

Supporting Information

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(-)-Carvyl acetate	Furfuryl butyrate	2,6-Dimethyl-5-heptenal	Ethyl vinyl ketone	2-Acetylpyridine
1-Octen-3-yl acetate	Furfuryl hexanoate	2-Ethylbutyraldehyde	trans-2-Nonenal	2-Pentylpyridine
2-Ethylbutyl acetate	Furfuryl octanoate	2-Furaldehyde	trans-3-Octen-2-one	3-Acetylpyridine
2-Ethylhexyl acetate	Furfuryl pentanoate	2-Isopropyl-5-methyl-2-hexenal	β -Ionone	3-Ethyl-2-methylpyridine
2-Ethylhexyl salicylate	Furfuryl propionate	2-Methyl-2-pentenal	(\pm)- γ -Valerolactone	Piperidine
2-Methoxyphenyl acetate	Geranyl butyrate	2-Methylbutyraldehyde	Menthallactone	Pyrrolidine
2-Methylbutyl 2-methylbutyrate	Geranyl tiglate	2-Methylundecanal	α -Angelicalactone	
2-Methylbutyl acetate	Heptyl formate	2-Phenyl-2-butenal	γ -Dodecalactone	
2-Methylbutyl isovalerate	Hexyl 2-furoate	2-Phenylpropionaldehyde	γ -Heptalactone	
2-Pentyl butyrate	Hexyl formate	2-Phenylpropionaldehyde dimethyl-acetal	γ -Nonalactone	
2-Phenoxyethyl isobutyrate	Hexyl tiglate	3-(5-Methyl-2-furyl)butanal	δ -Dodecalactone	
3-Hexenyl 3-methylbutanoate	Isomyl acetate	3-(5,5-Trimethyl)hexanal	δ -Hexalactone	
3-Methylbutyl 2-methylbutanoate	Isomyl benzoate	3-Ethoxypropionaldehydediethyl-acetal	δ -Nonalactone	
3-Octyl acetate	Isomyl butyrate	3-furaldehyde	δ -Tetradecalactone	
Allyl 2-ethylbutyrate	Isomyl cinnamate	4-Methyl-2-phenyl-2-pentenal	5-Undecalactone	
Allyl 2-furoate	Isomyl formate	5-Methylfurfural	ϵ -Decalactone	
Allyl anthranilate	Isomyl isobutyrate	Acetal	ω -6-Hexadecenalactone	
Allyl butyrate	Isomyl isovalerate	Benzaldehyde dimethyl acetal		
Allyl cinnamate	Isomyl propionate	Benzaldehyde propylene glycol acetal	(S)-(-)-Perillyl alcohol	2-(Methylthio)ethanol
Allyl cyclohexanepropionate	Isomyl pyruvate	cis-3-Hexenal	1-Hexen-3-ol	2,3-,10-Mercaptopinane
Allyl hexanoate	Isomyl propionate	cis-4-Decenal	1-Pentanol	2,4,5-Trimethylthiazole
Allyl isovalerate	Isobutyl angelate	cis-6-Nonenal	1-Phenyl-1-propanol	2,4-Dimethylthiazole
Allyl nonanoate	Isobutyl butyrate	cis-8-Undecenal	1-Phenyl-3-methyl-3-pentanol	2,5-Dimethylthiophene
Allyl octanoate	Isobutyl formate	Citral diethyl acetal	2,6-Diisopropylphenol	2,6-Dimethylthiophenol
Allyl phenoxyacetate	Isobutyl isobutyrate	Citral dimethyl acetal,	2,6-Dimethyl-4-heptanol	2-Acetylthiazole
Allyl phenylacetate	Isobutyl tiglate	heptanal	2-Ethyl-1-hexanol	2-Ethoxythiazole
Allyl propionate	Isobutyl trans-2-butenate	Hydrocinnamaldehyde	2-Ethylfenchol	2-Isopropyl-4-methylthiazole
Amyl 2-furoate	Isopropyl 2-methylbutyrate	Isobutyraldehyde	2-Hexanol	2-Mercapto-3-butanol
Amyl acetate	Isopropyl acetate	Isovaleraldehyde	2-Methoxy-4-methylphenol	2-Mercaptopropionic acid
Amyl butyrate	Isopropyl formate	Nonanal	2-Methoxy-4-propylphenol	2-Methoxythiophenol
Amyl formate	Isopropyl butyrate	Propionaldehyde	2-Methoxy-4-vinylphenol	2-Methyl-2-thiazoline
Anisyl acetate	Isopropyl myristate	p-Tolualdehyde	2-Methyl-1-butanol	2-Methyl-3-furanthiol
Benzyl acetoacetate	Isopropyl phenylacetate	Safranal	2-Methyl-3-buten-2-ol	2-Methyl-3-methylthiofuran
Benzyl isovalerate	Isopropyl acetate	trans, trans-2,4-Heptadienal	2-Nonanol	3-(Methylthio)-1-hexanol
Benzyl salicylate	Lauryl acetate	trans, trans-2,4-Nonadienal	2-Octanol	3-Acetyl-2,5-dimethylthiophene
Benzyl trans-2-methyl-2-butenate	Linylal butyrate	trans, trans-2,6-Nonadienal	3,5,5-Trimethyl-1-hexanol	4,5-Dihydro-3(2H)-thiophenone
Bornyl valerate	Linylal formate	trans-2,cis-6-Nonadienal	3,7-Dimethyl-1-octanol	4,5-Dimethylthiazole
Butyl 2-methylbutyrate	Linylal propionate	trans-2-Decenal	3-Hexanol	2-Isopropyl-4-methylthiazole
Butyl butyrate	Methyl (p-toloxyl)acetate	trans-2-Dodecenal	3-Methyl-1-pentanol	4-Methyl-5-thiazolethanol acetate
Butyl formate	Methyl 2-furoate	trans-2-Heptenal	3-Methyl-3-buten-1-ol	4-Methyl-5-vinylthiazol acetate
Butyl hexanoate	Methyl 2-methylbutyrate	trans-2-Hexen-1-ol	3-Methyl-3-pentanol	4-Methylthiazole
Butyl isobutyrate	Methyl 2-methylpentanoate	trans-2-Octenal	3-Octanol	5-Methyl-2-thiophenecarboxaldehyde
Butyl isovalerate	Methyl 2-nonylate	trans-2-Pentenal	3-Phenyl-1-propanol	Allyl disulfide
Butyl laurate	Methyl 2-thiofuroate	α -Amylcinnamaldehyde	4-Allyl-2,6-dimethoxyphenol	Allyl sulfide
Butyl levulinate	Methyl 3-phenylpropionate	α -Amylcinnamaldehyde dimethyl-acetal	4-Ethylguaiaicol	Benzyl mercaptan
Butyl L-lactate	Methyl 4-methylvalerate	α -Hexylcinnamaldehyde	4-Hexen-1-ol	Dicyclohexyl disulfide
Butyl phenylacetate	Methyl anthranilate	α -Methylcinnamaldehyde	4-Isopropylbenzyl alcohol	Dimethyl disulfide
Butyl propionate	Methyl cyclohexanecarboxylate	α -Methylcinnamaldehyde	4-Methyl-2,6-dimethoxyphenol	Dimethyl trisulfide
Butyl valerate	Methyl decanoate	β -Cyclocitral	5-Phenyl-1-pentanol	2-Pentyl 2-mercaptopropionate
Cedryl acetate	Methyl dihydrojasmonate		6-Methyl-5-hepten-2-ol	Ethyl thioacetate
cis-3-Hexenyl acetate	Methyl formate	1-(p-Methoxyphenyl)-2-propanone	cis-2-Hexen-1-ol	Ethyl(methylthio)acetate
cis-3-Hexenyl benzoate	Methyl isobutyrate	1-Octen-3-one	cis-2-Nonen-1-ol	Furfuryl isopropyl sulfide
cis-3-Hexenyl butyrate	Methyl isovalerate	2,2,6-Trimethylcyclohexanone	cis-2-Penten-1-ol	Furfuryl methyl sulfide
cis-3-Hexenyl cis-3-hexenoate	Methyl jasmonate	2,3-butanedione	cis-3-Hepten-1-ol	Isopropyl disulfide
cis-3-Hexenyl crotonate	Methyl propionate	2,3-Heptanedione	cis-3-Hexen-1-ol	Methyl (methylthio)acetate
cis-3-Hexenyl formate	Methyl p-tert-butylphenylacetate	2,3-Hexanedione	cis-3-Octen-1-ol	Methyl 3-(methylthio)propionate
cis-3-Hexenyl hexanoate	Methyl sorbate	2,3-Pentanedione	cis-5-Octen-1-ol	Methyl furfuryl disulfide
cis-3-Hexenyl isobutyrate	Methyl stearate	2,5-Dimethyl-4-hydroxy-3(2H)-furanone	cis-6-Nonen-1-ol	Methyl phenyl sulfide
cis-3-Hexenyl lactate	Methyl tiglate	2,6-Dimethyl-4-heptanone	Decahydro-2-naphthol	Methyl propyl disulfide
cis-3-Hexenyl propionate	Methyl trans-2-octenoate	2',4'-Dimethylacetophenone	Dihydromyrcenol	Methyl sulfoxide
cis-3-Hexenyl tiglate	Methyl trans-3-hexenoate	2'-Aminoacetophenone	DL-3-Methyl-2-butanol	p-Mentha-8-thiol-3-one
Citronellyl tiglate	Methyl valerate	2-Methylcyclohexanone	D-Neomenthol	Propyl mercaptan
Cyclohexyl acetate	Myrtenyl acetate	2-Methyltetrahydro-3-furanone	Heptyl alcohol	
Cyclohexyl propionate	n-Decyl acetate	2-Methyltetrahydrothiophen-3-one	Isobutyl alcohol	(\pm)-Theaspirane
Decyl butyrate	Neryl acetate	2-Nonanone	Isopropyl alcohol	1,1-Dimethoxyethane
Decyl propionate	Octyl formate	2-Octanone	Nerol	1,2,3,4-Tetrahydroquinoline
Diethyl malate	<i>o</i> -Tolyl isobutyrate	2-sec-Butylcyclohexanone	Nerolidol	1,2,6-Trihydroxyhexane
Dimethyl malonate	Piperonyl isobutyrate	3,4-Hexanedione	p, <i>o</i> , <i>o</i> -Trimethylbenzyl alcohol	1,4-Cineole
Dimethyl succinate	Propyl formate	3-Decanone	Rhodinol	1-Methyl-1,4-cyclohexadiene
Ethyl (\pm)-2-hydroxycaproate	trans-2,cis-6-Nonadienyl acetate	3-Decanol	Tetrahydrofurfuryl alcohol	2,4-Dimethylanisole
Ethyl 2-methyl-4-pentenoate	α -Methylbenzyl acetate	3-Decen-2-one	Tetrahydromyrcenol	2-Isobutyl-2-methyl-1,3-dioxolane
Ethyl 2-methylbutyrate	α -Methylbenzyl butyrate	3-Heptanone	trans-2,cis-6-Nonadien-1-ol	2-Methylanisole
Ethyl 2-methylpentanoate	α -Methylbenzyl propionate	3-Hexanone	trans-2-Octen-1-ol	2-Propyl-4-methyl-1,3-dioxolane
Ethyl 2-nonylate	(\pm)-4-Methylcrotonic acid	3-Methyl-2-cyclohexenone	trans-3-Hexen-1-ol	2,2'-(Dithiodimethylene)difuran
Ethyl 2-trans-4-cis-decadienoate	2-Ethylbutyric acid	3-Methylcyclohexanone	α -Amylcinnamyl alcohol	2,3-Dimethylbenzofuran
Ethyl 3-hydroxyhexanoate	2-Methyl-4-pentenoic acid	3-Nonanone	2,3,5-Trimethylpyrazine	2-Acetyl-5-methylfuran
Ethyl 3-oxohexanoate	2-Methylbutyric acid	3-Octanone	2,3-Diethylpyrazine	2-Ethylfuran
Ethyl 3-phenylglycidate	2-Methylheptanoic acid	3-Pentanone	2,3-Dimethylpyrazine	2-Methylfuran
Ethyl acetoacetate	2-Methylpentanoic acid	3-Penten-2-one	2,5-Dimethylpyrazine	2-Pentylfuran
Ethyl anthranilate	2-Oxobutylic acid	4-(4-Methoxyphenyl)-2-butanone	2-Acetyl-3,5(6)-dimethylpyrazine	3-Acetyl-2,5-dimethylfuran
Ethyl chrysanthemate	Methyl trans-3-hexenoate	4-(p-Acetoxyphenyl)-2-butanone	2-Acetyl-3-ethylpyrazine	3,7-Dimethyl-2,6-cycladienenitrile
Ethyl cyclohexanepropionate	Methyl valerate	4,5-Dimethyl-3-hydroxy-2,5-dihydrofuran-2-one	2-Acetyl-3-methylpyrazine	3-Butylideneephthalide
Ethyl formate	2-Methyl-2-pentenoic acid	4-Heptanone	2-Ethyl-3,5(or 6)-dimethylpyrazine	3-Propylideneephthalide
Ethyl heptanoate	4-Ethylpentanoic acid	4-Hexen-3-one	2-Ethyl-3-methoxy-pyrazine	4-Methylanisole
Ethyl isobutyrate	4-Pentenoic acid	4-Methyl-2-pentanone	2-Ethyl-3-methylpyrazine	4,5,6,7-Tetrahydro-3,6-dimethylbenzofuran
Ethyl isovalerate	Formic acid	4-Methyl-3-penten-2-one	2-Ethyl-5(6)-methylpyrazine	5,6,7,8-Tetrahydroquinoxaline
Ethyl levulinate	Isovaleric acid	4-Methylcyclohexanone	2-Ethylpyrazine	5-Methylquinoxaline
Ethyl nonanoate	Pyroglutamic acid	4-Methylthio-2-butanone	2-Isobutyl-3-methylpyrazine	Anisole
Ethyl pyruvate	Valeric acid	4-Methylthio-4-methyl-2-pentanone	2-Methoxy-pyrazine	Dipentene
Ethyl sorbate	(S)-(-)-Penillaldehyde	5-Hydroxy-4-octanone	2-Methylpyrazine	Isopentylamine
Ethyl tiglate	10-Undecenal	5-Methyl-2-hepten-4-one	5H-5-Methyl-6,7-dihydrocyclopenta[b]pyrazine	m-dimethoxybenzene
Ethyl trans-2-butenate	2,4-Dimethylbenzaldehyde	Allyl-cis-one		p-Propyl anisole
Ethyl trans-2-octenoate	2,4-Dimethylbutyraldehyde	cyclohexenecarboxaldehyde		Tetrahydro-4-methyl-2-(2-methyl-1-propenyl)2H-pyran
Ethyl trans-3-hexenoate	Ethyl valerate	2,4-Hexadienal		trans-2,3-Epoxybutane
Ethyl trans-4-octenoate	Ethylene brassylate	2,4-Octadienal		
Ethyl undecanoate	Furfuryl 3-methylbutanoate	2,6,6-Trimethyl-1-cyclohexene-1-acetaldehyde		
Furfuryl acetate	Furfuryl acetate			

Fig. S1. Odor panel. The 479 odorants used in the initial screen, color coded by functional group (dark green, esters; pink, acids; gray, aldehydes; yellow, ketones; dark blue, lactones; red, alcohols; purple, pyrazines; light blue, pyrroles, pyridines, and piperidines; light green, terpenes; black, sulfur compounds; brown, other compounds). We note that some odorants, e.g., ethyl thioacetate, can be classified in more than one class but are listed in only one. Some groups contain both aliphatic and aromatic compounds.

Dataset S1. Responses of receptors to the most effective odorants tested at 10^{-4} dilution

[Dataset S1](#)

Values are mean spike rates \pm SEM (in spikes per second). Spontaneous activity and response to paraffin oil solvent alone have been subtracted from the mean spike rates and are indicated below. Spontaneous firing rates were subtracted from the values shown for the paraffin oil diluent ($6 \leq n \leq 10$).