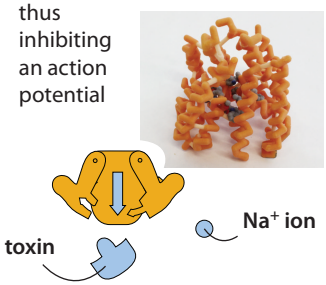
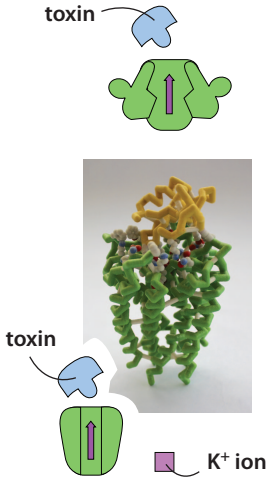
## Sodium channel

- 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



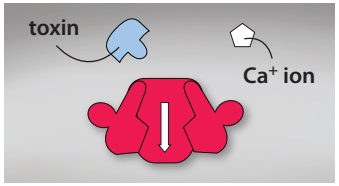




## Potassium Channel

- 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

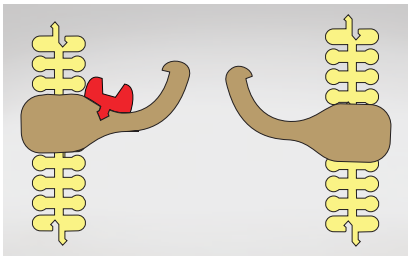
## Calcium Channel

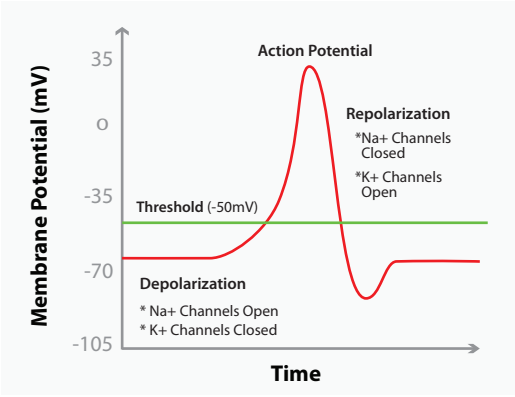
- Voltage-gated calcium channels are activated when an action potential, moves calcium ions into the cell
- Calcium is necessary for vesicular fusion required for neurotransmitter release
- Inhibited by the cone snail toxin

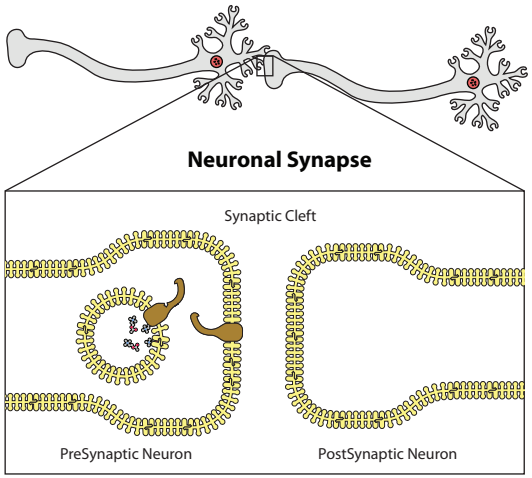


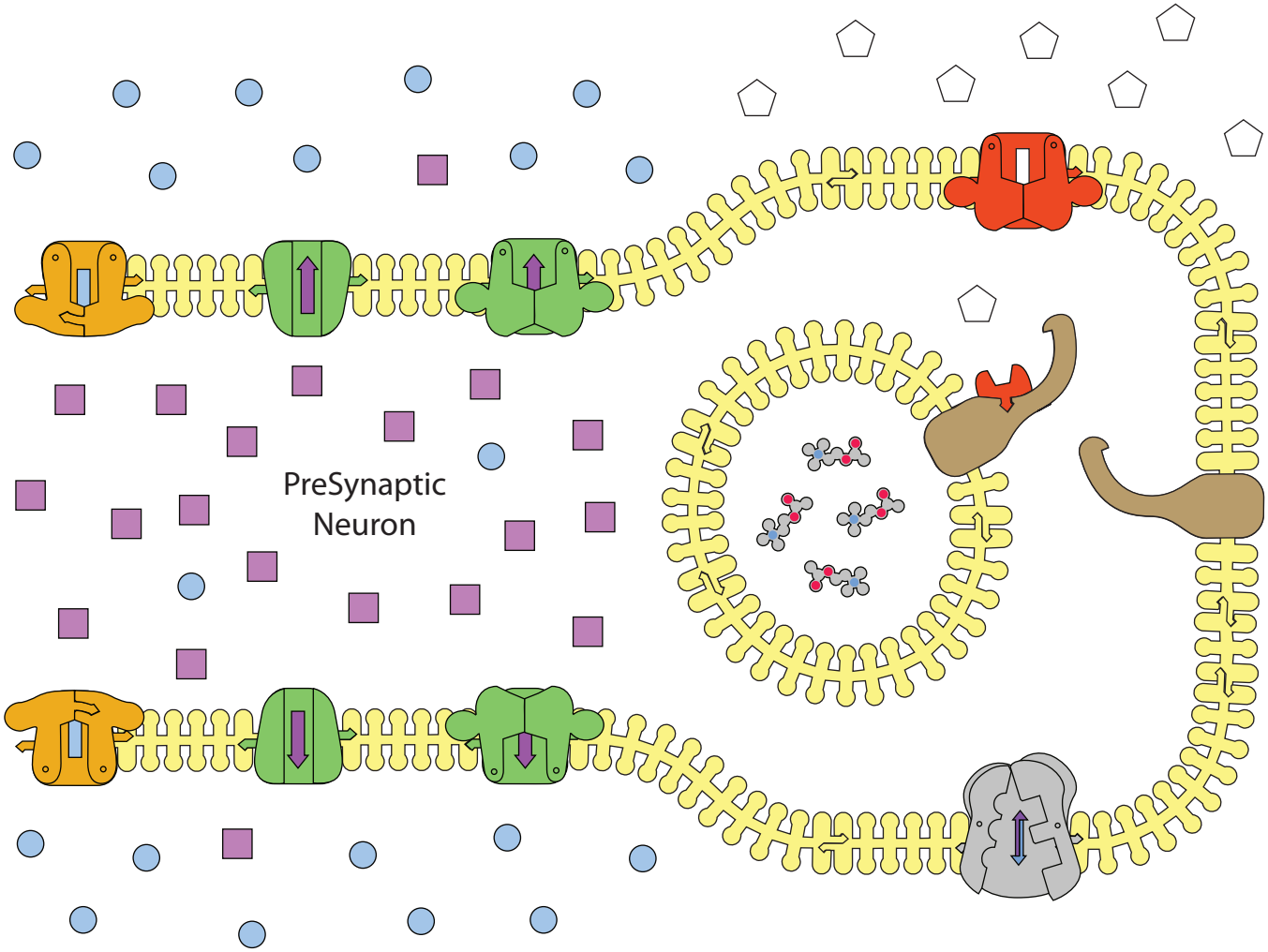

## SNAP/SNARE proteins

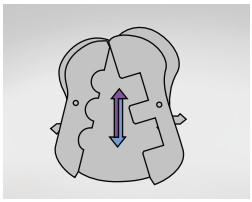
- Present in the vesicle and neuronal membranes
- The influx of calcium ions triggers conformational changes enabling vesicle fusion with neuron membrane, releasing neurotransmitters into synapse





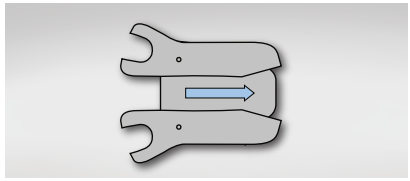





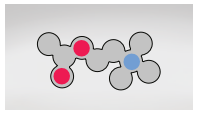
**Sodium/Potassium ATP Pump**

- 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



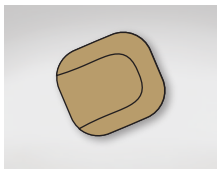
**Acetylcholine Receptor**

- A sodium ion channel located on the post-synaptic neuron
- Binding of acetylcholine induces a conformational change in the structure, opening an ion channel, permitting sodium ions to enter the cell
- If the influx of sodium ions is large enough, an action potential is triggered



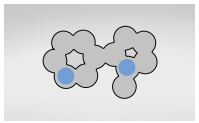
**Acetylcholine**

- Neurotransmitter, a chemical messenger
- Binds to the acetylcholine receptor on the post-synaptic neuron
- Broken down by acteylcholinesterase, found in the synapse



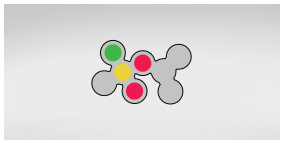
**Acetylcholinesterase**

- Enzyme located in the synaptic cleft
- Breaks down acetylcholine to remove the neurotransmitter from the synapse



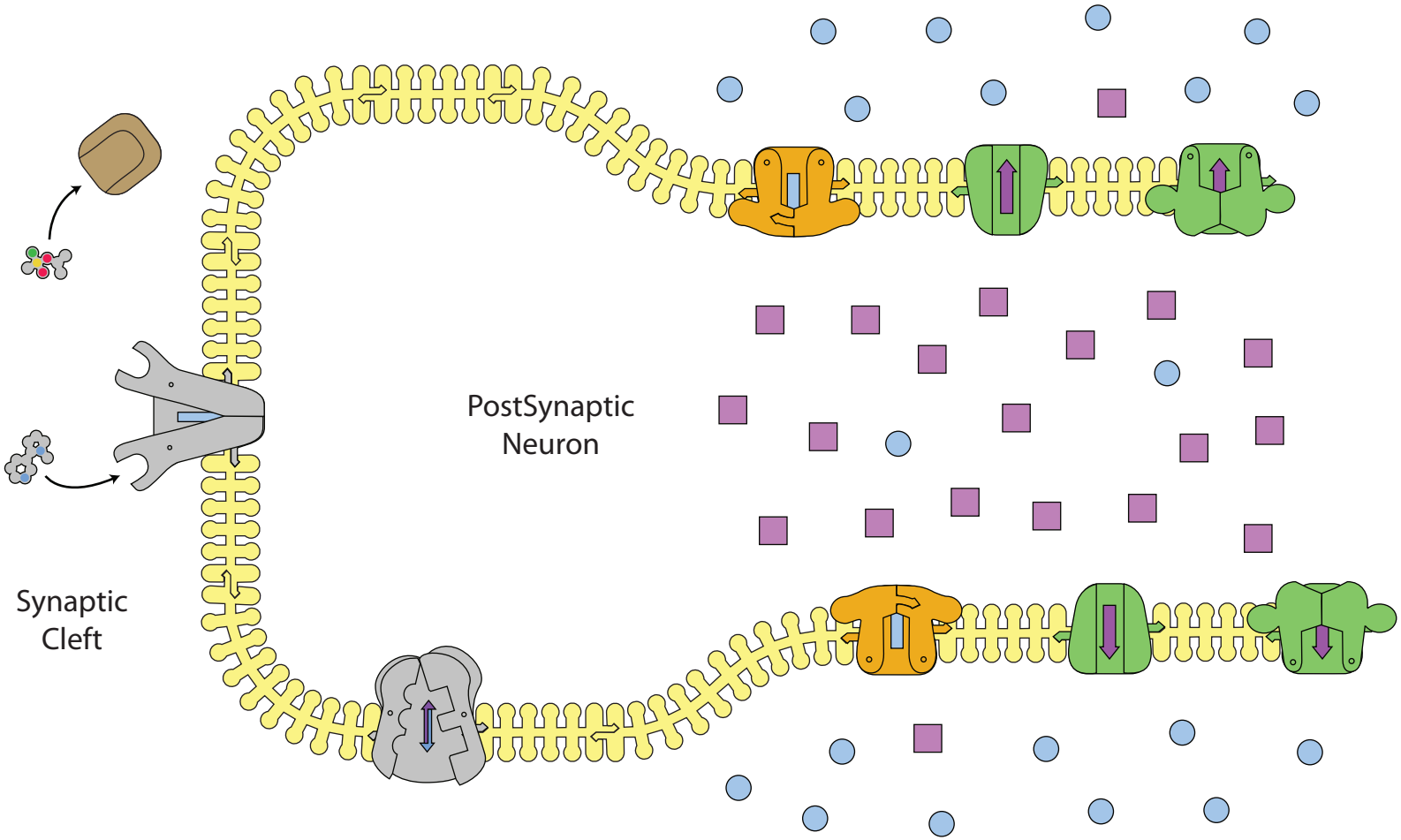
**Nicotine**

- Binds to and activates the acetylcholine receptor, triggering an influx of sodium ions into the cell



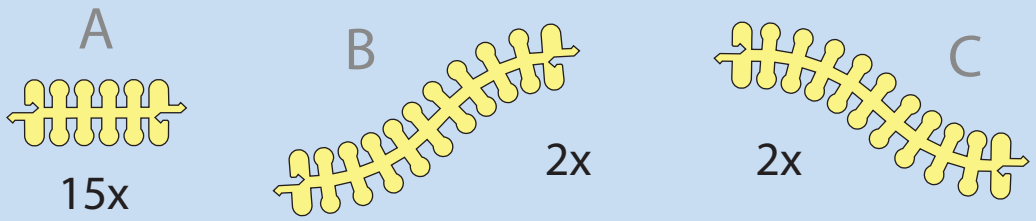
**Sarin**

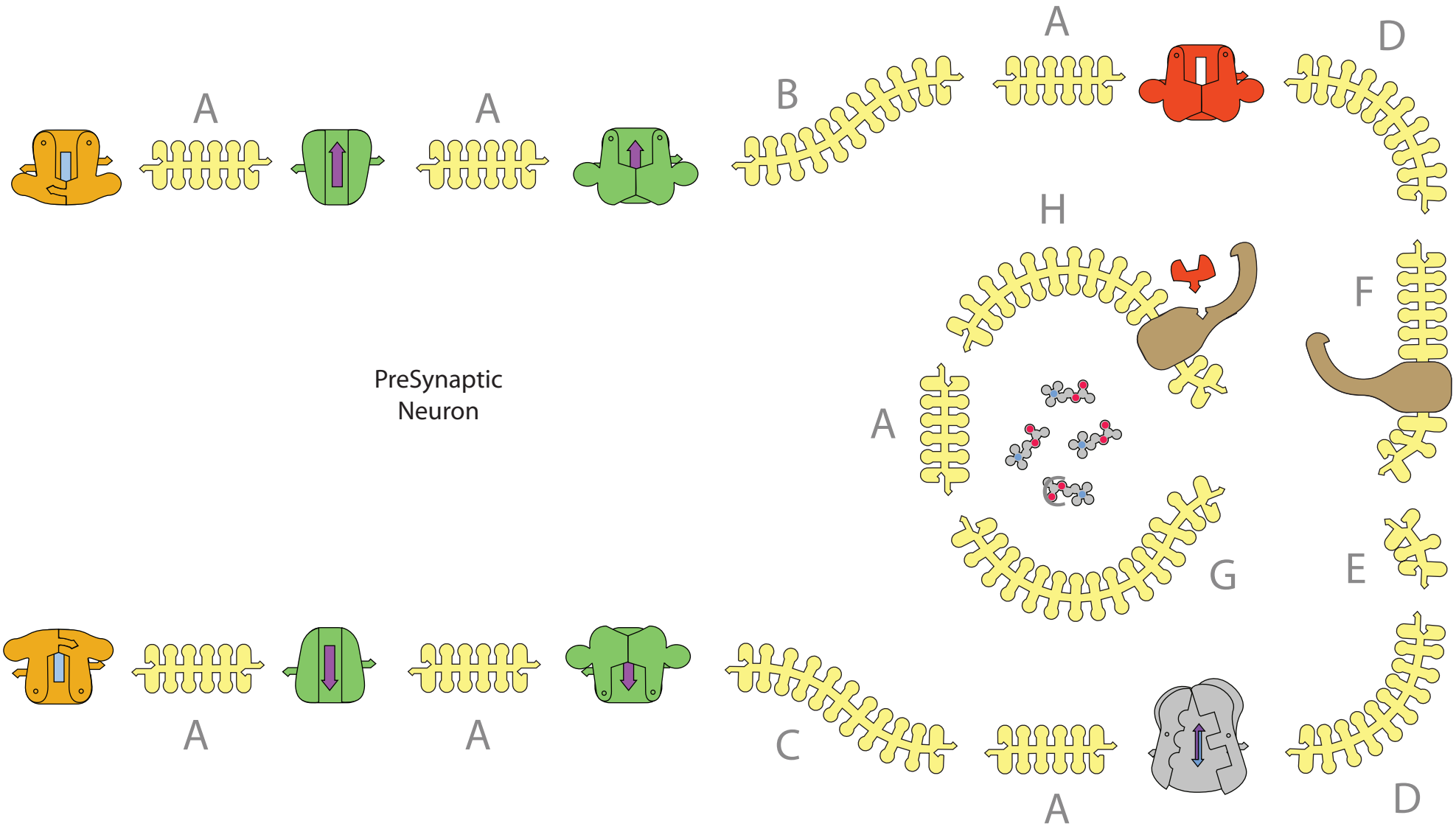
- Binds competitively inhibits acetylcholinesterase by covalently binding to the active site

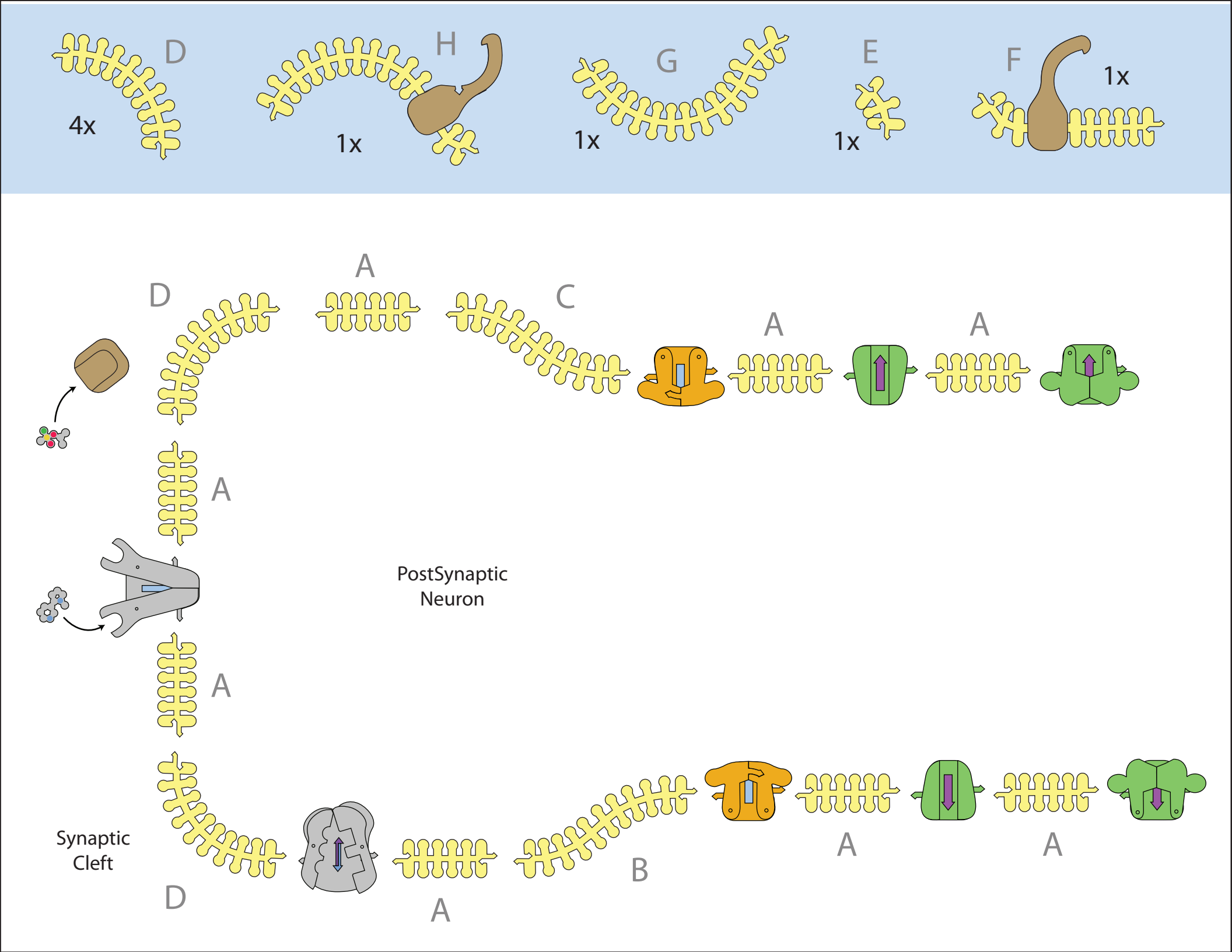



# Cholinergic Synapse

# Cholinergic Synapse




D
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PostSynaptic
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Cleft
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