

1 **Supplementary Figure Legends**

2 **Supplementary Figure 1. Electroantennogram response of Orco^{-/-} strain of *Drosophila***
3 ***melanogaster* to coffee furanone**

4 Stimulus is presented at a concentration of 10^{-1} g/mL for 0.5 s at an airflow of 0.5 L/min and is
5 denoted by red bar on EAG curve.

6 **Supplementary Figure 2. Olfactory detection of Coffee furanone by olfactory neurons**

7 Representative SSR traces from olfactory neurons in *Drosophila melanogaster* showing responses
8 to known ligands (concentration of 10^{-4} g/mL for ab1-3 and 10^{-3} g/mL for others) and lowest
9 significant response to coffee furanone (concentration 10^{-3} to 10^{-1} g/mL as indicated in Figure 2
10 by black asterisks). Recordings are from 1 s before stimulus and 3.5 s after stimulus. Stimulus is
11 presented for 0.5 s and is depicted by red line.

12 **Supplementary Figure 3. SSR representative responses for various species to Coffee**
13 **furanone**

14 **(A)** *Helicoverpa armigera*, and **(B)** *Rhagoletis pomonella* responding to coffee furanone (10^{-1}
15 g/mL) listed known odorants dissolved in mineral oil. Hexane is presented at a concentration of
16 10^0 g/mL as in Tait et al., 2016. Recordings are from 1 s before stimulus and 2.5 s after stimulus.
17 Stimulus is presented for 0.5 s and is depicted by red bar.

18 **Supplementary Figure 4. Comparison of normalized responses to coffee furanone and 2-**
19 **heptanone in *Drosophila melanogaster***

20 Normalized responses for **A**, coffee furanone and **B**, 2-heptanone at a concentration of 10^{-2} for all
21 wild type antennal *D. melanogaster* receptor neurons reported with electrophysiological response
22 to 2-heptanone in DoOR2.0 (n = 10; Hallem et al., 2004; Münch and Galizia, 2016). Spike rates

23 per neuron type are normalized to the highest response for each odor and listed according to
24 receptor expressed in that neuron.

25 **Supplementary Figure 5. *In vitro* detection of coffee furanone**

26 Representative current traces of oocytes (**A**) from trial 1 and (**B**) trial 2, expressing DmelOr22a
27 and DmelOrco; and uninjected controls upon stimulation with dimethyl sulfoxide (DMSO), ethyl
28 butyrate (EB), and two different concentrations of coffee furanone (CF) and ethyl hexanoate (EH;
29 trial 2 only)

30 **Supplementary Figure 6. Ligand interaction diagram for Or22a and Or42b *Drosophila***
31 ***melanogaster* olfactory receptor models with known ligands**

32 Amino acid residues in interaction within 5Å of known ligands as depicted by ligand interaction
33 diagram for pairs (**A**) Or22a- ethyl butyrate; (**B**) Or42b-ethyl acetate.

34 **Supplementary Figure 7. Ligand interaction diagram for Or56a and Or67d *Drosophila***
35 ***melanogaster* olfactory receptor models**

36 Amino acid residues in interaction within 5Å of ligand as depicted by ligand interaction diagram
37 for (**A**), Or56a- coffee furanone- pocket 1; (**B**) Or56a- geosmin- pocket 1; (**C**) Or56a- coffee
38 furanone- pocket 2; (**D**) Or56a- geosmin- pocket 2; (**E**) Or67d- coffee furanone and (**F**) Or67d-
39 11-cis-vaccenyl acetate (cVA). The figure was obtained using the “Ligand Interaction Diagram”
40 of the GLIDE software (Schrödinger Release 2013–1., version 2.6, Schrödinger, LLC, New York,
41 NY, 2013).

42 **Supplementary Figure 8. Snakeplots for *Drosophila melanogaster* olfactory receptor**
43 **structures**

44 Snakeplots highlighting residues in purple predicted to interact with coffee furanone in **(A)** Or22a;
45 **(B)** Or42b; **C**, Or56a –Pocket 1; **D**, Or56a –Pocket 2 and **E**, Or67d. Snakeplots made using “Johns
46 S.J., TOPO2, Transmembrane protein display software,
47 <http://www.sacs.ucsf.edu/TOPO2/>”

48 **Legends for additional supplementary files**

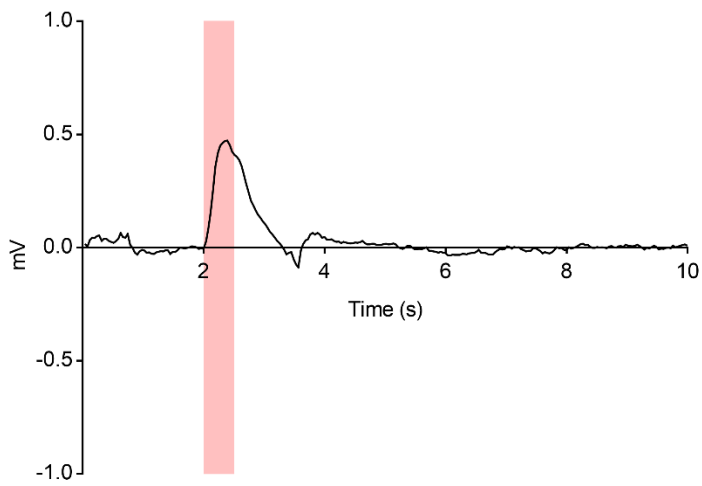
49 Supplementary File 1: or22a.pdb - Coordinate file for Or22a modeled structure

50 Supplementary File 2: or42b.pdb - Coordinate file for Or42b modeled structure

51 Supplementary File 3: or56a.pdb - Coordinate file for Or56a modeled structure

52 Supplementary File 4: or67d.pdb - Coordinate file for Or67d modeled structure

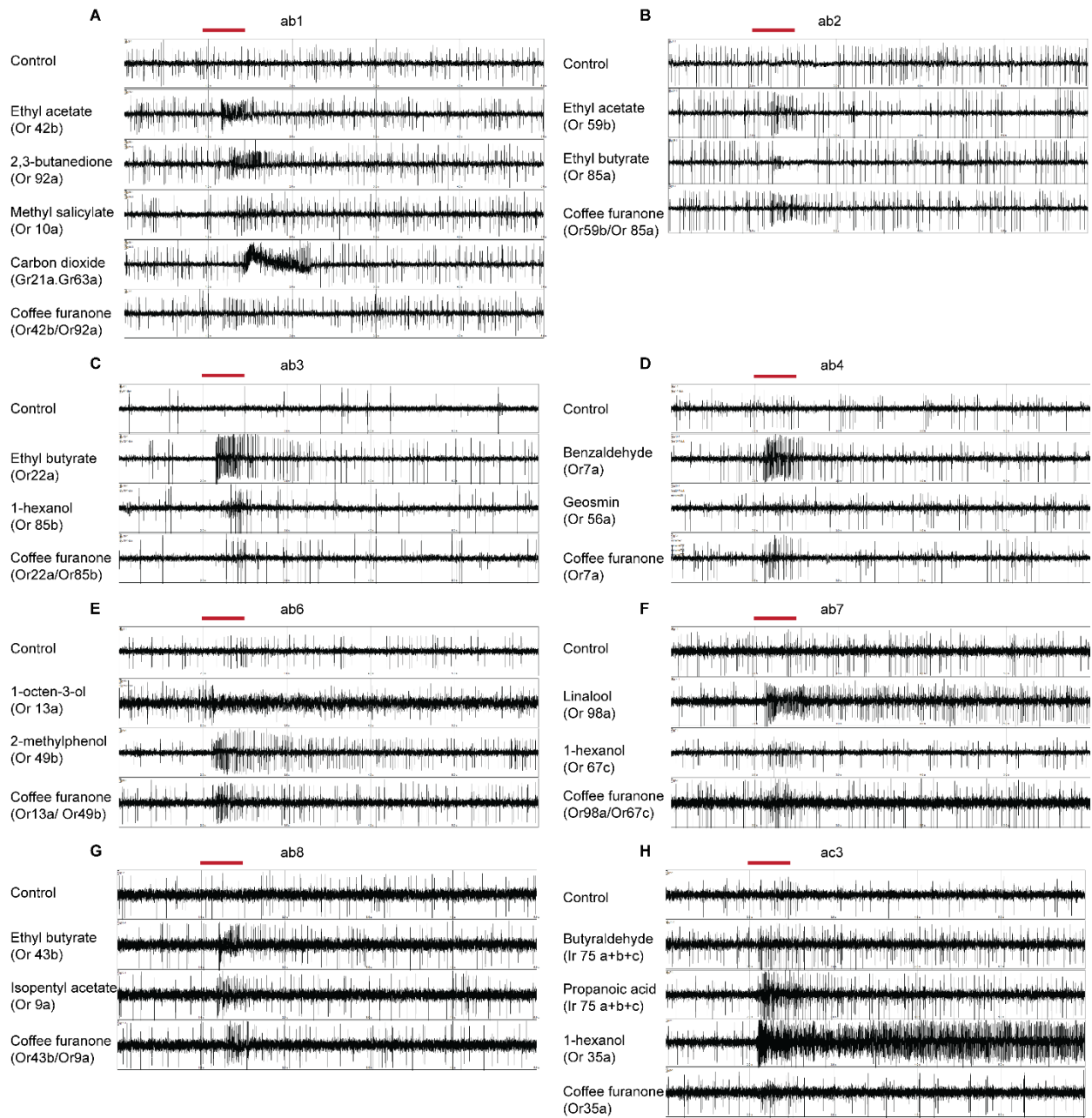
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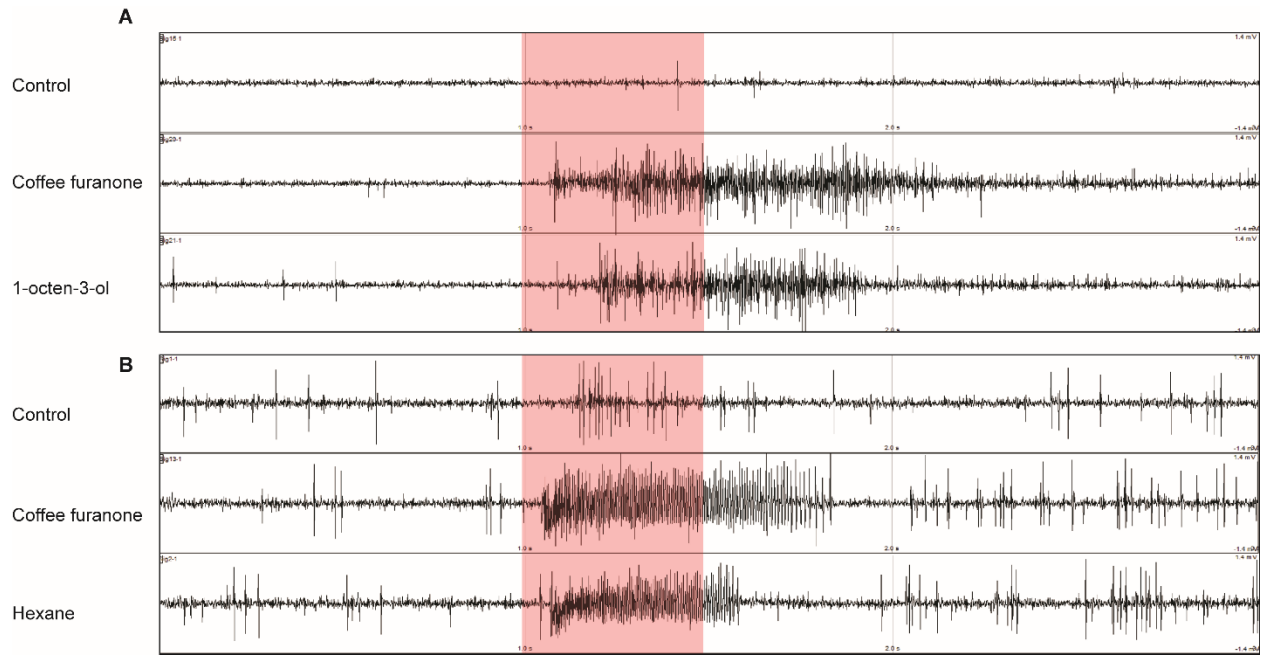
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56 **Supplementary Figure 1**



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58 **Supplementary Figure 2**



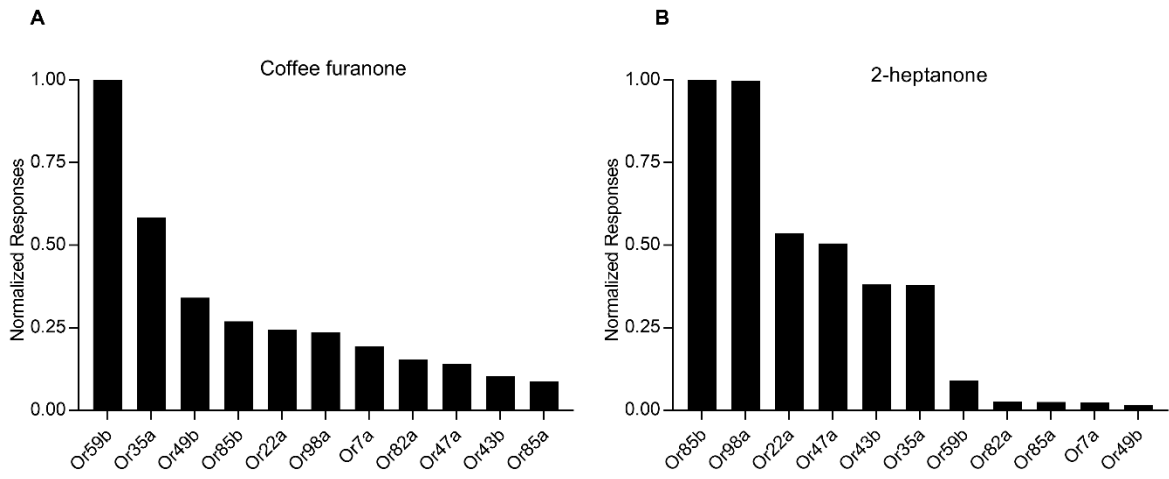
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61 **Supplementary Figure 3.**

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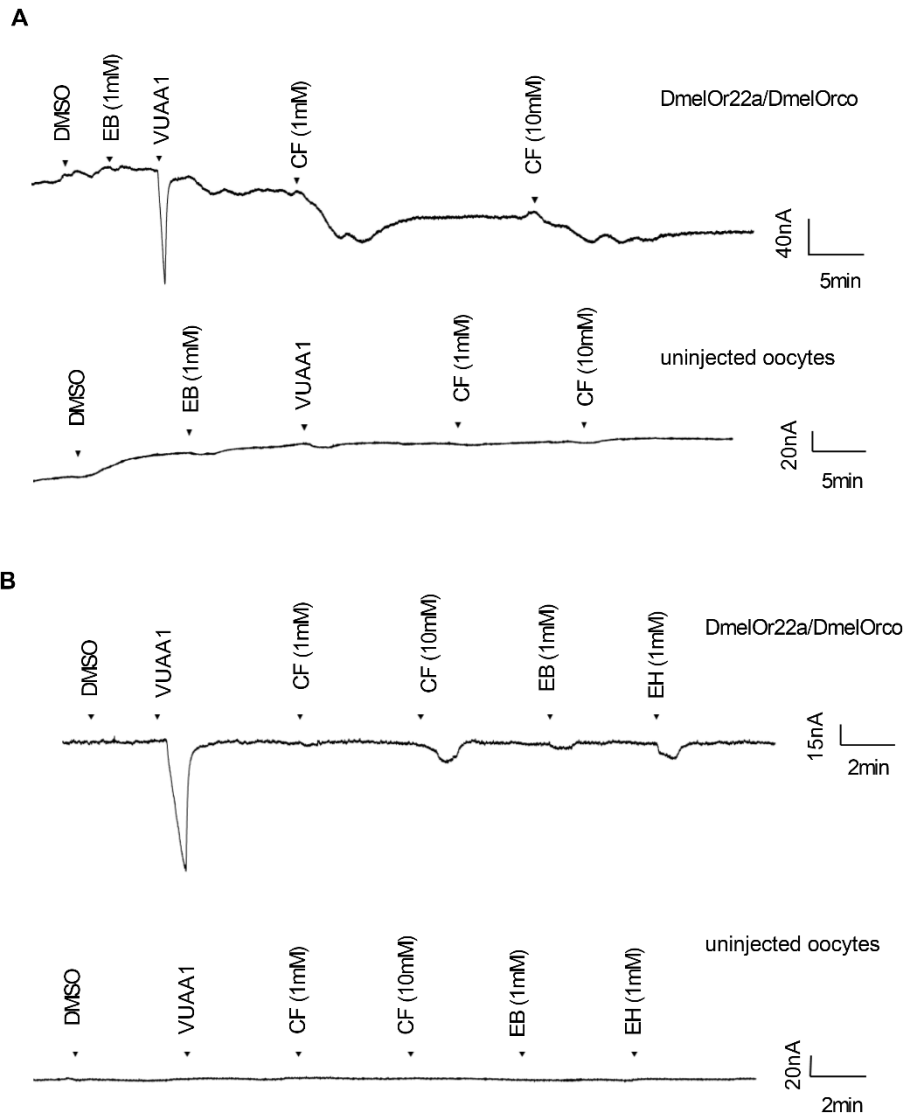
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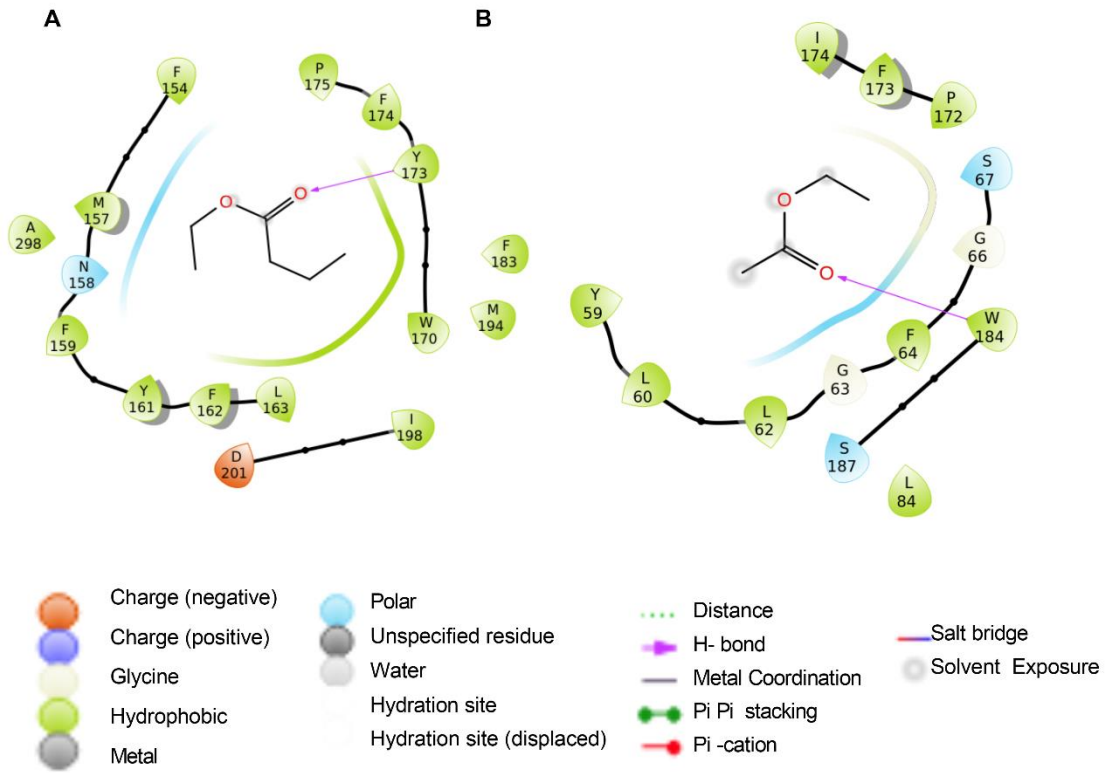
65 **Supplementary Figure 4.**

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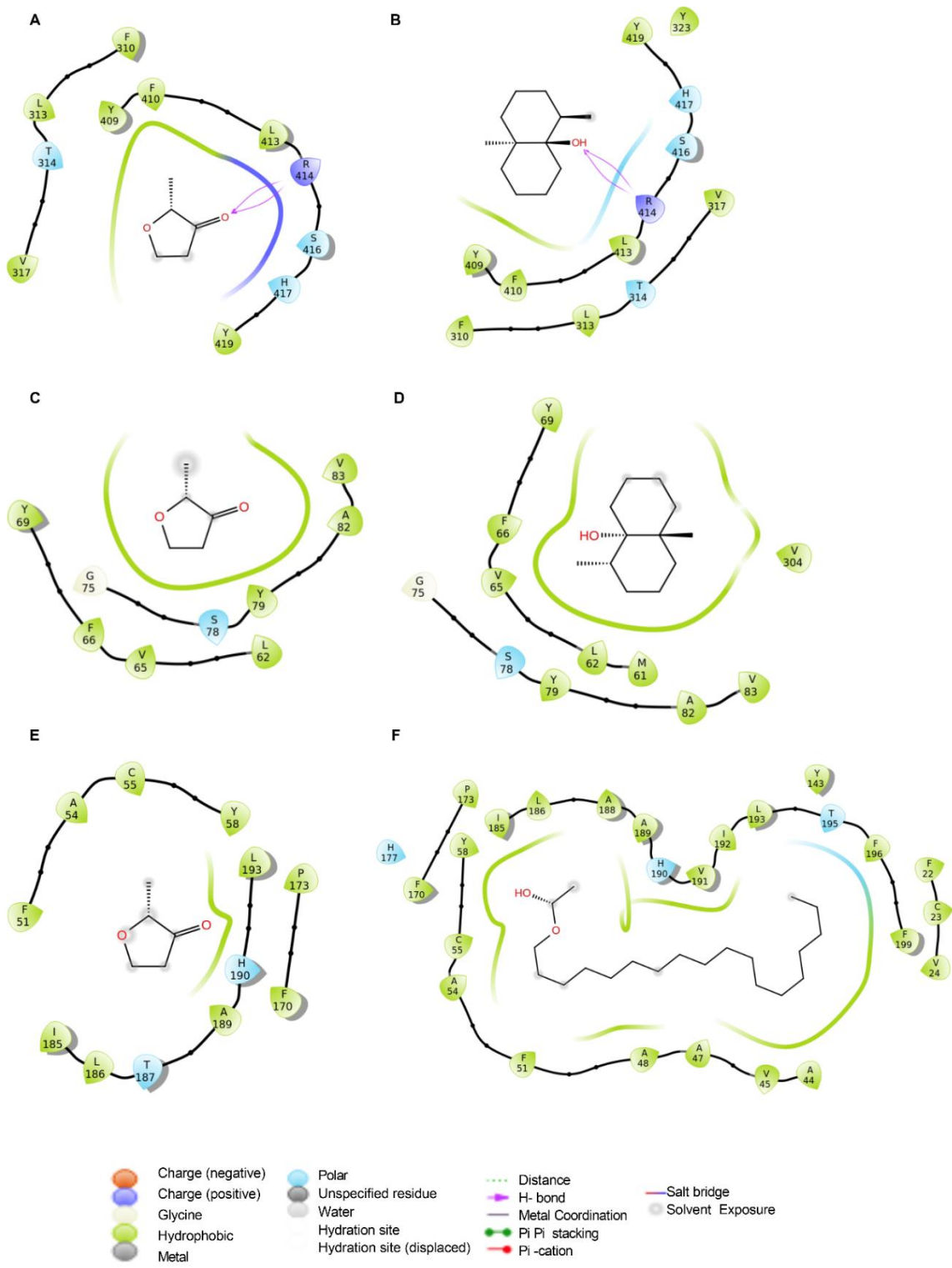
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68 **Supplementary Figure 5.**



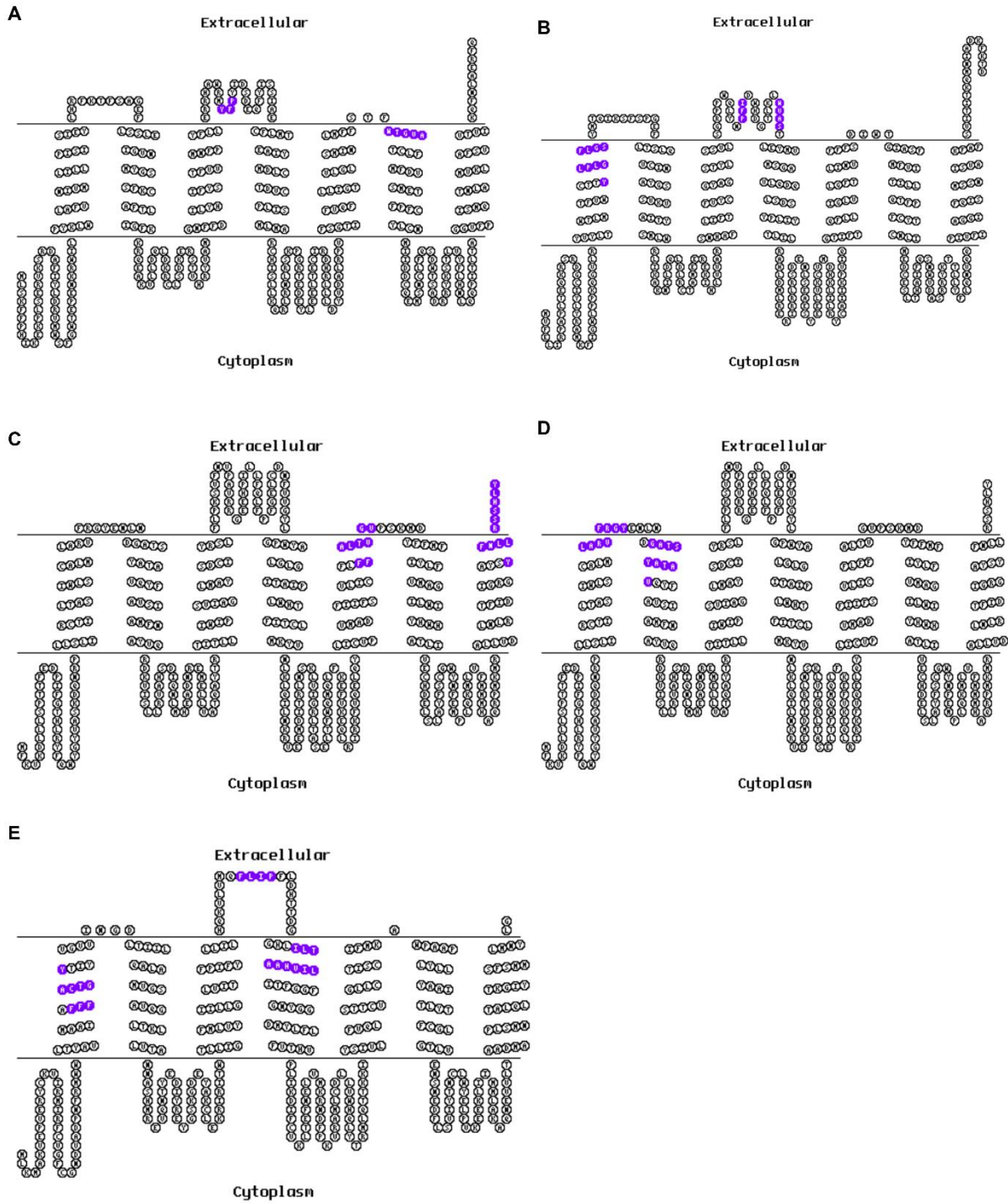
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70 **Supplementary Figure 6.**



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72 **Supplementary Figure 7.**



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74 **Supplementary Figure 8.**