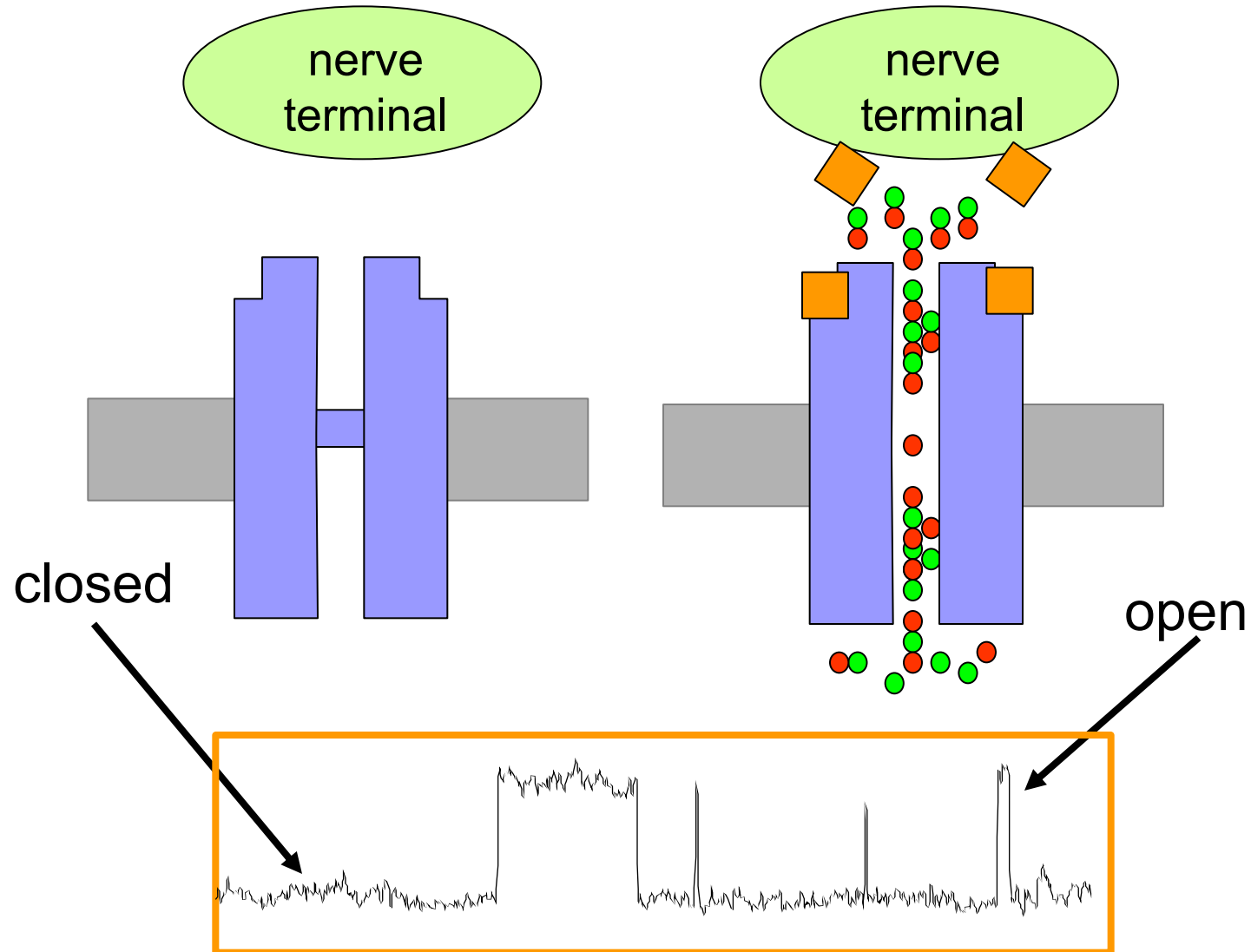
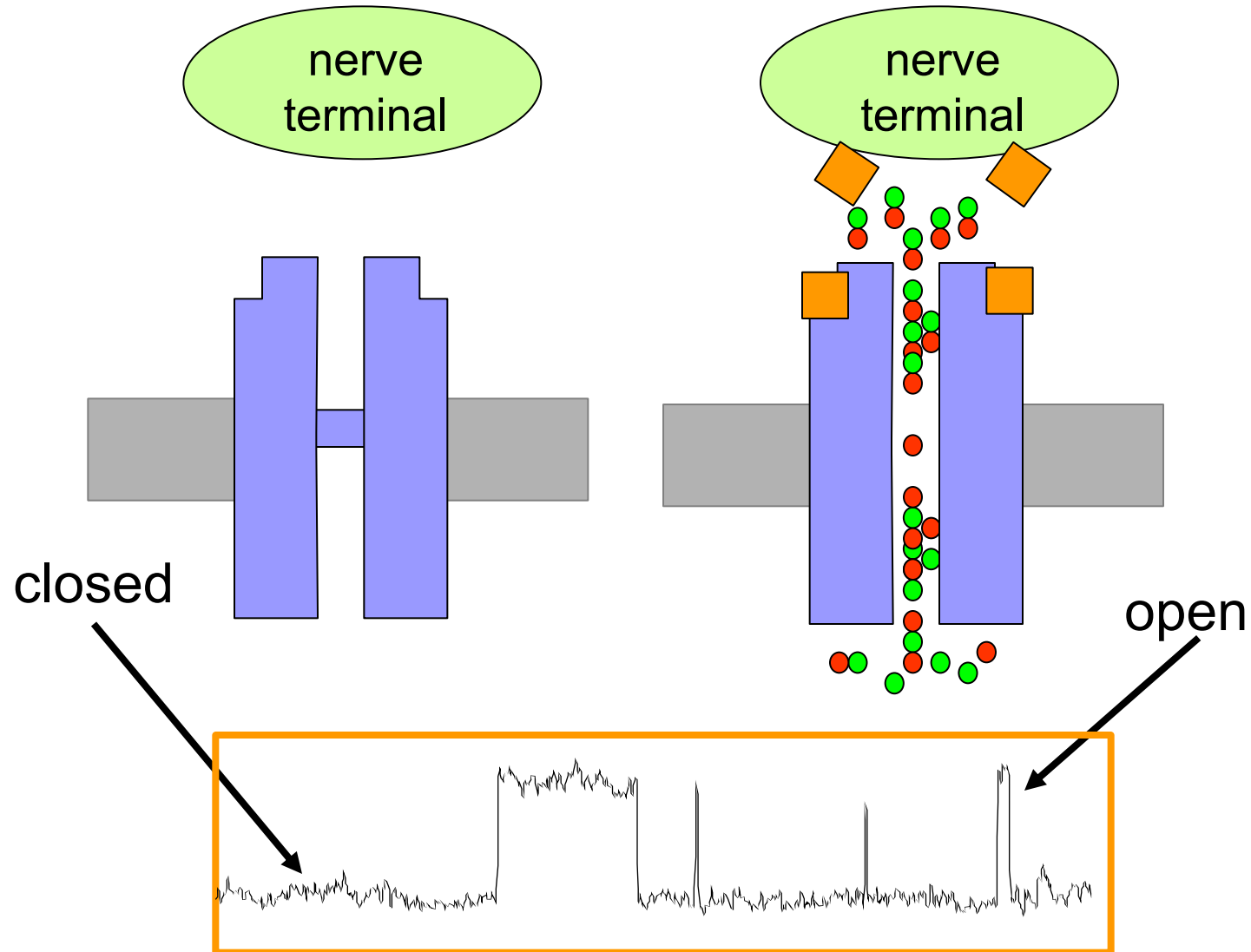


Ligand gated channels

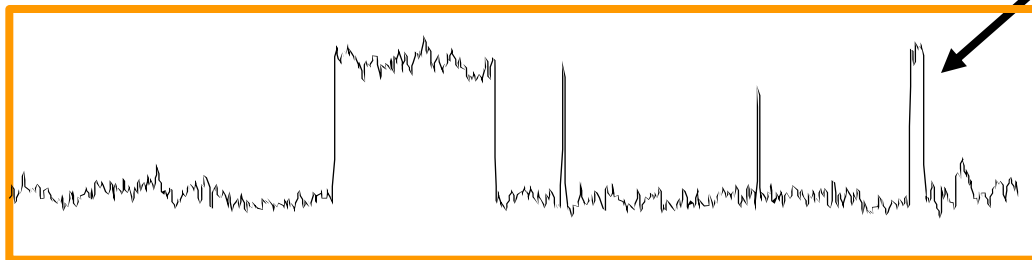
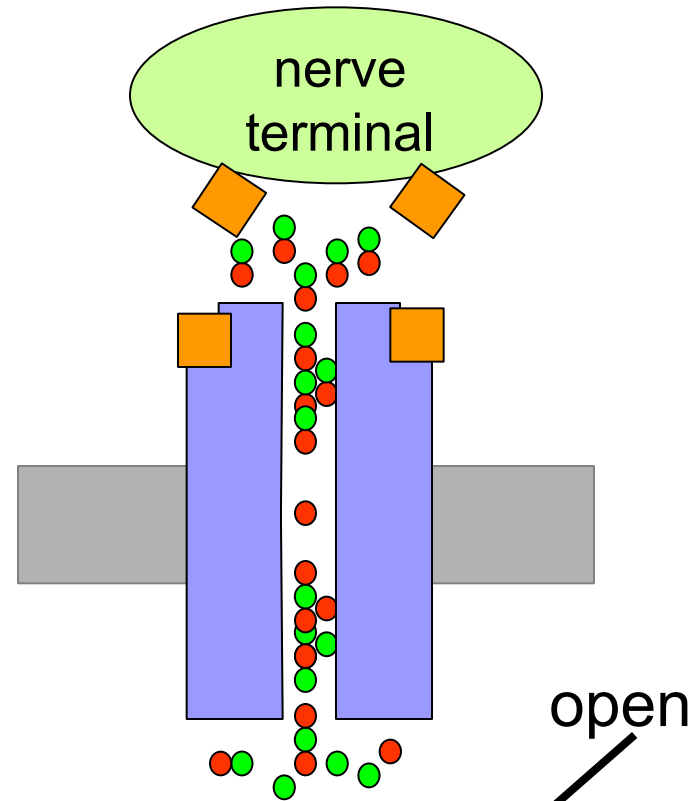


Iontropic receptors



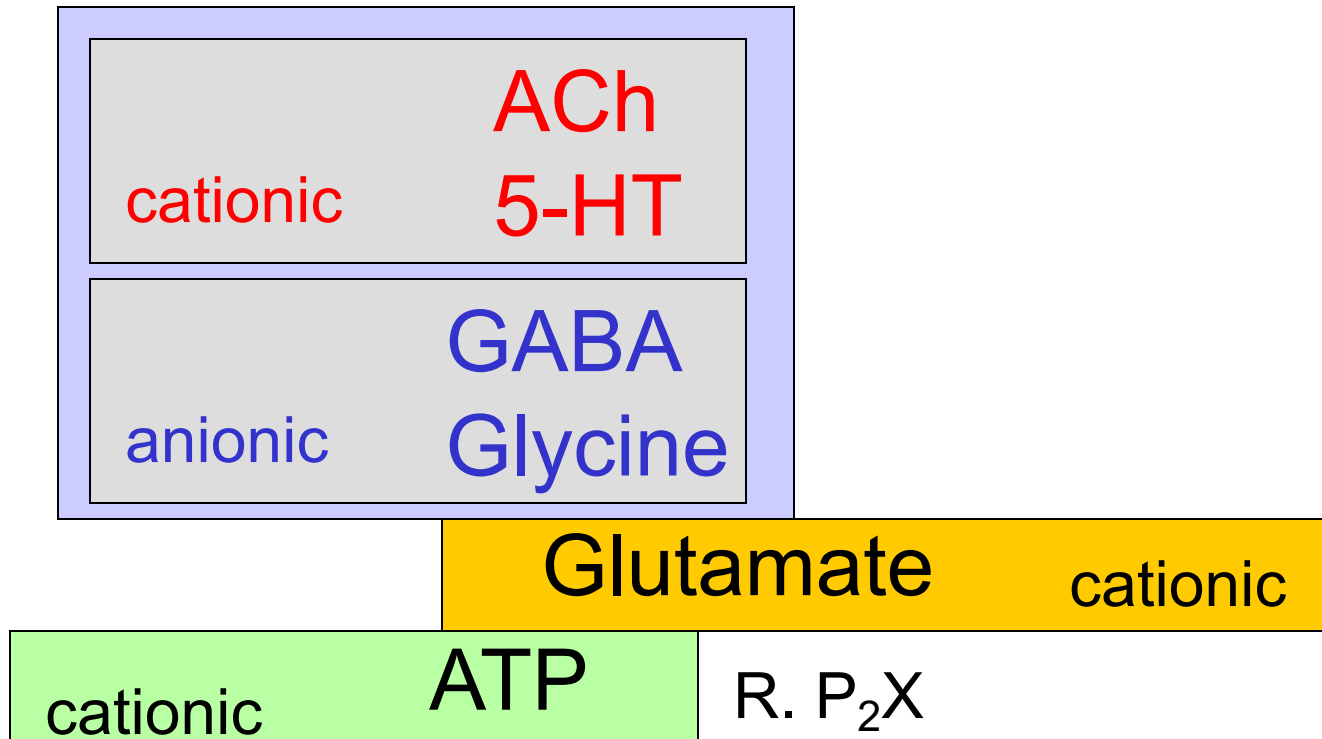
Neurotransmitters

ACh
5-HT
GABA
Glycine
Glutamate
ATP



Ionotropic receptor families

C=C loop R



What happens in
postsynaptic membrane when ligand-
gated channels open?

Selectivity

L-G ion channels :

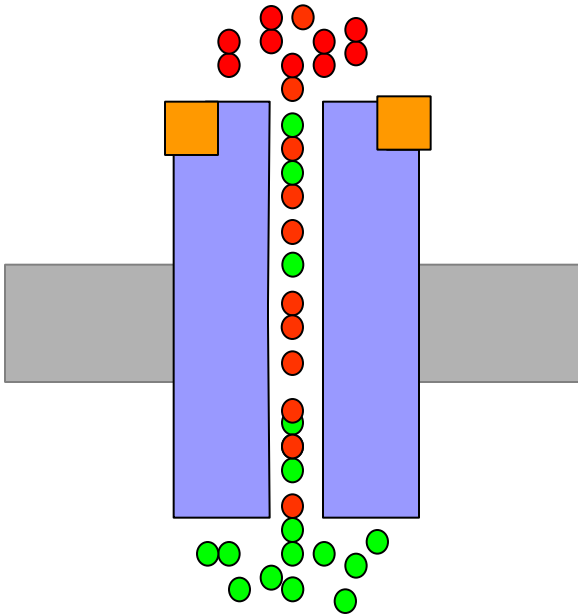
Loose selectivity (anions/cations)

$$V_m = \frac{RT}{F} \ln \frac{P_K[K^+]_e + P_{Na}[Na^+]_e + P_{Cl}[Cl^-]_i}{P_K[K^+]_i + P_{Na}[Na^+]_i + P_{Cl}[Cl^-]_e}$$

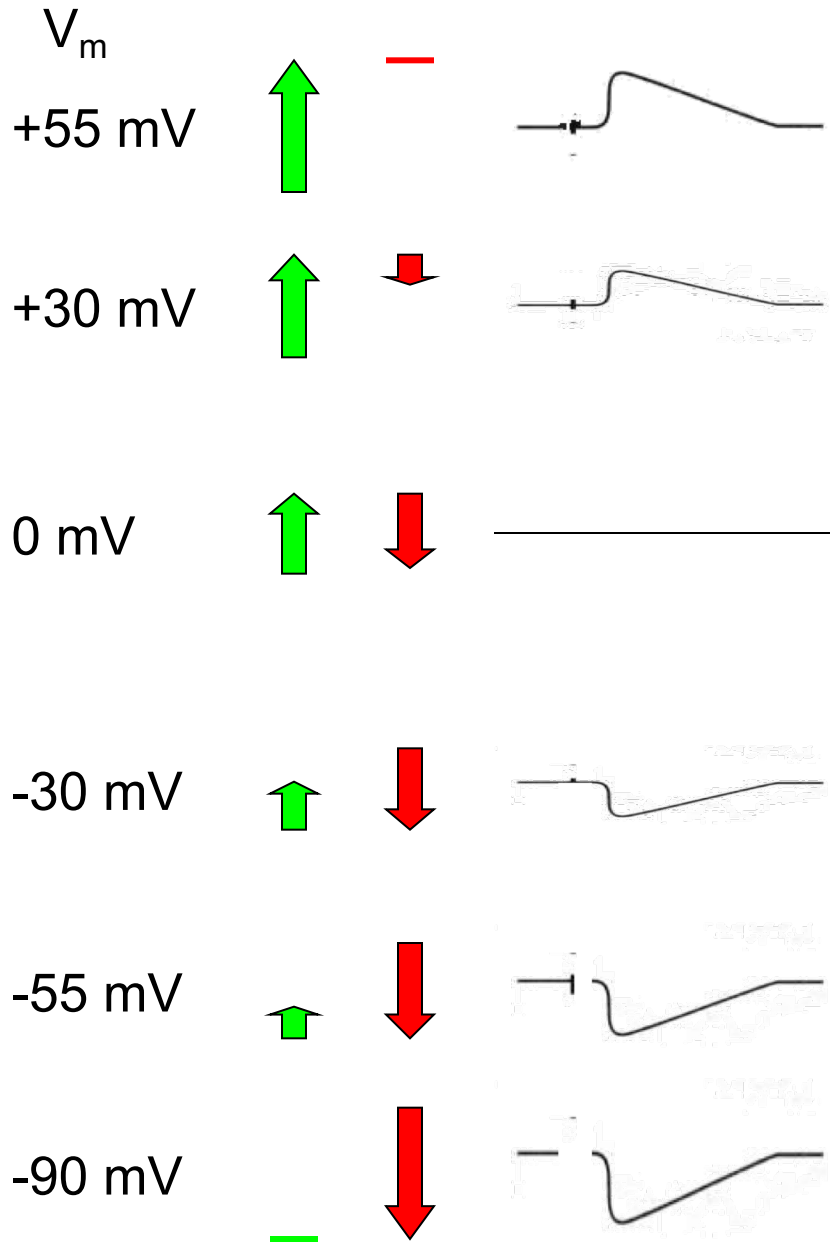
Cationic

$$V_m = \frac{RT}{F} \ln \frac{P_K [K^+]_e + P_{Na} [Na^+]_e + \cancel{P_{Cl} [Cl^-]_i}}{P_K [K^+]_i + P_{Na} [Na^+]_i + \cancel{P_{Cl} [Cl^-]_e}}$$

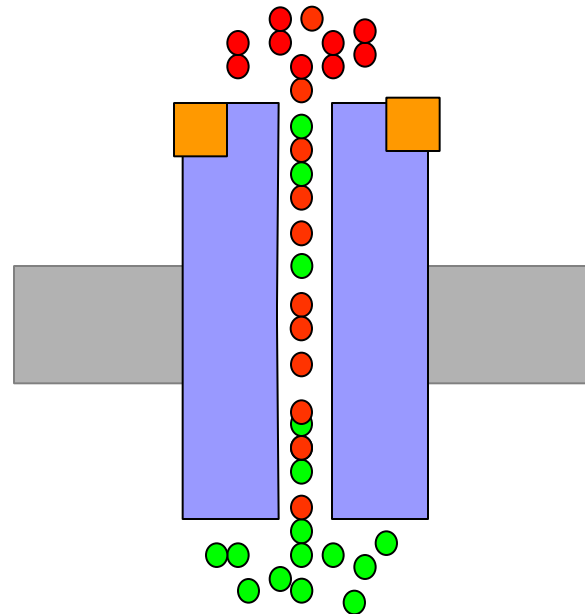
- Na⁺ (E_{Na} = +55 mV)
- K⁺ (E_K = -90 mV)



Cationic



- Na^+ ($E_{\text{Na}} = +55 \text{ mV}$)
- K^+ ($E_{\text{K}} = -90 \text{ mV}$)

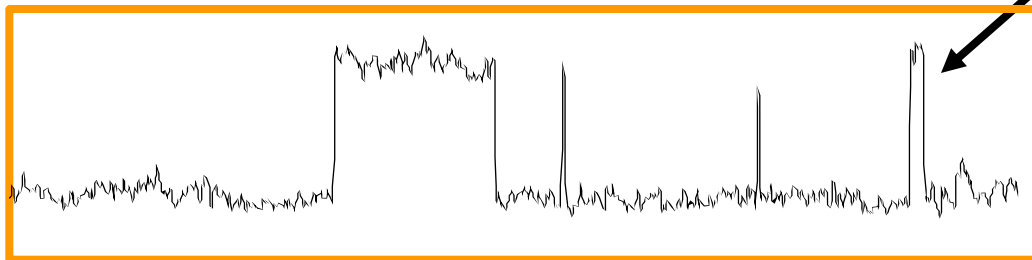
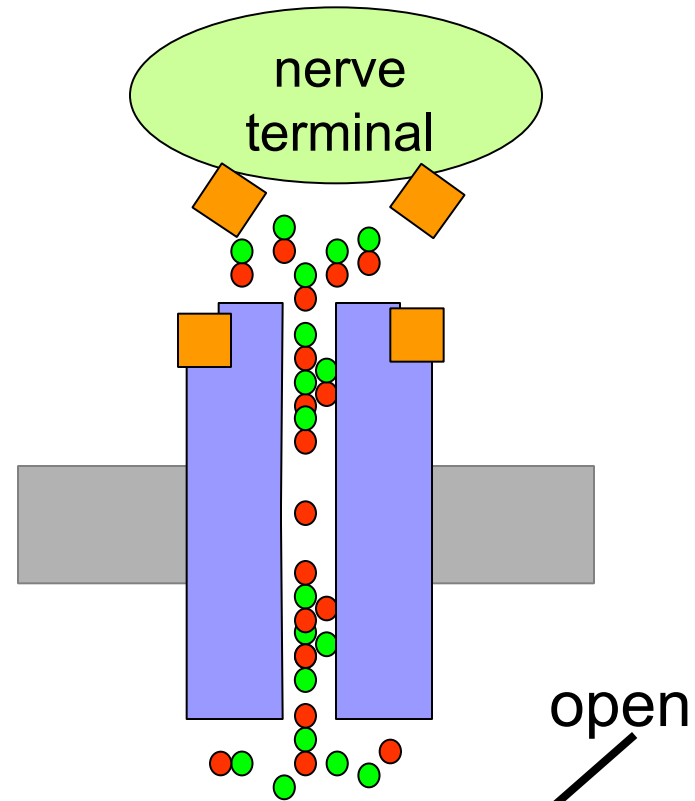


Anionic

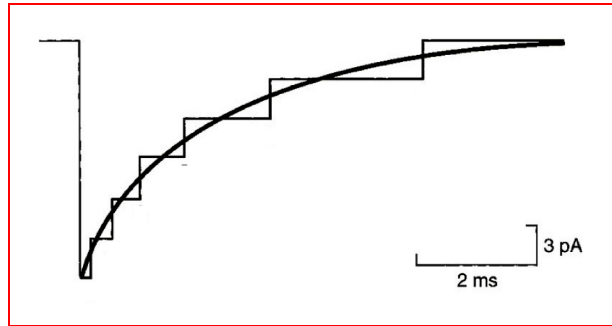
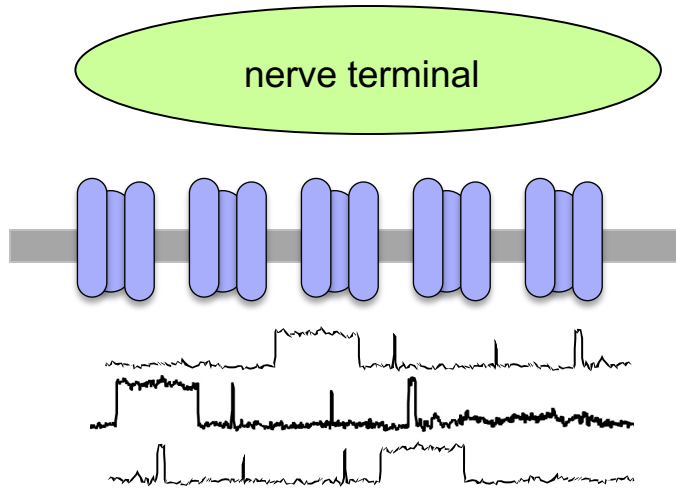
$$V_m = \frac{RT}{F} \ln \frac{P_{K^+}[K^+]_i + P_{Na^+}[Na^+]_e + P_{Cl^-}[Cl^-]_i}{P_{K^+}[K^+]_e + P_{Na^+}[Na^+]_i + P_{Cl^-}[Cl^-]_e}$$

$$V_m \rightarrow E_{Cl}$$

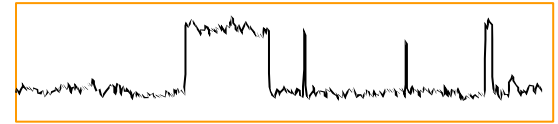
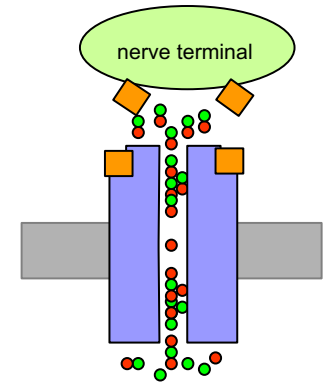
Functional features



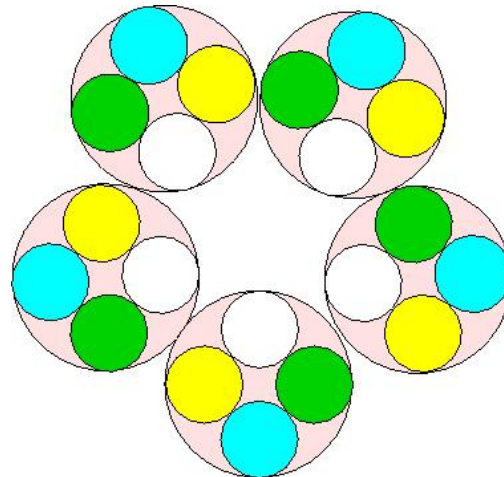
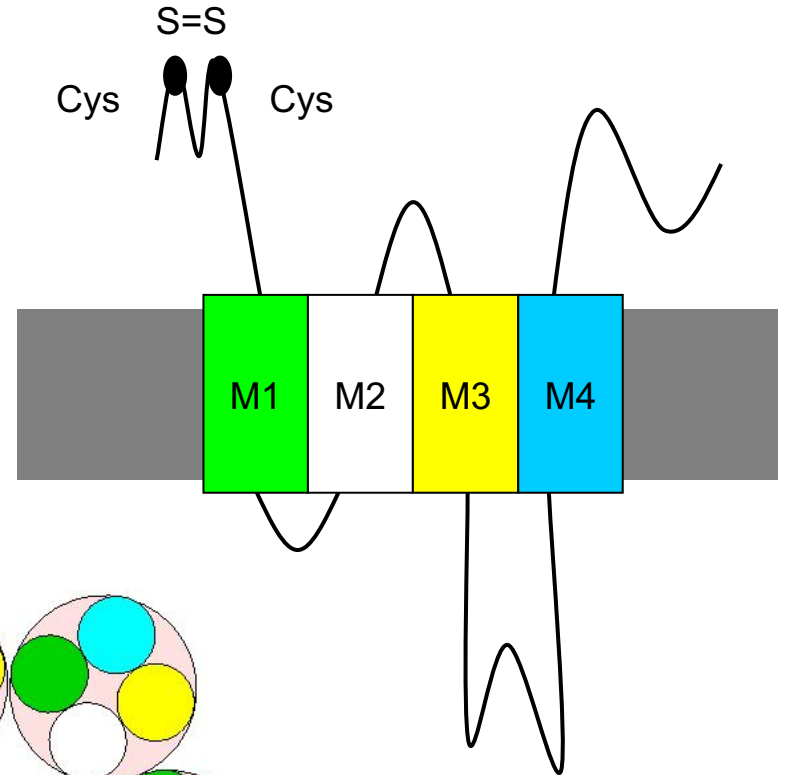
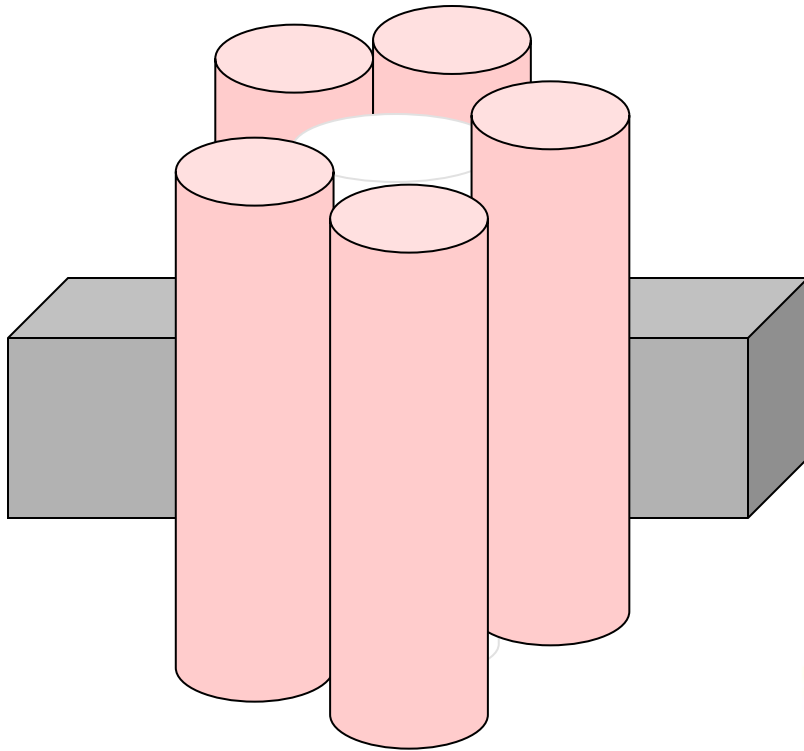
Functional features



total current

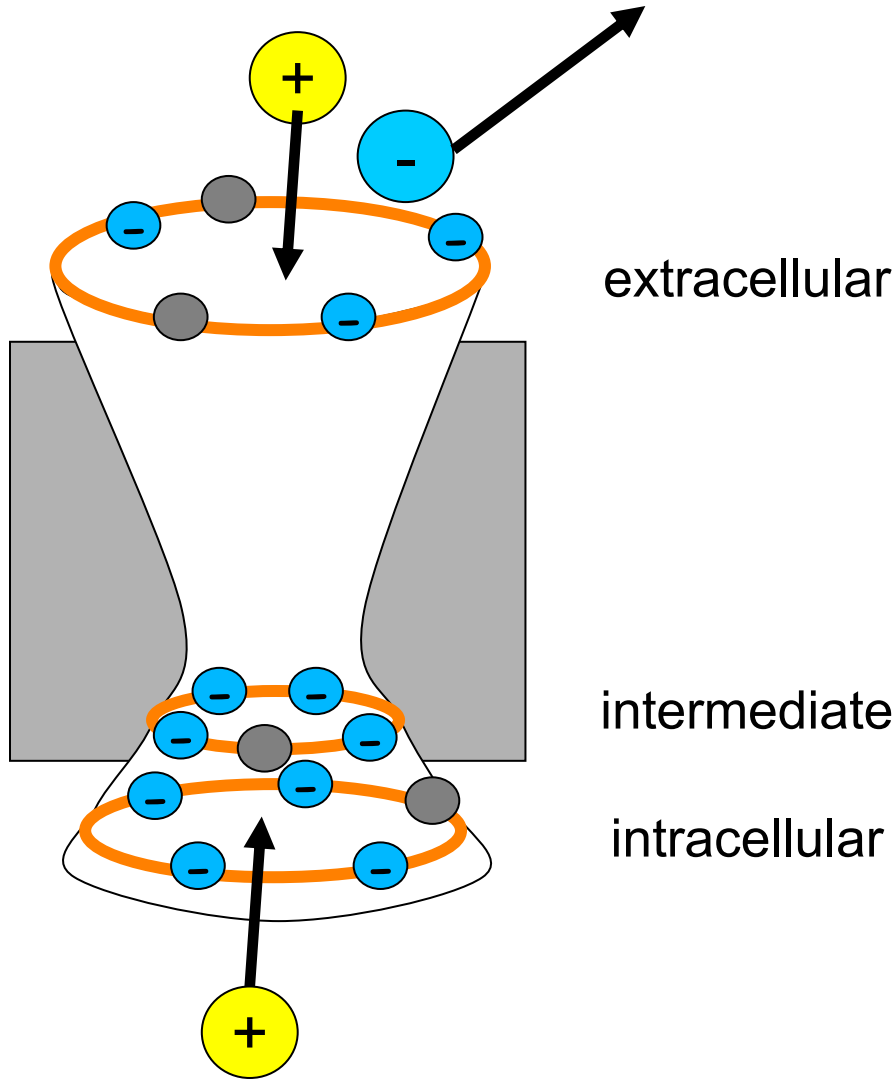


Cys-loop receptors

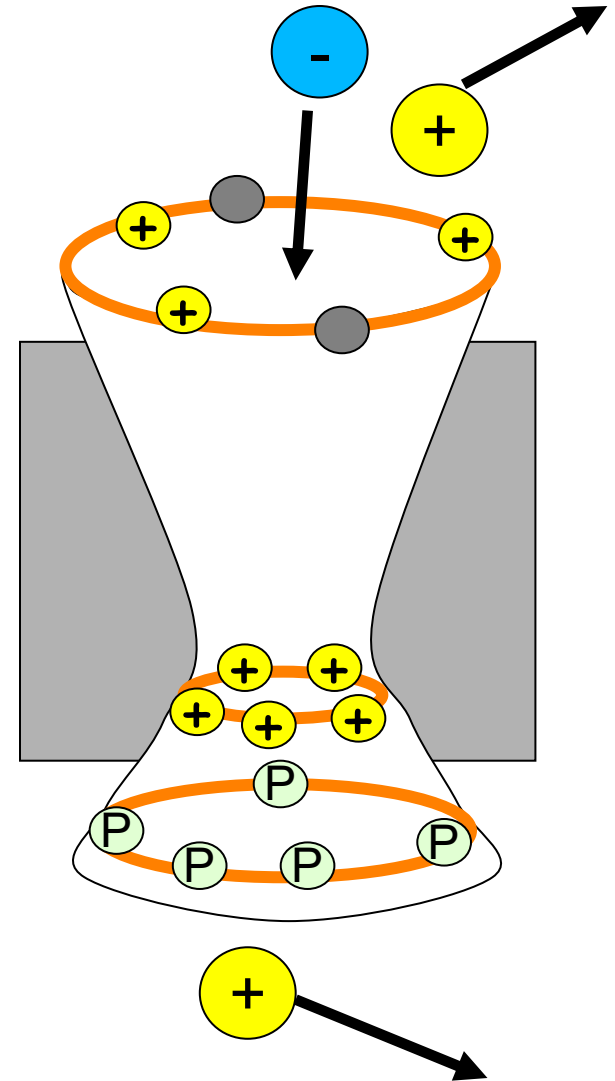


Loose selectivity

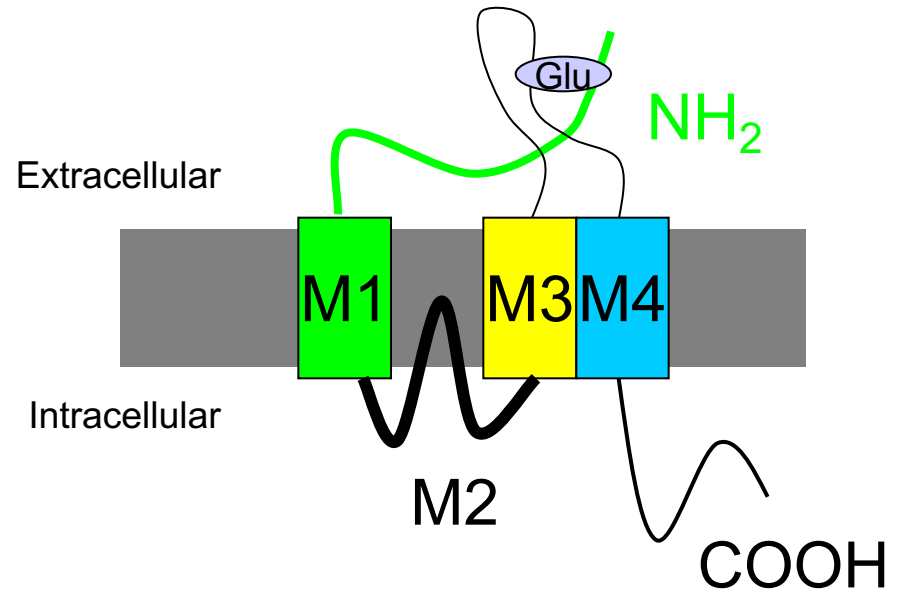
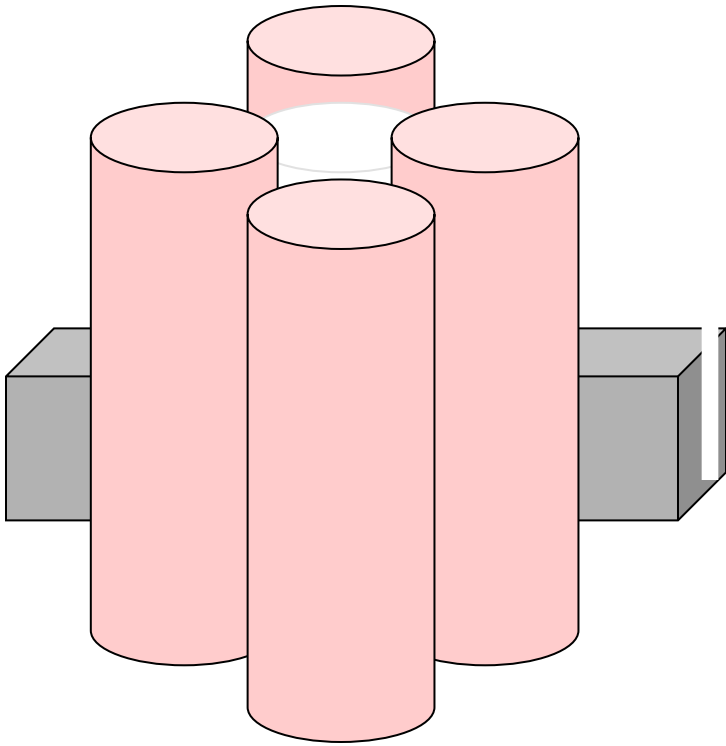
Cations



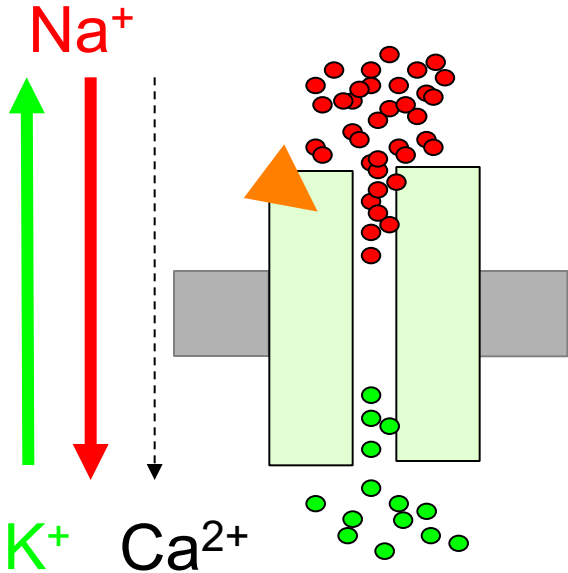
Anions



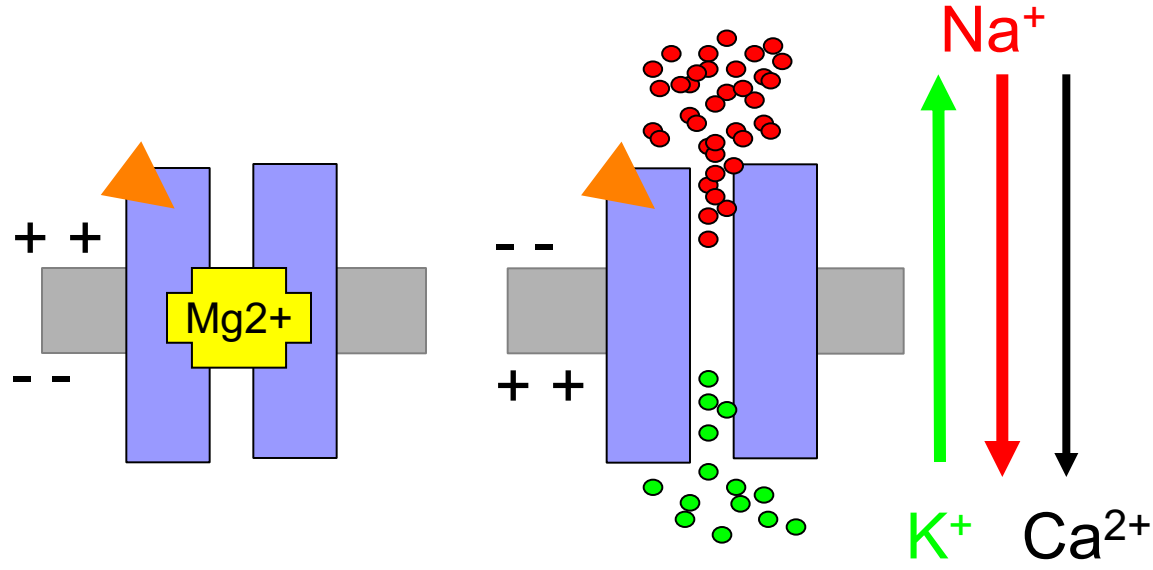
Glutamate receptors



non-NMDA receptors
(AMPA; kainateR)



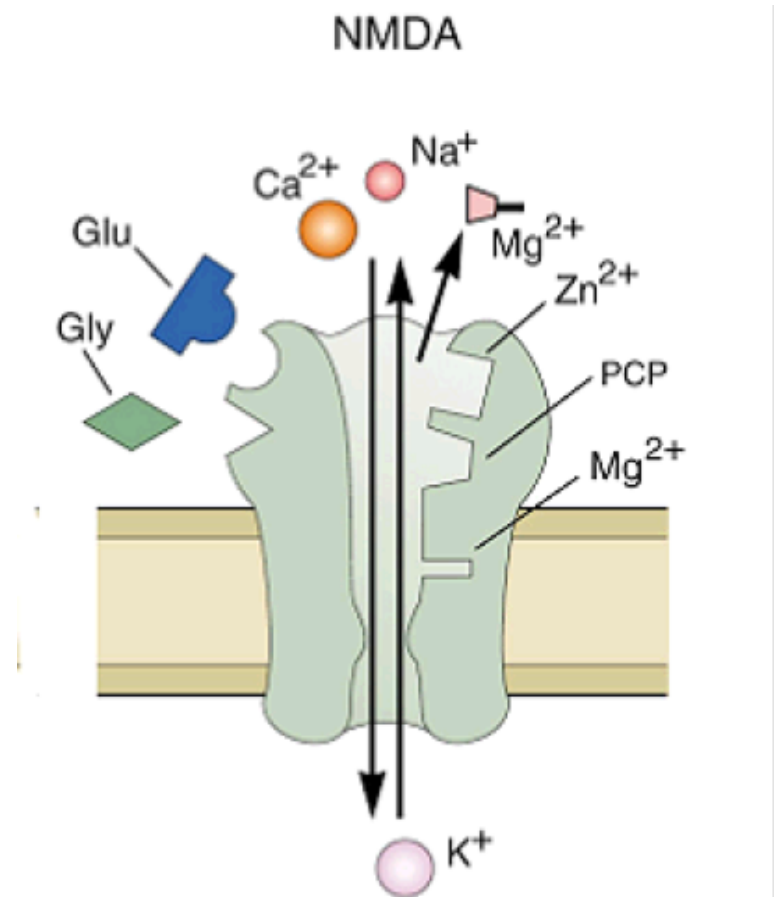
NMDA receptors



GluR types

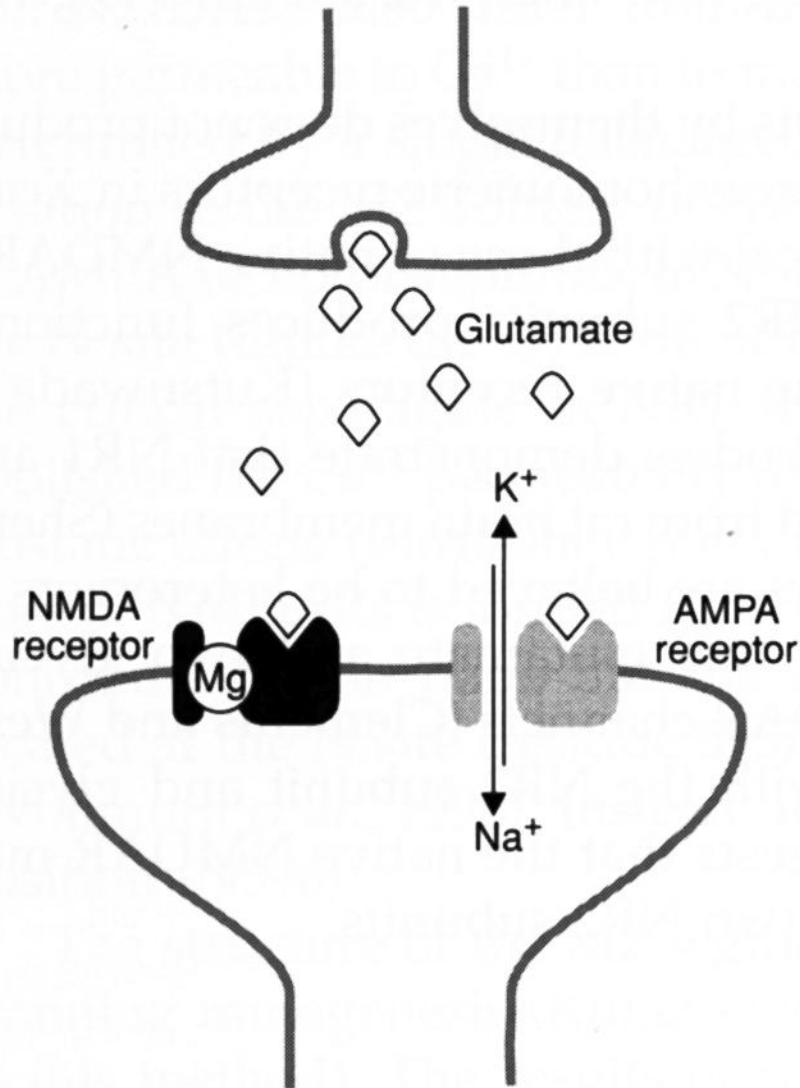
NMDA-R

V-dip Mg^{2+} block
 Ca^{2+} permeability

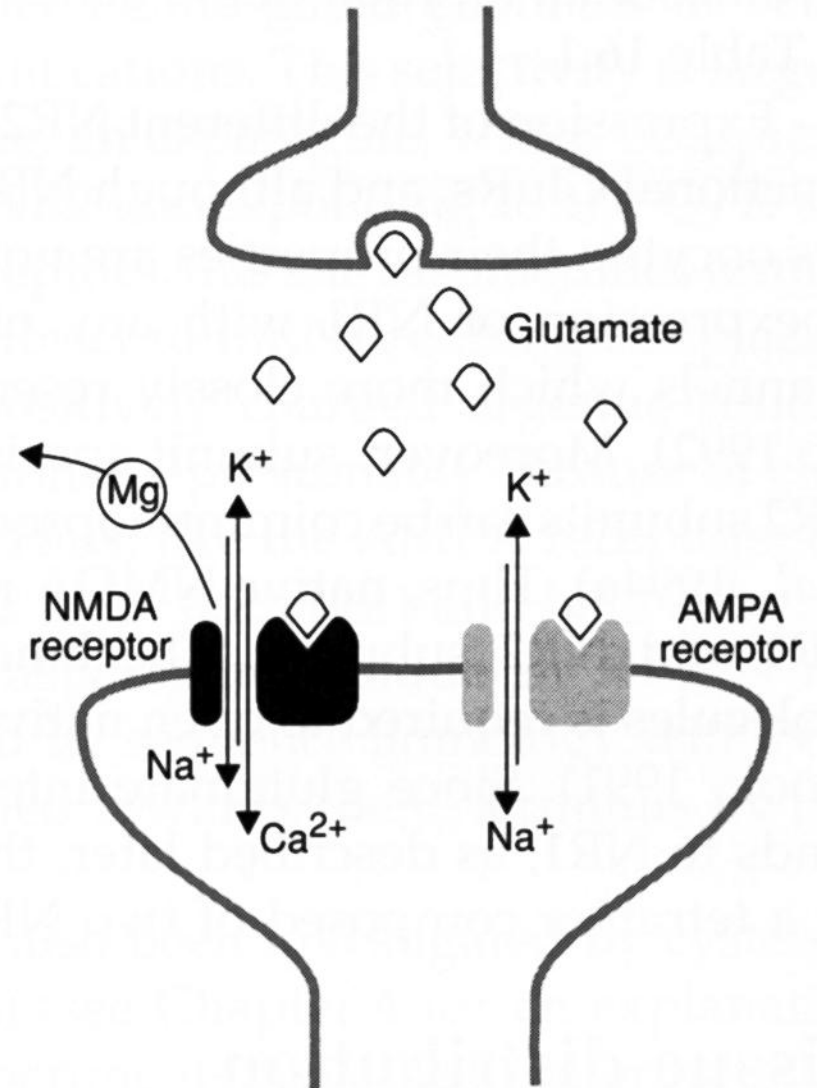


glutamatergic synapse

Normal synaptic transmission



During depolarisation



How do Rs
stay where they belong?

