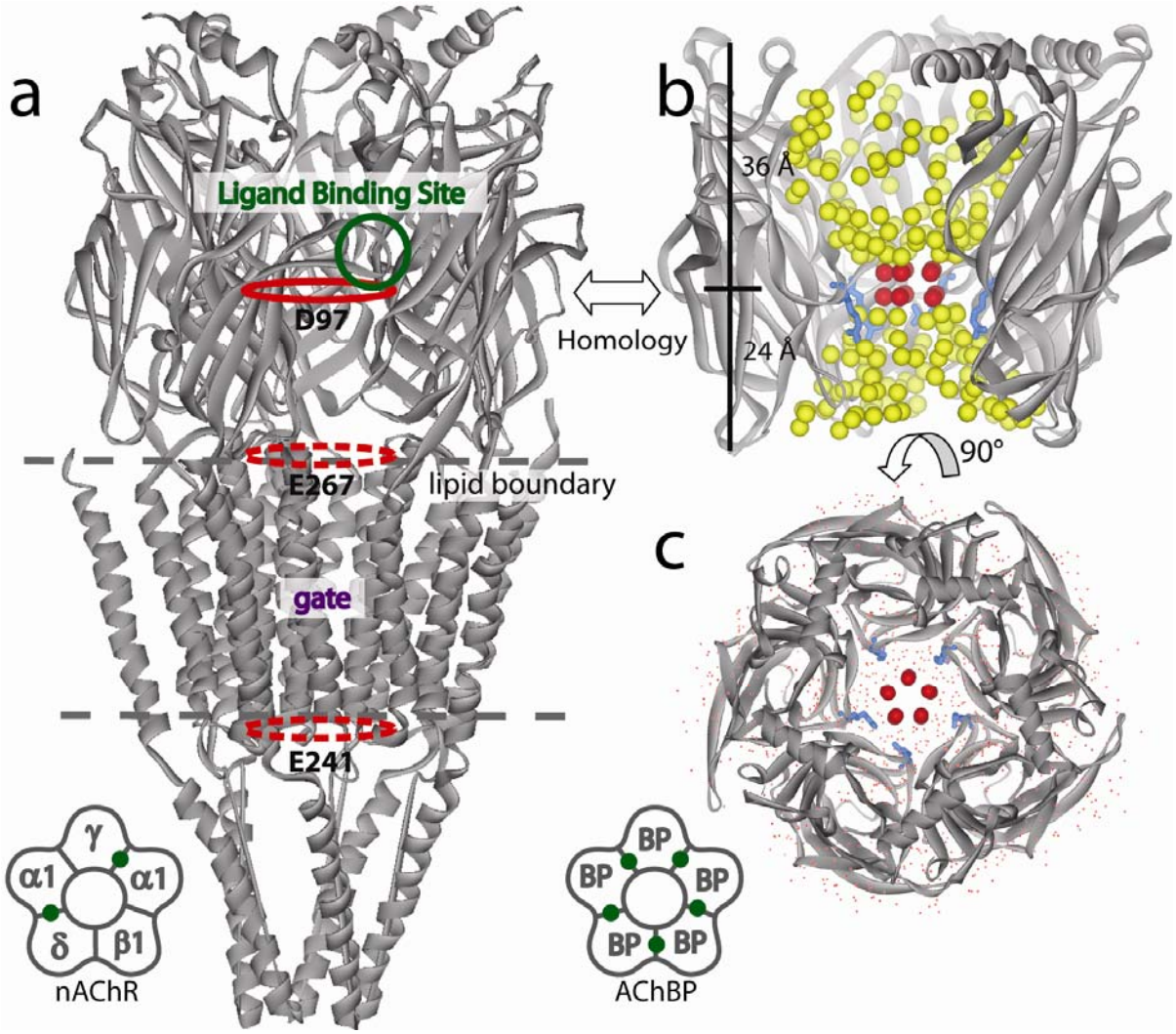

Figure S1 a, nAChR is a hetero-pentameric receptor with two ligand binding sites (green) in its extracellular domain (ECD). Regions of ion selectivity are shown in red. A putative gate (purple) is located in the transmembrane domain. **b,** Homomeric AChBP is homolous to the ECD of the nAChR with five ligand binding sites. A, water filled *Ac*_AChBP vestibule[15] is shown with one subunit removed. Vestibule waters are colored in yellow. Ten oxygen atoms at the constriction point are colored red and make a plane of two pentameric rings (108° angles) orthogonal to the five fold axis. **c,** Top view looking down the vestibule of AChBP.

Table S1 **Data Collection & Refinement Statistics**	
Data collection	SO_4^{2-}/cacodylate
Beamline	ALS/ 8.2.2
Wavelength (Å)	1.00
Space group	$P4_1$
a, b, c (Å)	98.4, 98.4, 265.7
Pentamer / asymmetric unit	2
Resolution range [1]	50 –3.08 (3.19 – 3.08)
R_{merge} (%) [1,2]	13.1 (48.8)
Observations	294,191
Unique reflections	46,364
Completeness (%) [1]	100 (100)
Redundancy [1]	6.3 (6.3)
$\langle I/\sigma I \rangle$ [1]	14.3 (4.0)
B-factor from Wilson plot (Å^2)	64.0
Refinement	
Resolution range (Å)	20 – 3.1
Protein atoms	17346
Solvent / PEG atoms	293 / 105
R_{cryst} (%) / R_{free} (%)	21.2 / 25.0
Free reflections	2,300
R.m.s. 1-2 bond distances (Å)	0.012
R.m.s. 1-3 bond angles (°)	1.441
Mean main / side chain B (Å^2)	50.1 /50.8
Mean B solvent /PEG (Å^2)	17.5 / 69.9
PDB accession code	Xxxx

[1] Values in parentheses are for the highest resolution shell.

[2] $R_{merge} = \Sigma_{hkl} \Sigma_i | I_{hkli} - \langle I_{hkli} \rangle | / \Sigma_{hkl} \Sigma_i \langle I_{hkli} \rangle$; $R_{cryst} = \Sigma ||F_o| - |F_c|| / \Sigma |F_o|$