAAACTTC
dsOR3–s (RNAi)	GGATCCTAATACGACTCACTATAGGTGCTTCTCCGTGTTCAACTG
dsOR3–as (RNAi)	GGATCCTAATACGACTCACTATAGGAGCACCTTGGTGAAGGTCTG
dsGFP–s (RNAi)	GGATCCTAATACGACTCACTATAGGCACAAGTTCAGCGTGTCCG
dsGFP–as (RNAi)	GGATCCTAATACGACTCACTATAGGGTTCACCTTGATGCCGTTC
qPCR– <i>LmigActin</i> –s	GCAAAGCTGGCTTCGCCG
qPCR– <i>LmigActin</i> –as	ATGTTCTCCTCGGGCGCCAC
qPCR–dsOR3–s	CTCCGAGCTGCTCATCTTCT
qPCR–dsOR3–as	AGCACCTTGGTGAAGGTCTG

¹ Experimental Section: The following PCR protocol was used for WM–FISH: 94 °C for 5 min; 30 cycles of 94 °C for 30 s, 55 °C for 30 s, and 72 °C for 1 min; and 72 °C for 10 min. The annealing temperature of the above procedure was changed to 50 °C to detect the expression levels of GFP and actin. The target fragments of the primers in Table S1 are 374 bp, 731 bp, 420 bp, and 210 bp.

Table S3. The formula of solutions used in whole–mounts *in situ* hybridization.

Solutions	Ingredients	Resource	Catalog Number
1×Tris–acetate–EDTA	0.04mol/L Tris–Base	Sigma, USA	V900483–1KG
	0.12%acetic acid	Beijing chemical regents company, China	10000292
	Ethylenediaminetetraacetic acid disodium salt (EDTA)	Sigma, USA	03677
10×phosphate buffer saline (pH7.1)	8.5%NaCl	Sinopharm, China	10019392
	14mM KH ₂ PO ₄	Sigma, USA	V900041–500G
	80mM Na ₂ HPO ₄	Sigma, USA	V900268–500G
10×Tris buffered saline(pH7.5)	1M Tris–Base	Sigma, USA	V900483–1KG
	1.5M NaCl	Sinopharm, China	10019392
	100mM Tris–Base	Sigma, USA	V900483–1KG
Detection Buffer (DAP) chromogenic detection pH9.5 TSA detection pH8.0	100mM NaCl	Sinopharm, China	10019392
	50mM MgCl ₂ ·6H ₂ O	Sigma, USA	V900020–500G

20×saline–sodium citrate(pH7.0)	3M NaCl	Sinopharm, China	10019392
	0.3M Na–Citrate	Sigma, USA	V900095–500G
	4% paraformaldehyde	Sigma, USA	V900894–100G
4% paraformaldehyde solution(pH9.5)	0.1M NaHCO ₃	Sigma, USA	V900182–500G
	80mM NaHCO ₃	Sigma, USA	V900182–500G
	120mM Na ₂ CO ₃	Sigma, USA	S7795–500G
Sodium Carbonate Buffer(pH10.2)	50% Deionized Formamide	MPBIO, USA	FORMD002
	5×saline–sodium citrate		
	1% Blot	Roche, Switzerland	11175041910
Blocking Buffer in Tris buffered saline	0.03% Triton X–100	AMRESCO, USA	0694–500ML
	1×Tris buffered saline		
	1.5 U/ml anti–digoxigenin alkaline phosphatase conjugated antibody	Roche, Switzerland	11175041910
Alkaline phosphatase solution	Blocking Buffer in Tris buffered saline		
	1.5 U/ml anti–digoxigenin alkaline phosphatase conjugated antibody	Roche, Switzerland	11175041910
	1% anti–biotin streptavidin horse radish peroxidase– conjugated antibody	TSA kit, Perkin Elmer, USA	NEL701A001KT
Alkaline phosphatase/ horse radish peroxidase solution	Blocking Buffer in Tris buffered saline		
	50% Deionized Formamide	MPBIO, USA	FORMD002
	2×saline–sodium citrate		
Hybridization Buffer	10% dextran sulphate	Sigma, USA	D8906–50G
	20 µg/ml yeast t–RNA	invitrogen, USA	AM7119
	0.2 mg/ml herring sperm DNA	Sigma, USA	D3159–10G

2-hydroxy-3-naphtoic acid-2'-phenylanilide phosphate/ 4-chloro-2-methylbenzenediazon ium hemi-zinc chloride salt substrate	1% 2-hydroxy-3-naphtoic acid-2'-phenylanilide phosphate (10mg/ml)	Roche, Switzerlan d	11758888001
	1% 4-chloro-2-methylbenzenediazon ium hemi-zinc chloride salt (25mg/ml)	Roche, Switzerlan d	11758888001
Tyramide signal amplification substrate	Detection Buffer		
	2% fluorescein-tyramides	TSA kit, Perkin Elmer, USA	NEL701A001K T
	Amplification Diluent	TSA kit, Perkin Elmer, USA	NEL701A001K T