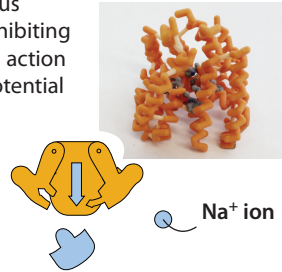


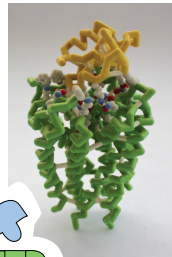
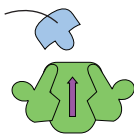
Sodium channel

- Transports sodium ions into the cell, depolarizing the membrane, initiating an action potential

- **Tetrodotoxin** (from pufferfish) blocks the transport of sodium ions, and thus inhibiting an action potential



toxin



toxin



Na⁺ ion

K⁺ ion

Potassium Channel

- Transports potassium ions out of the cell, repolarizing the membrane

- **Scorpion toxins** and **tarantula toxins** block the transport of potassium ions, thus inhibiting action potential

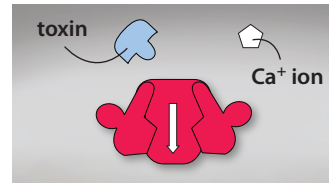
- Some potassium channels are not gated (leaky), but are open, allowing potassium ions to flow in the direction of the concentration gradient

Calcium Channel

- Voltage-gated calcium channels are activated when an action potential, moves calcium ions into the cell

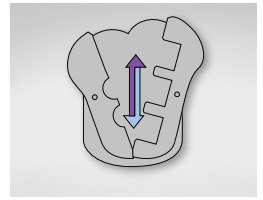
- Calcium is necessary for vesicular fusion required for neurotransmitter release

- Inhibited by the **cone snail toxin**



SNAP/SNARE proteins

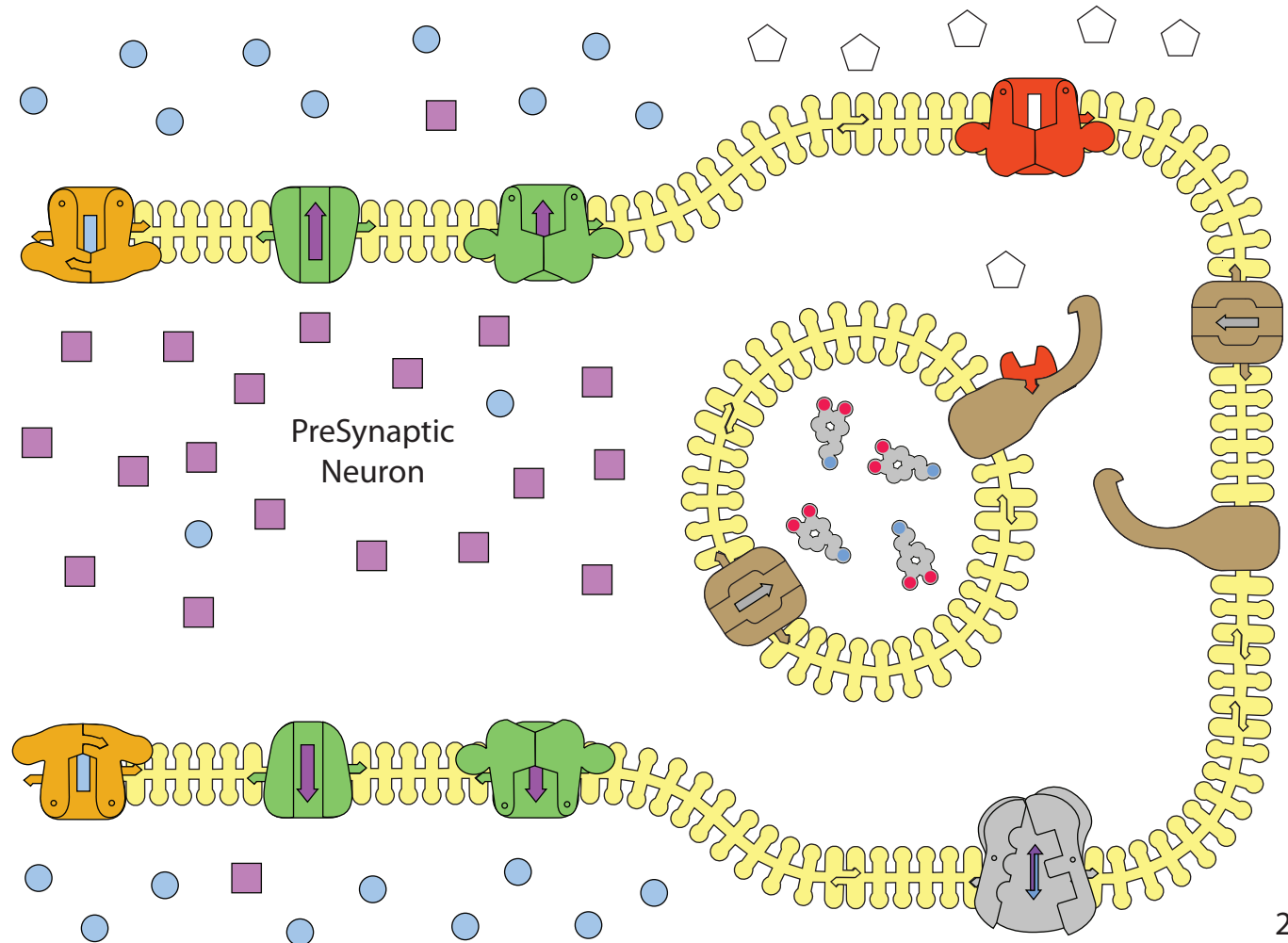
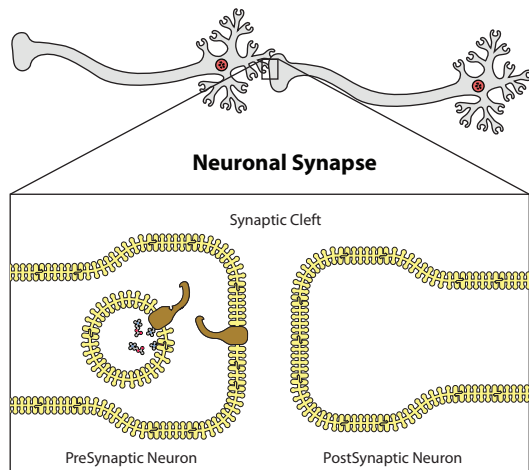
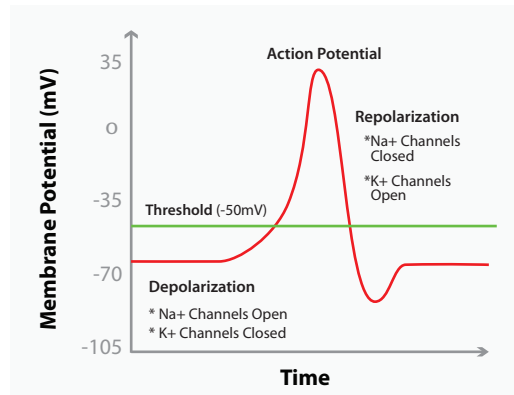
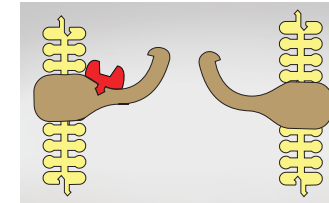
- Present in the vesicle and neuronal membranes
- The influx of calcium ions triggers conformational changes enabling vesicle fusion with neuron membrane, releasing neurotransmitters into synapse



Sodium/Potassium ATP Pump

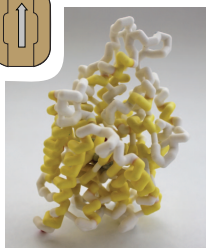
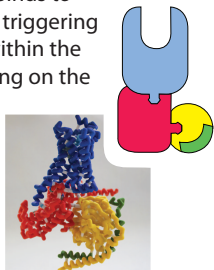
- Active transport of sodium and potassium to re-establish gradient

- 3 sodium ions are pumped out of the cell in exchange for 2 potassium ions



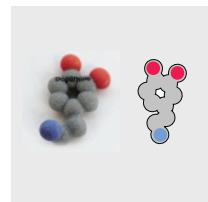
Dopamine Receptor

- A G protein coupled receptor on post synaptic neuron
- Triggers reaction in cell based on G protein coupled to receptor
- Dopamine binds to the receptor, triggering a response within the cell, depending on the G-protein coupled to receptor



Dopamine Transporter

- Removes dopamine from synaptic cleft
- Cocaine blocks the re-uptake of dopamine



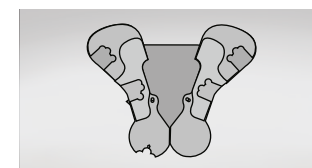
Dopamine

- Neurotransmitter, a chemical messenger
- Binds to dopamine receptor on post-synaptic receptor
- Recycled through dopamine transporter



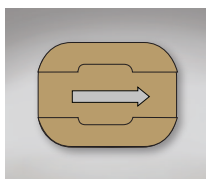
Cocaine

- Binds to the dopamine transporter, increasing the time that dopamine remains in synapse



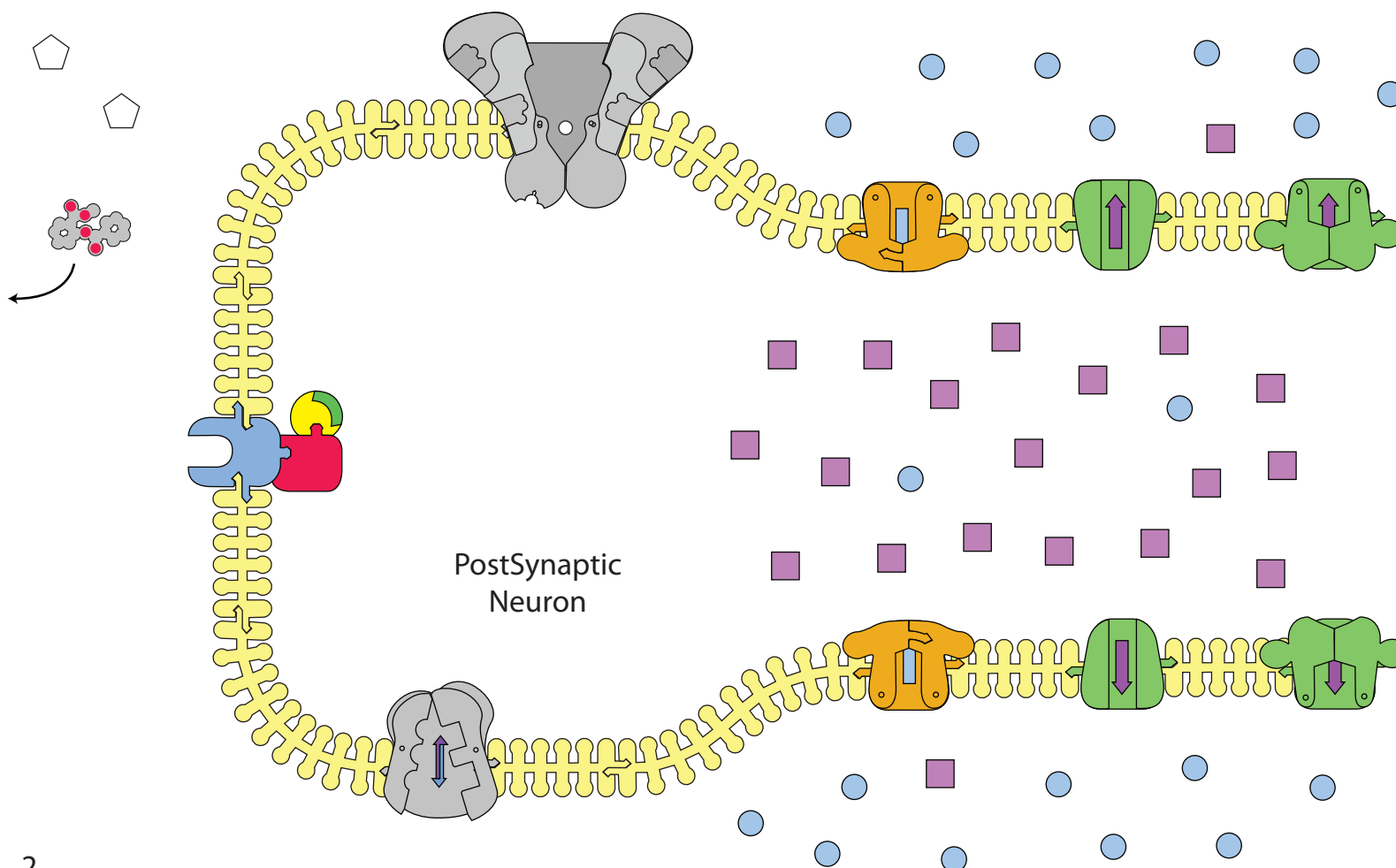
NMDA Receptor

- N-methyl-D-aspartate receptor
- Ionotropic receptor in the postsynaptic neuron membrane
- When activated allows the passage of sodium and calcium ions into the postsynaptic neuron



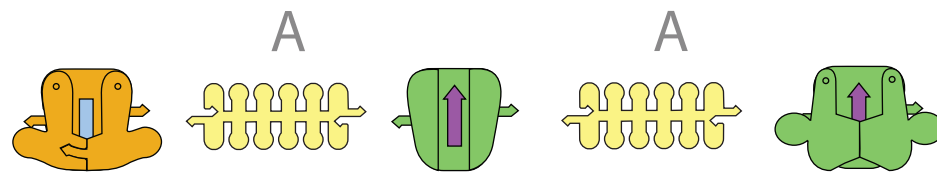
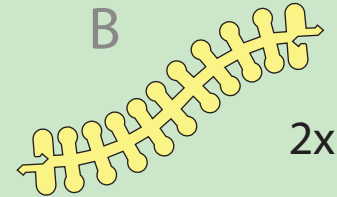
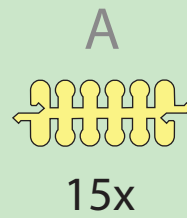
Vesicular Transporter

- Transporter embedded in the vesicle to transport the neurotransmitters into the vesicle



Dopaminergic Synapse

Dopaminergic Synapse



PreSynaptic
Neuron

