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1173 **Figure S1 related to Figure 1.**

1174 (A) PCR analysis of genomic DNA from wild-type and heterozygous or homozygous  
1175 Ms4a cluster knockout mice.

1176 (B) Heatmap of expression of Ms4a family member mRNA transcripts detected by RNA  
1177 sequencing experiments performed on RNA isolated from the main olfactory epithelia of  
1178 wild-type and Ms4a cluster knockout mice.

1179 (C) Quantification of the velocity of Ms4a cluster knockout mice and their wild-type  
1180 littermate controls during the odor avoidance assays.

1181 (D) Heat maps (top panels) of the occupancy of wild-type mice in the odor avoidance  
1182 chamber in response to the indicated odorants. Small square represents location of  
1183 odorant, and dashed line demarcates the odor avoidance zone from the rest of the  
1184 chamber. Scale bar, 5 cm. Bottom panels represent quantification of the avoidance mice  
1185 exhibit in response to the indicated odors. \*\*p < 0.01, \*\*\*p < 0.001, a paired t test compared  
1186 to water. EUG; eugenol, LA; linolenic acid, OA; oleic acid, ALA; alpha-linolenic acid, AA;  
1187 arachidonic acid, 2,3-DMP; 2,3-dimethylpyrazine, 2,5-DMP; 2,5-dimethylpyrazine.

1188 (E) Quantification of the amount of time male (left panel) and female (right panel) *Ms4a*  
1189 cluster knockout mice and their wild-type littermate controls spend in open arms in an  
1190 elevated plus maze assay. Unpaired Welch t-test compared to wild-type mice.

1191

1192 **Figure S2 related to Figure 2.**

1193 (A) PCR genotyping analysis of the wild-type (top) and deleted (bottom) *Ms4a6c* alleles  
1194 from, wild-type and heterozygous or homozygous *Ms4a6c* knockout mice.

1195 (B) Heatmap of expression of *Ms4a* family member mRNA transcripts detected by RNA  
1196 sequencing experiments performed on RNA isolated from the main olfactory epithelia of  
1197 wild-type and *Ms4a6c* knockout mice. The residual *Ms4a6c* transcripts detected in  
1198 *Ms4a6c* knockout mice all map to 5' UTR regions of the gene, which were not targeted.

1199 (C) Quantification of the velocity of *Ms4a6c* knockout mice and their wild-type littermate  
1200 controls during the odor avoidance assays. Unpaired Welch t-test compared to wild-type  
1201 mice.

1202 (D) Quantification of the amount of time male (left panel) and female (right panel) *Ms4a6c*  
1203 knockout mice and their wild-type littermate controls spend in open arms in an elevated  
1204 plus maze assay. Unpaired Welch t-test compared to wild-type mice.

1205

1206 **Figure S3 related to Figure 3.**

1207 (A) Representative confocal images of HEK293 cells transfected with an N-terminal  
1208 mCherry-fusion version of MS4A1 (purple) in which the surface expression of MS4A1 was  
1209 determined using non-permeabilized staining conditions and an anti-MS4A1 antibody  
1210 (cyan).

1211 (B) Quantification of the velocity of *Ms4a1* knockout mice and their wild-type littermate  
1212 controls during the odor avoidance assays. Unpaired Welch t-test compared to wild-type  
1213 mice.

1214 (C) Quantification of the amount of time male (left panel) and female (right panel) *Ms4a1*  
1215 knockout mice and their wild-type littermate controls spend in open arms in an elevated  
1216 plus maze assay. Unpaired Welch t-test compared to wild-type mice.

1217 (D) Quantification of the velocity of *Rag1* knockout mice and their wild-type littermate  
1218 controls during the odor avoidance assays. Unpaired Welch t-test compared to wild-type  
1219 mice.

1220 (E) Quantification of odor avoidance behavior. The distance between the average center  
1221 of mass of the mouse and the location of odorant was determined for *Rag1* knockout mice  
1222 (right). Each circle represents an individual mouse. Data are presented as mean  $\pm$  SEM,  
1223  $n \geq$  five independent experiments, \* $p < 0.05$ , a paired t test compared to water exposure.  
1224 2,5-DMP; 2,5-dimethylpyrazine.

1225

1226 **Figure S5 related to Figure 5.**

1227 (A) Quantification of baseline responses of HEK293 cells expressing MS4A1 protein in  
1228 the absence of chemical stimulation.  $n \geq$  six independent experiments.

1229 (B) Quantification of responses of HEK293 cells expressing either mouse MS4A1 protein  
1230 or human MS4A1 protein in response to 2,5-DMP.  $n \geq 6$  independent experiments. \*\*  $p <$   
1231 0.01, Dunnett's test following one-way ANOVA compared to mCherry alone. 2,5-DMP;  
1232 2,5-dimethylpyrazine.

Figure S1 related to Figure 1

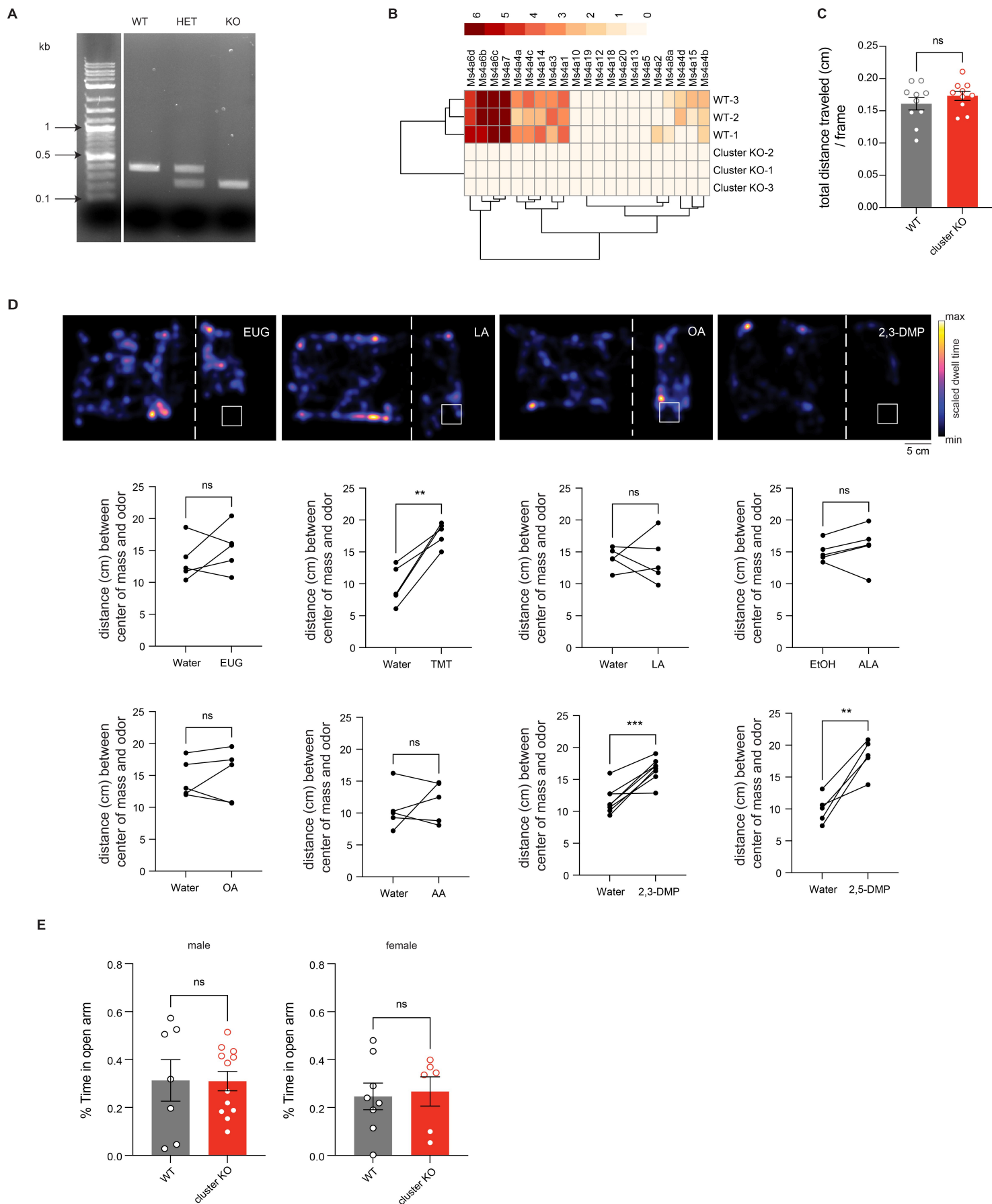


Figure S2 related to Figure 2

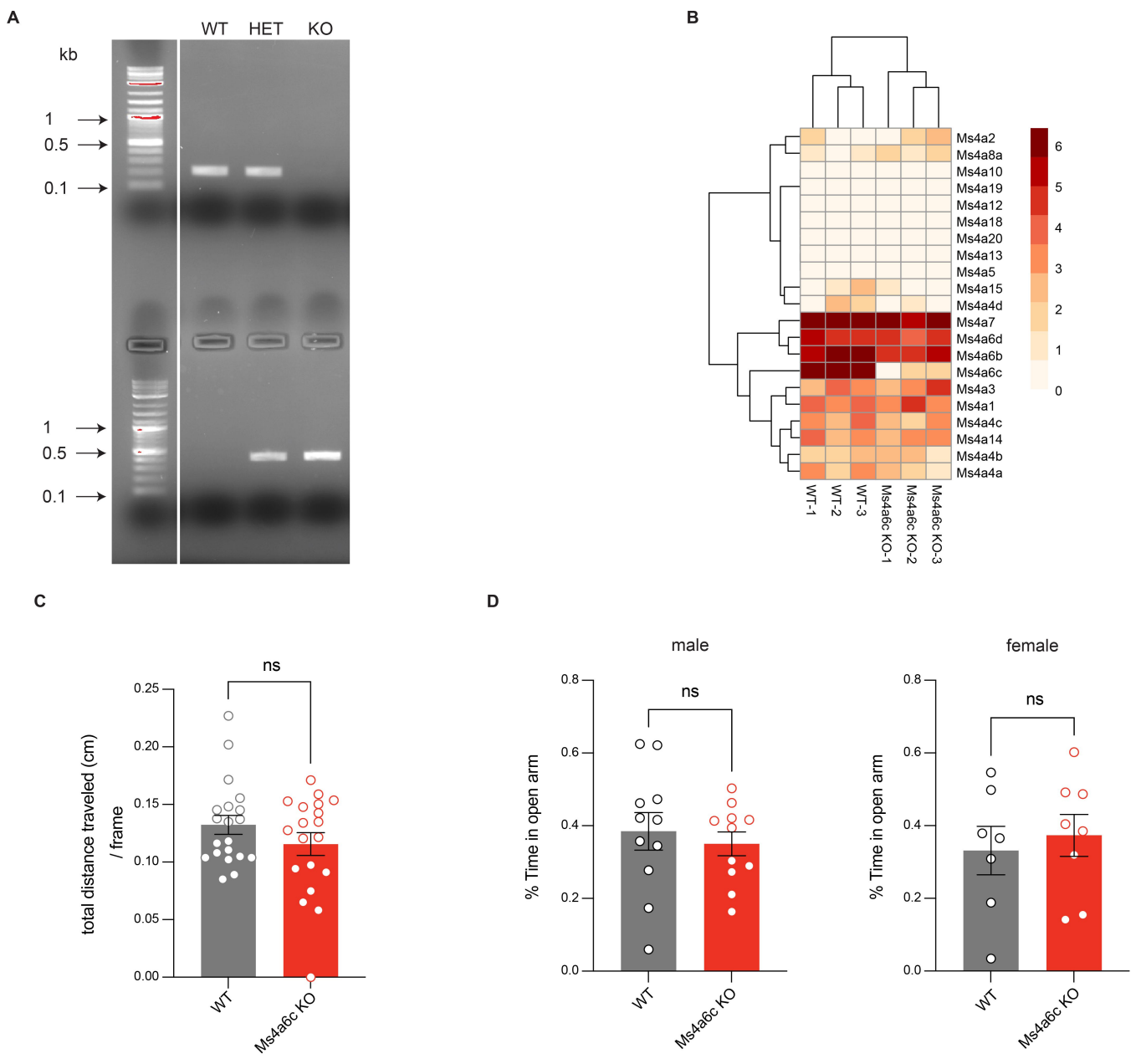


Figure S3 related to Figure 3

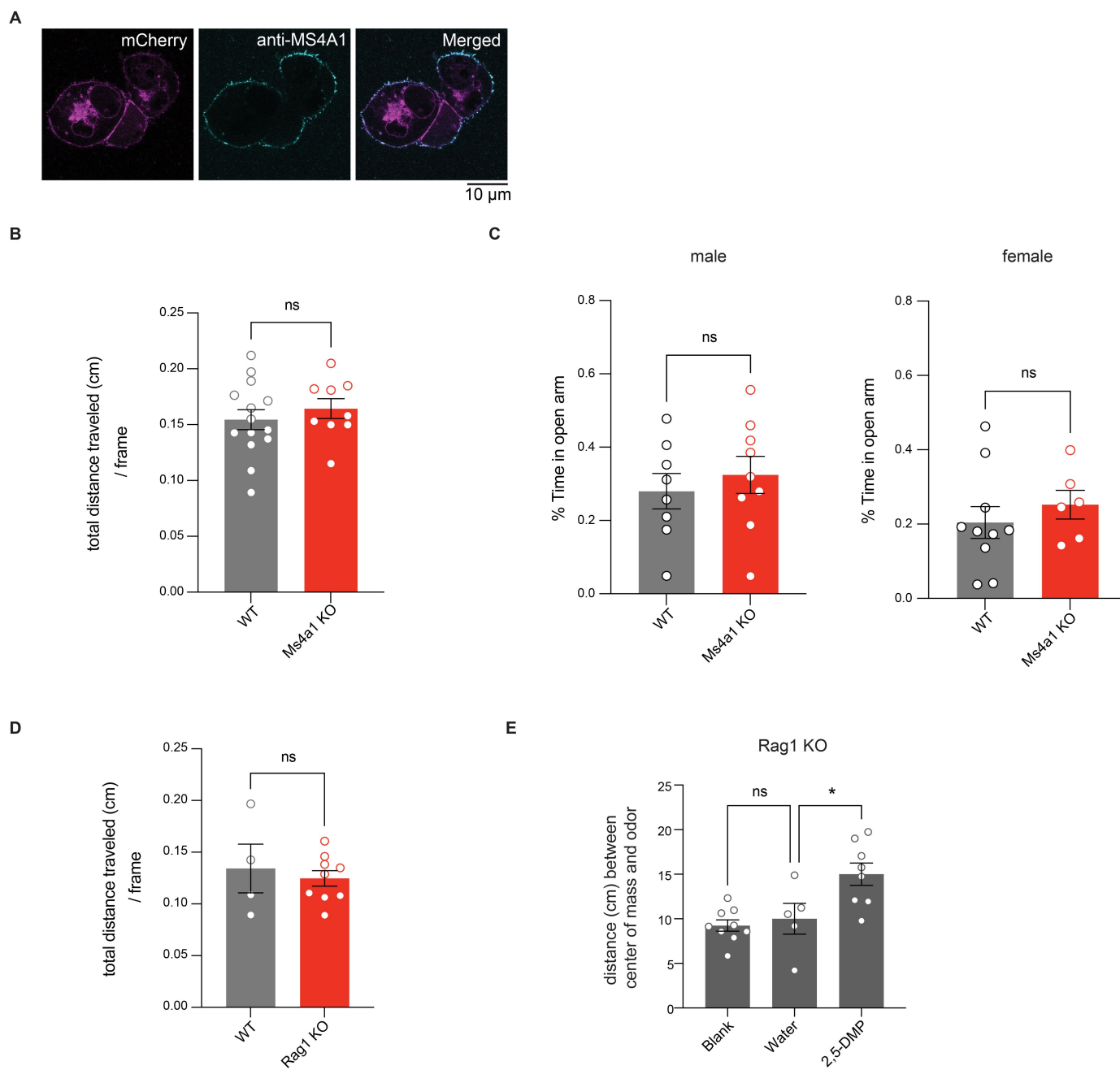


Figure S5 related to Figure 5

