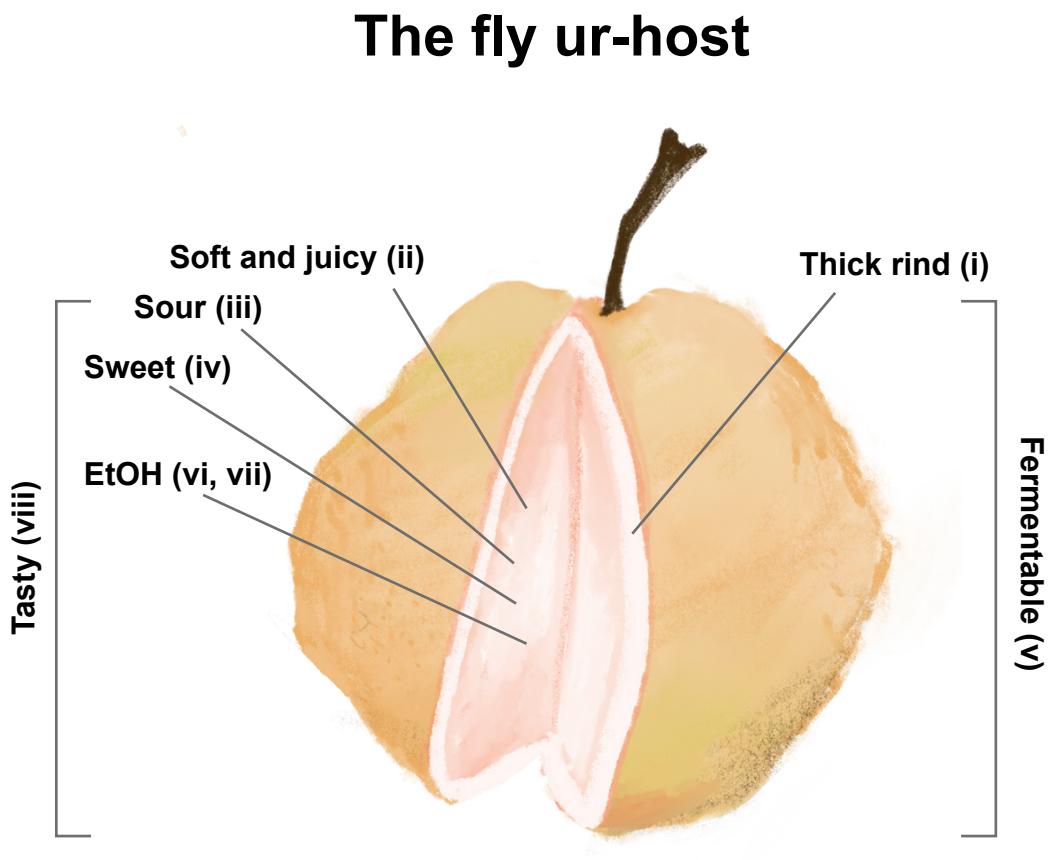

Figure S1. Putative characteristics of the ancestral host. Relates to Figure 1.
i) The citrus partiality indicates a fruit with thick rind [S1], **ii)** surrounding a soft and juicy pulp; allowing mobility of the larvae [S2]. **iii)** The fruit should be sour, since *D. melanogaster* preferentially lays eggs on acid-containing media [S3]. **iv)** The fruit should be sweet, given that *D. melanogaster* preferentially lays eggs on sugar rich substrates [S4]. **v)** The high sugar content would also ensure abundance of yeast – *D. melanogaster*'s favorite food [S5] – and enable rapid fermentation. **vi)** The fruit should have features that promote sustained high ethanol levels, under which *D. melanogaster* has a competitive advantage [S6]. **vii)** High ethanol levels also protect the larvae from parasitoid wasps [S7]. **viii)** The fruit should be palatable to humans, given that a shared human-fly preference would constitute the most direct route to commensalism. Drawing: Rakel Stensmyr.

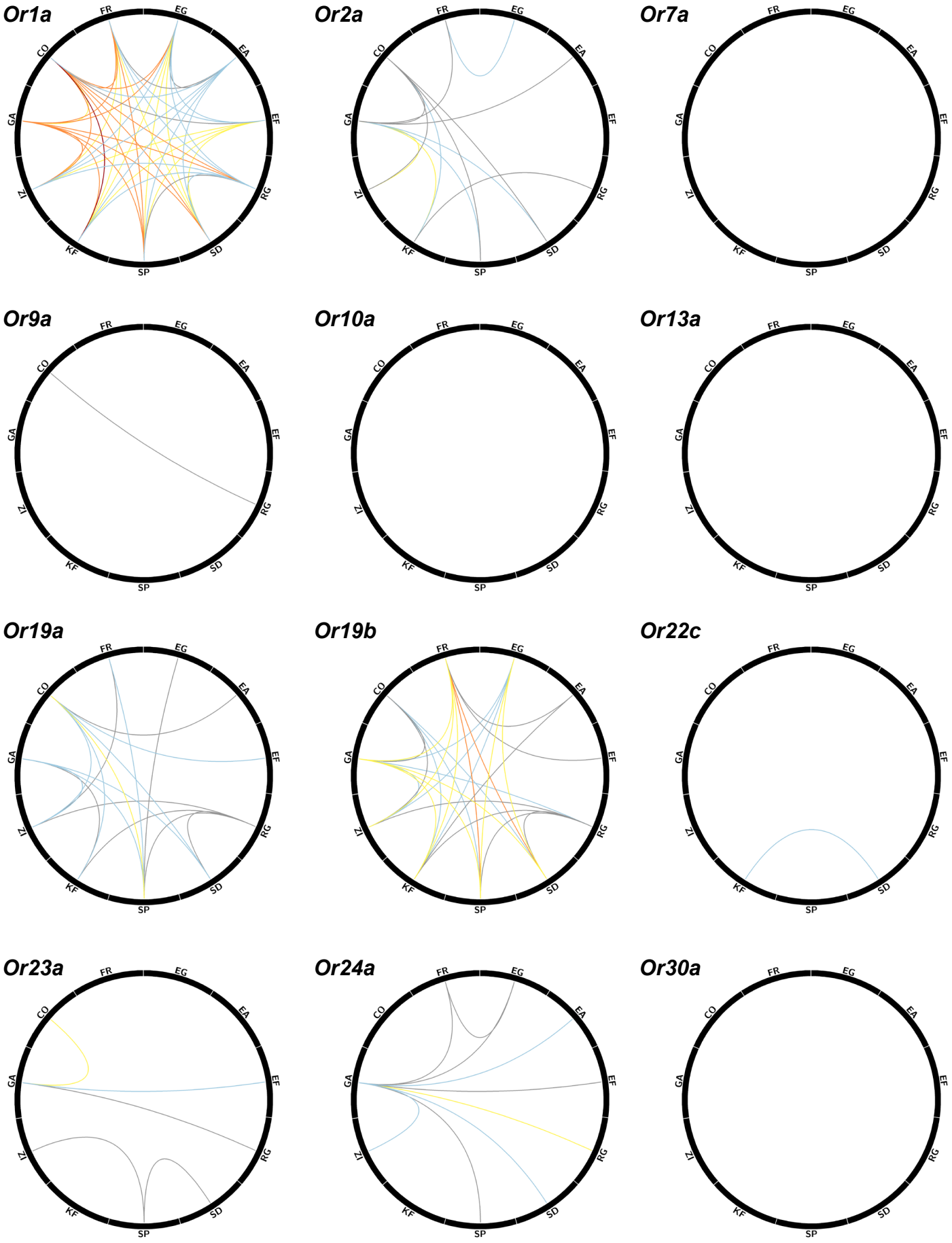

Figure S2. Local genetic differentiation within the OR family. Relates to Figure 3.
Circos plots based on F_{ST} quantiles for all drosophila odorant receptors. Only connections between populations with unusually high F_{ST} values (elevated genetic differentiation) are shown. Color code as in Figure 3O.

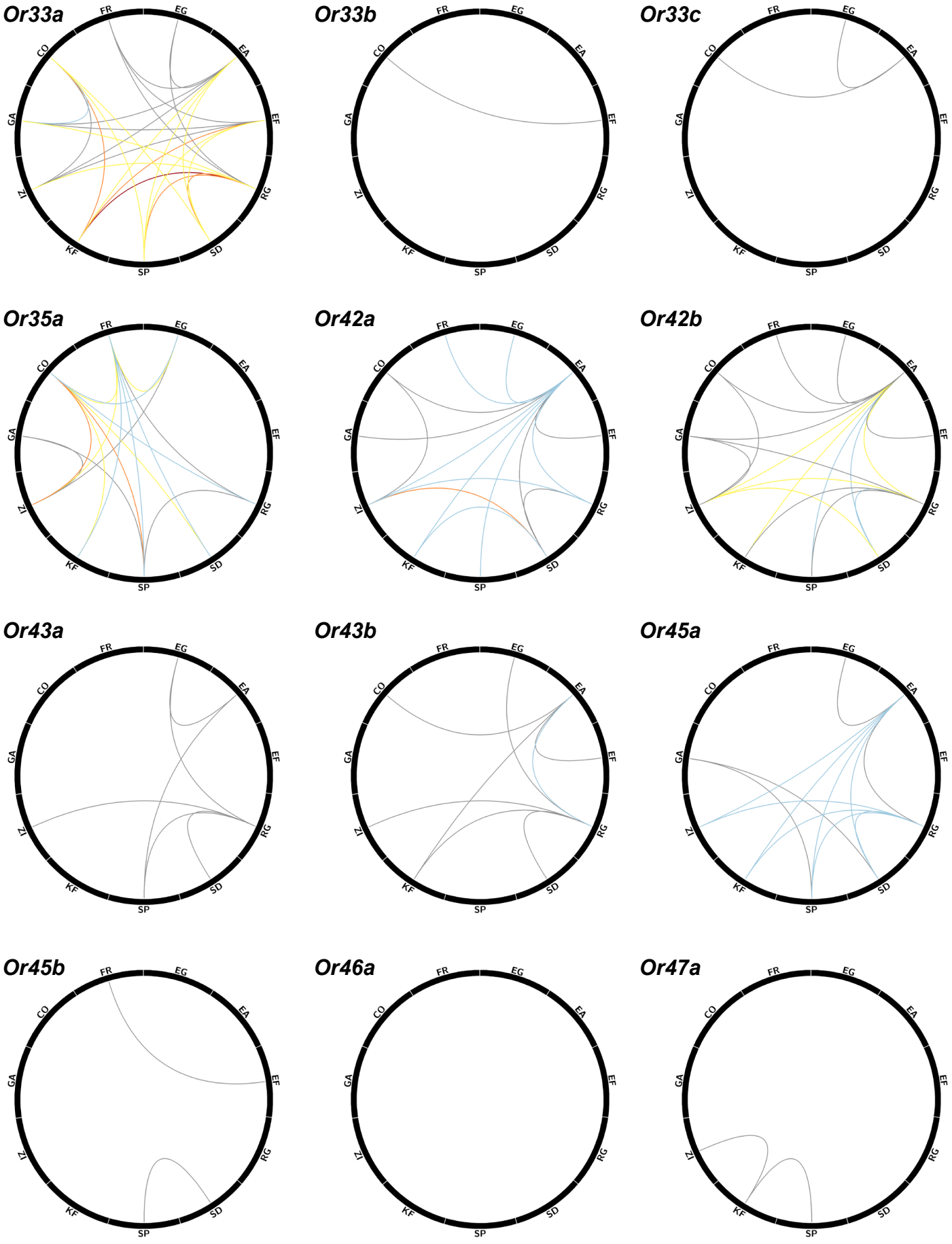

Figure S2. Local genetic differentiation within the OR family. Relates to Figure 3.
Continued

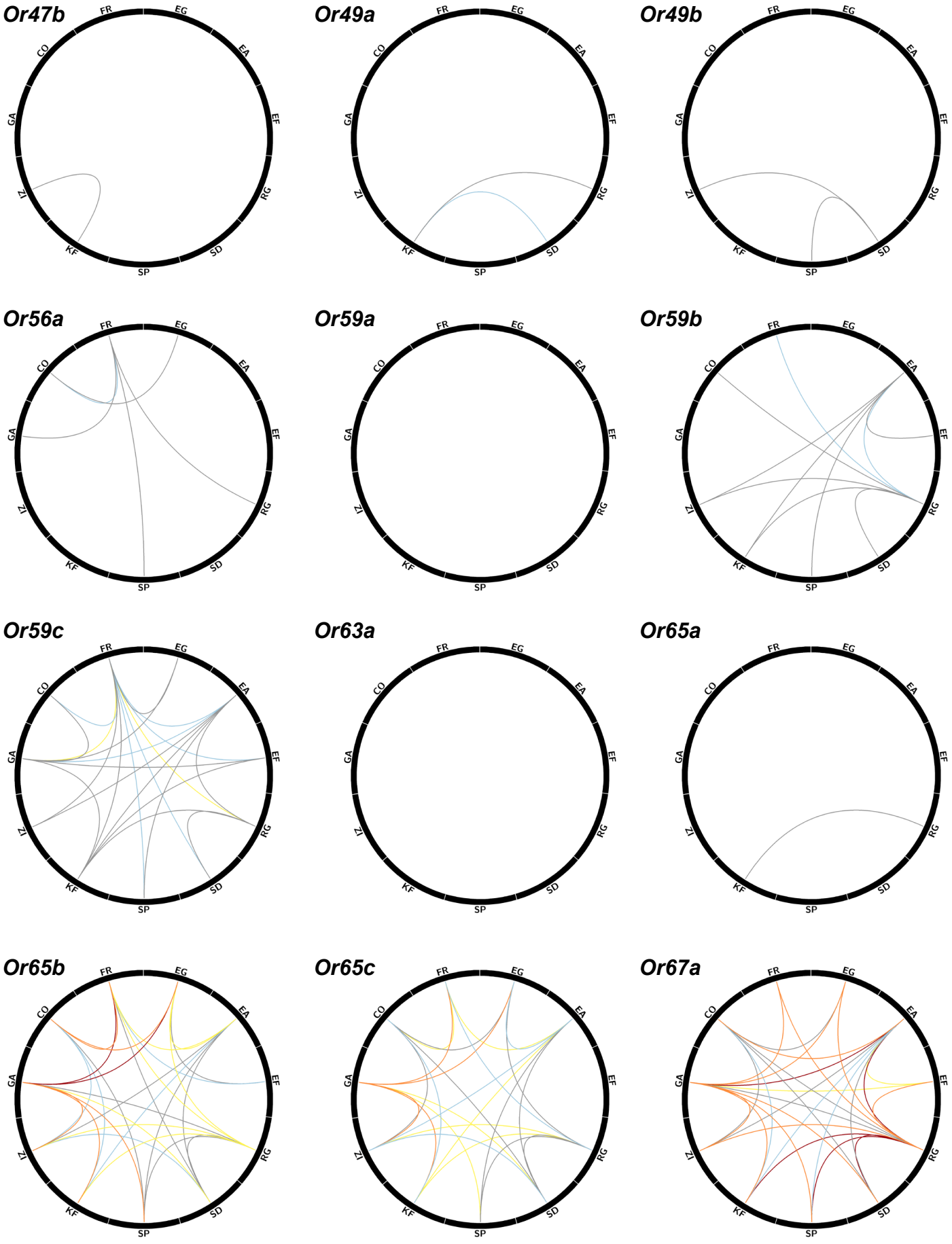

Figure S2. Local genetic differentiation within the OR family. Relates to Figure 3.
Continued

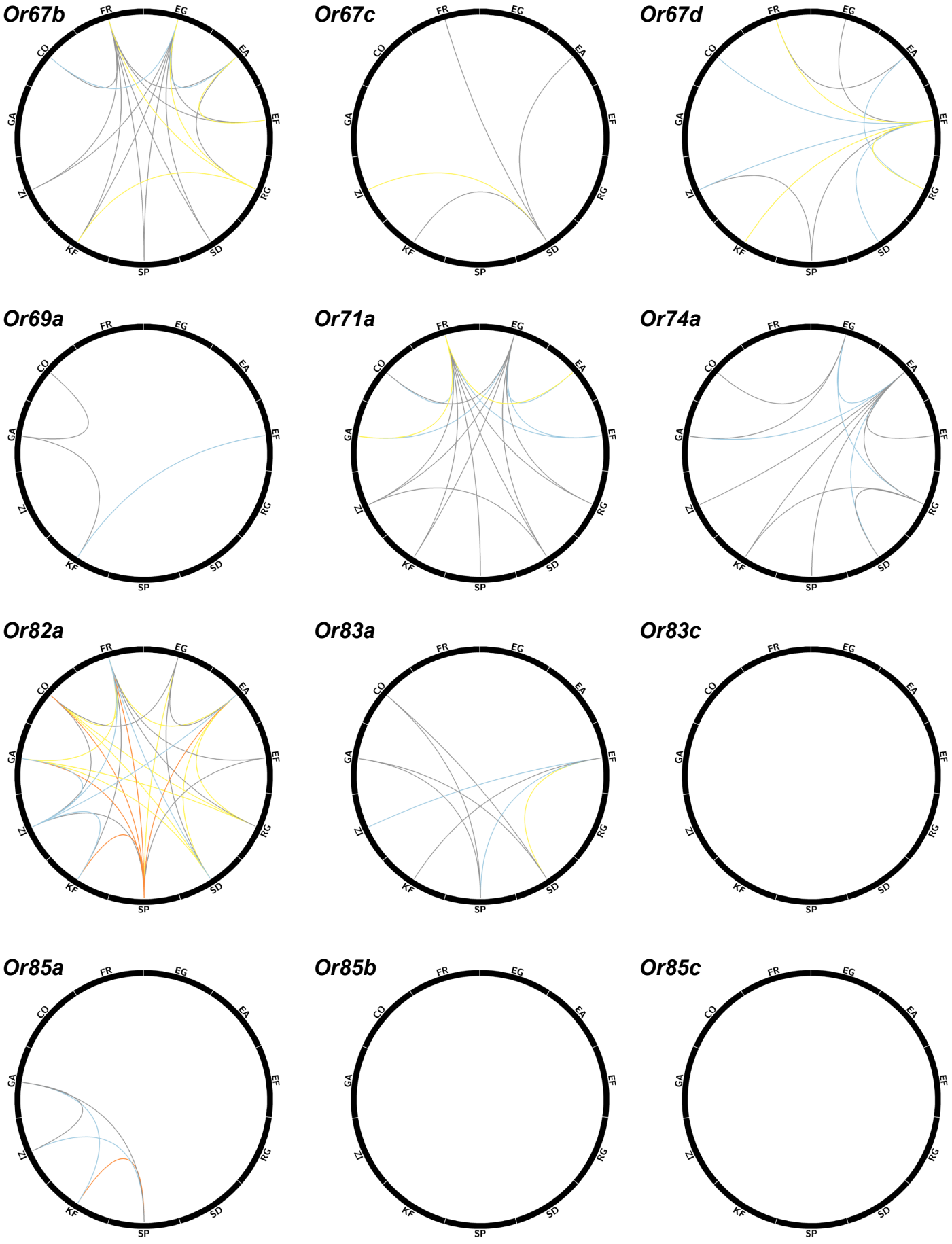

Figure S2. Local genetic differentiation within the OR family. Relates to Figure 3.
Continued

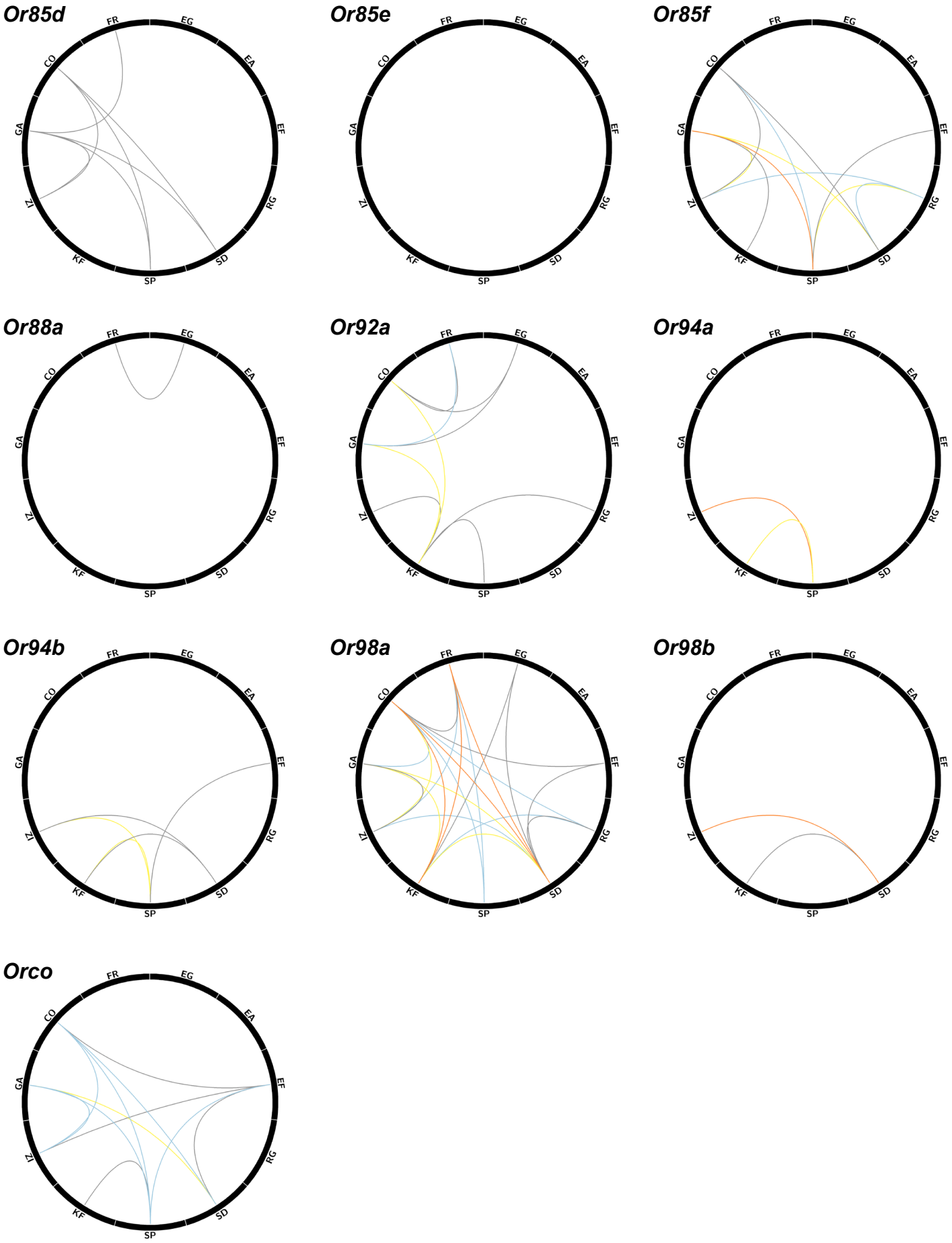

Figure S2. Local genetic differentiation within the OR family. Relates to Figure 3.
Continued

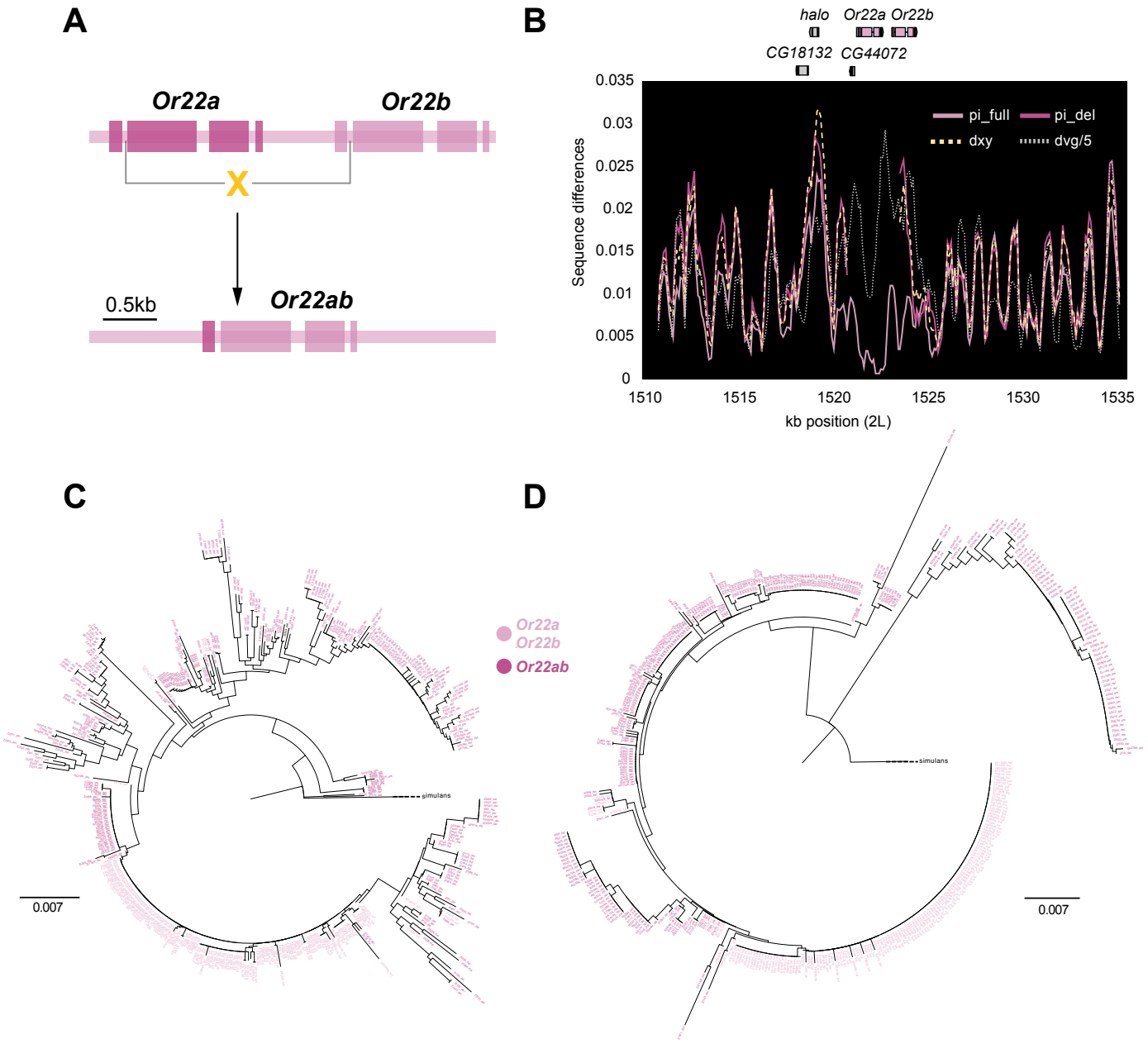

Figure S3. Genetic variation at the *Or22* locus. Relates to Figure 3.
(A) The *Or22a/Or22b* locus, with the chimeric *Or22ab* deletion variant below, in *D. melanogaster*. (B) Rates of pairwise sequence differences: among Zambia genomes carrying the full *Or22a/Or22b* haplotype (pi_full), among Zambia genomes carrying the deletion yielding the *Or22ab* fusion variant (pi_del), between Zambia full and Zambia deletion alleles (dxy) and average sequence divergence between Zambia *D. melanogaster* and the *D. simulans* reference (divided by 5 to show on the same scale). (C) A neighbor joining tree for a 500 bp section of the *Or22* region just upstream of the *Or22ab* deletion (1520.1 - 1520.6 kb), and (D) a comparable tree for a 500 bp region just downstream of this deletion (1522.9 - 1523.4 kb). Population labels are as in Figure 3O; “full” and ”deletion” alleles are noted.

Supplemental references

S1. Dweck, H.K.M., Ebrahim, S.A.M., Kromann, S., Bown, D., Hillbur, Y., Sachse, S., Hansson, B.S., and Stensmyr, M.C. (2013). Olfactory preference for egg laying on citrus substrates in *Drosophila*. Curr. Biol. 23, 2472–2480.

S2. Kim, D., Alvarez, M., Lechuga, L.M., and Louis, M. (2017). Species-specific modulation of food-search behavior by respiration and chemosensation in *Drosophila* larvae. eLife, 6, e27057

S3. Chen, Y., and Amrein, H. (2017). Ionotropic receptors mediate *Drosophila* oviposition preference through sour gustatory receptor neurons. Curr. Biol. 27, 2741-2750.

S4. Schwartz, N.U., Zhong, L., Bellemer, A., and Tracey, W. D. (2012). Egg laying decisions in *Drosophila* are consistent with foraging costs of larval progeny. PloS one, 7, e37910.

S5. Baumberger, J.P. (1917). The Food of *Drosophila melanogaster* Meigen. Proc. Natl. Acad. Sci. USA 3, 122–126.

S6. McKenzie, J. A., & Parsons, P. A. (1972). Alcohol tolerance: an ecological parameter in the relative success of *Drosophila melanogaster* and *Drosophila simulans*. Oecologia, 10, 373-388.

S7. Lynch, Z.R., Schlenke, T.A., Morran, L.T., and De Roode, J.C. (2017). Ethanol confers differential protection against generalist and specialist parasitoids of *Drosophila melanogaster*. PloS one, 12, e0180182.