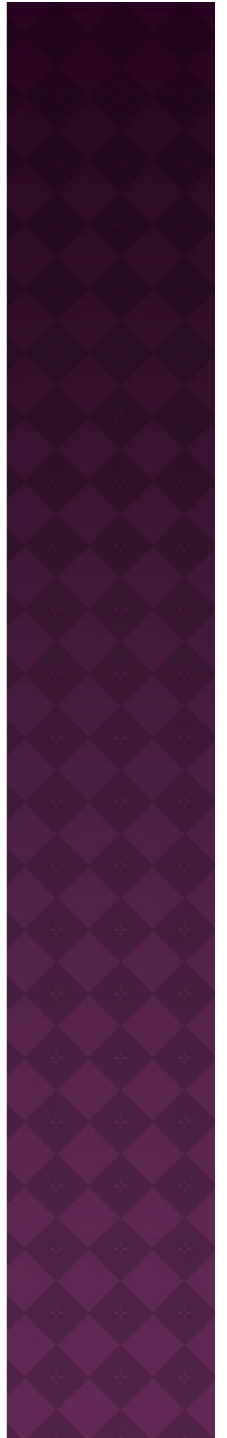


SYNAPSE

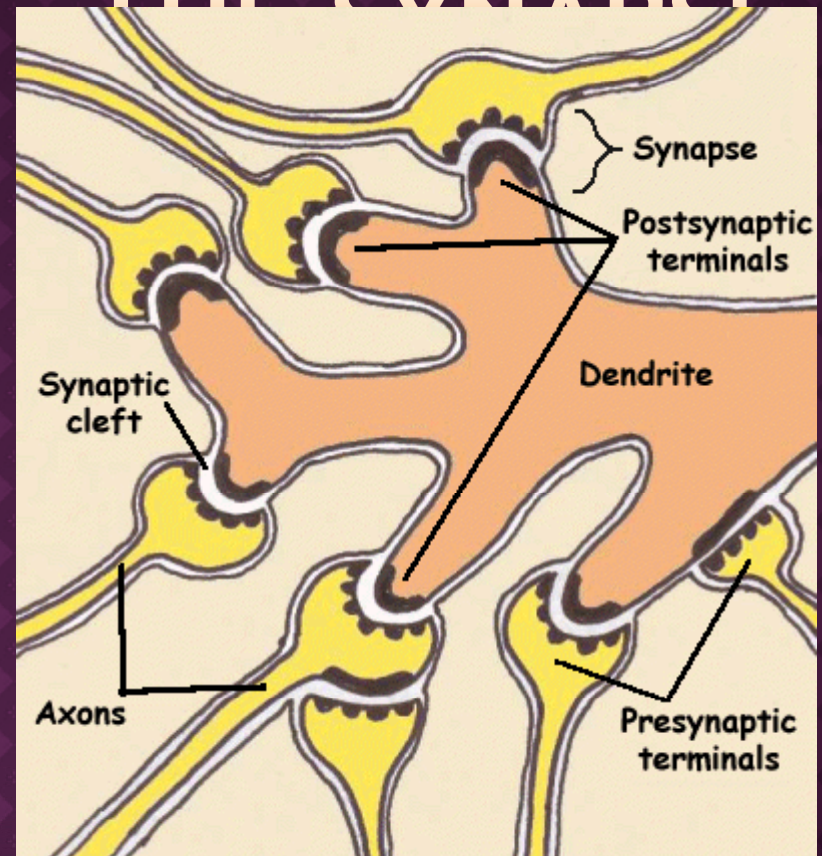
◉ Dr Atanu Saha

◉ Study material for B.Sc (H) Physiology 2nd
Sem



Where the electrical signal
becomes chemical

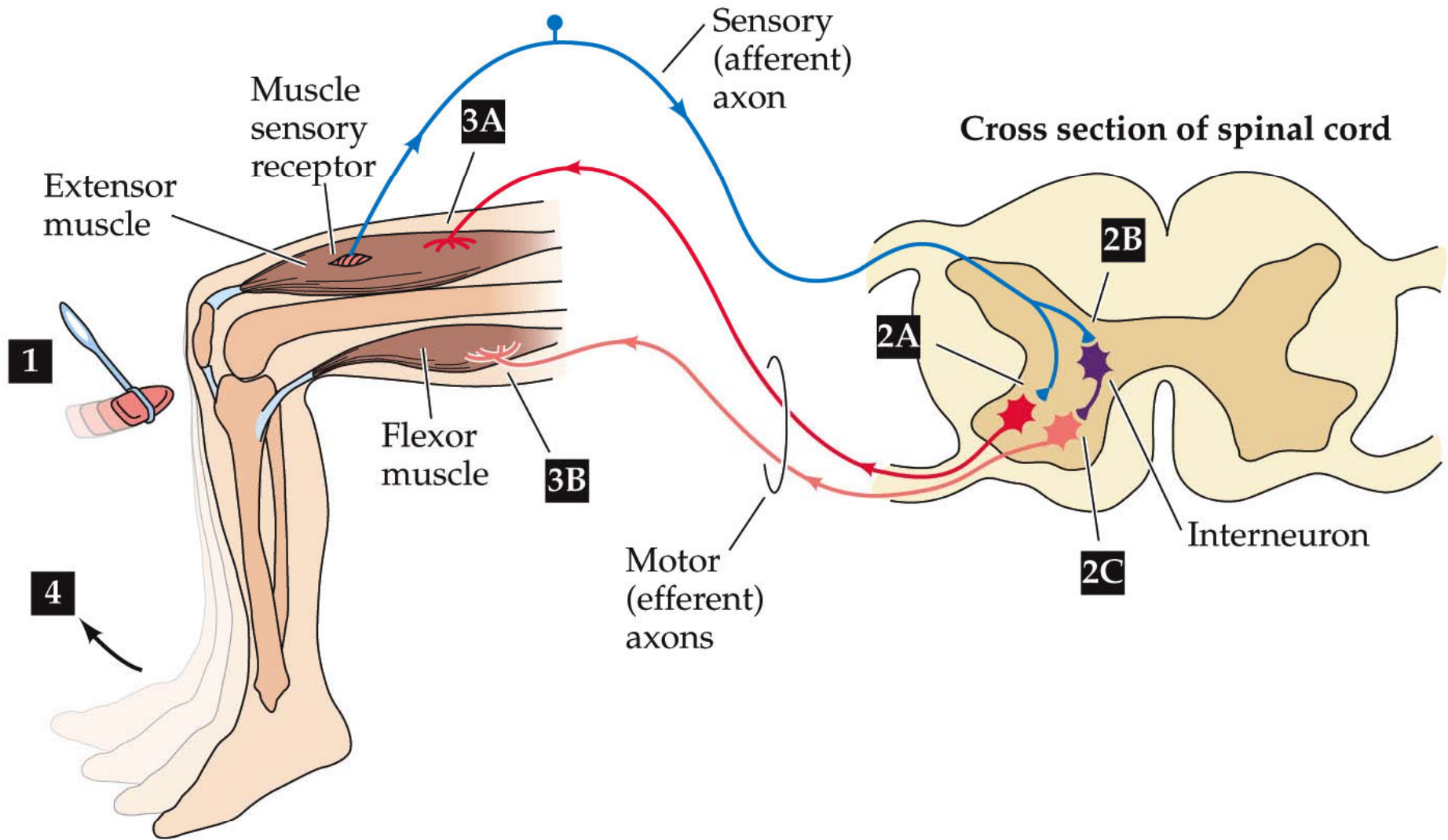
THE SYNAPSE



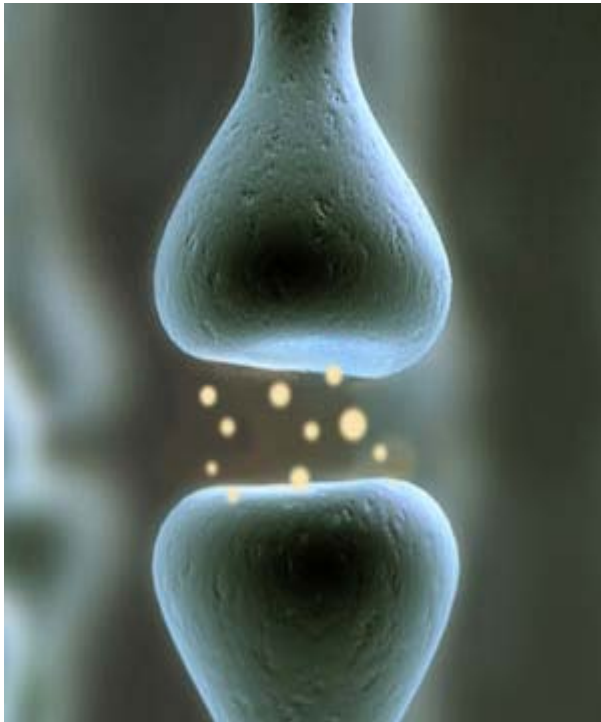
NERVOUS SYSTEM DIVISIONS

- We discussed the nervous system as an input-output device both on the cellular level and system level
- Remember that there are three types of neural cells:
 - sensory neurons take in signals
 - interneurons process signals
 - motor neurons send out signals

Synaptic transmission: communication between neurons



NEUROSCIENCE, Fourth Edition, Figure 1.7 (Part 1)



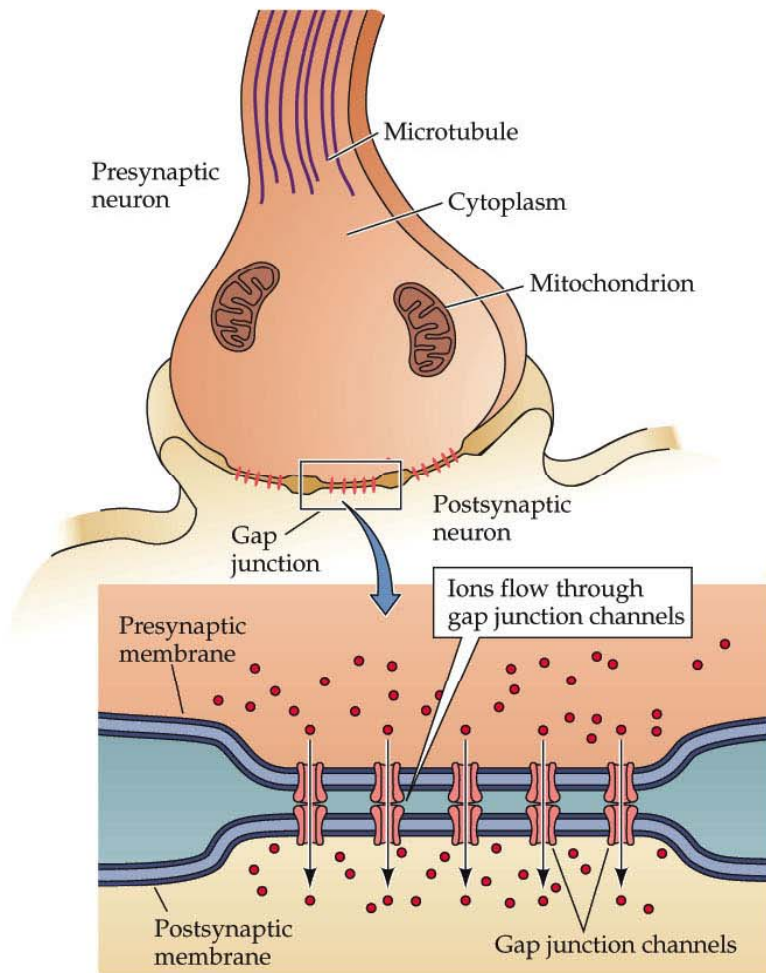
- ⦿ The **synapse** is the meeting point between two neurons.
- ⦿ The outgoing signal from the **presynaptic neuron** is passed to the **postsynaptic neuron**.
- ⦿ The signal comes from the presynaptic (axon / dendrite) and goes into the postsynaptic (axon / dendrite)

ELECTRICAL VS. CHEMICAL SYNAPSES

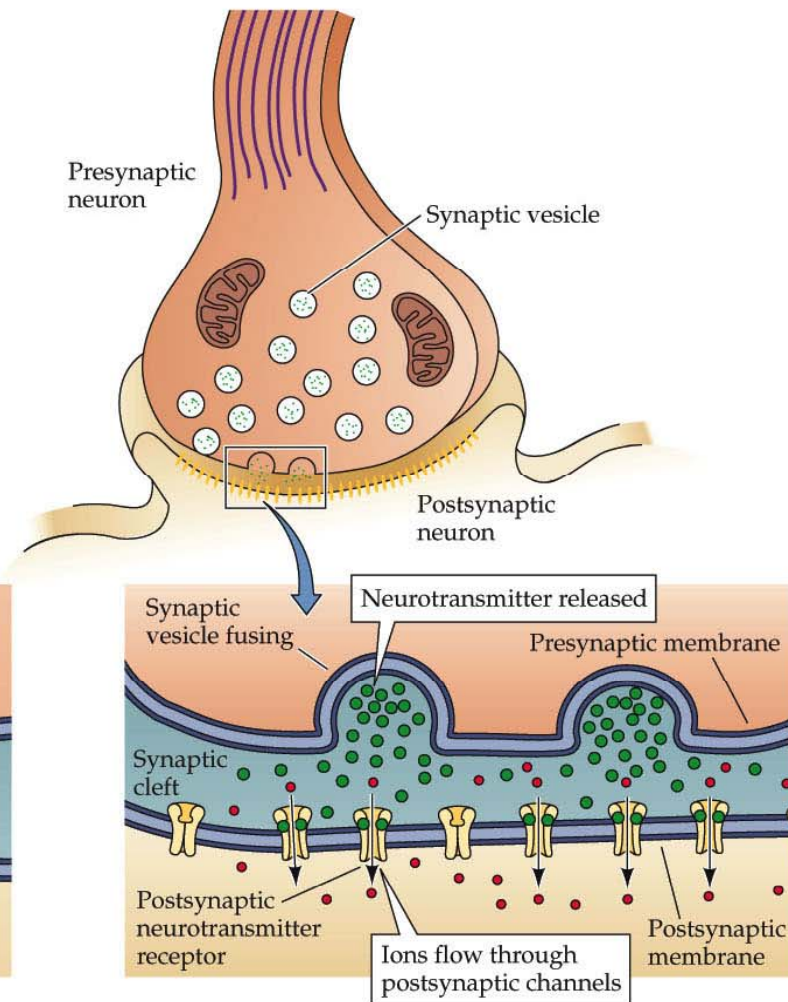
- ◉ There are two kinds of synapses that connect neurons.
- ◉ **Electrical synapses** are direct connections between neurons.
- ◉ **Chemical synapses** are small gaps between neurons where chemicals are triggered to diffuse.

ELECTRICAL VS. CHEMICAL

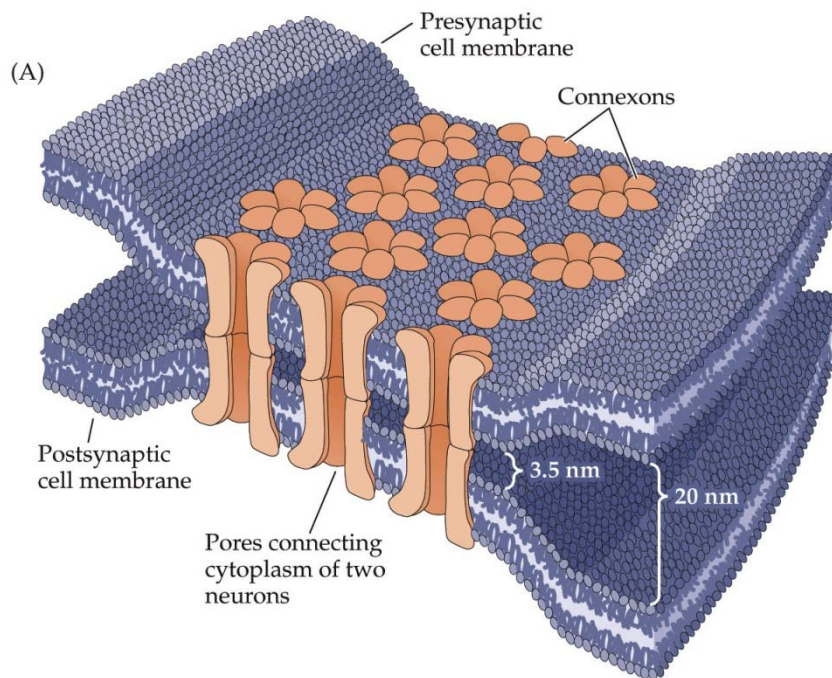
(A) ELECTRICAL SYNAPSE



(B) CHEMICAL SYNAPSE



ELECTRICAL SYNAPSES



ROSCIENCE, Fourth Edition, Figure 5.2 (Part 1)

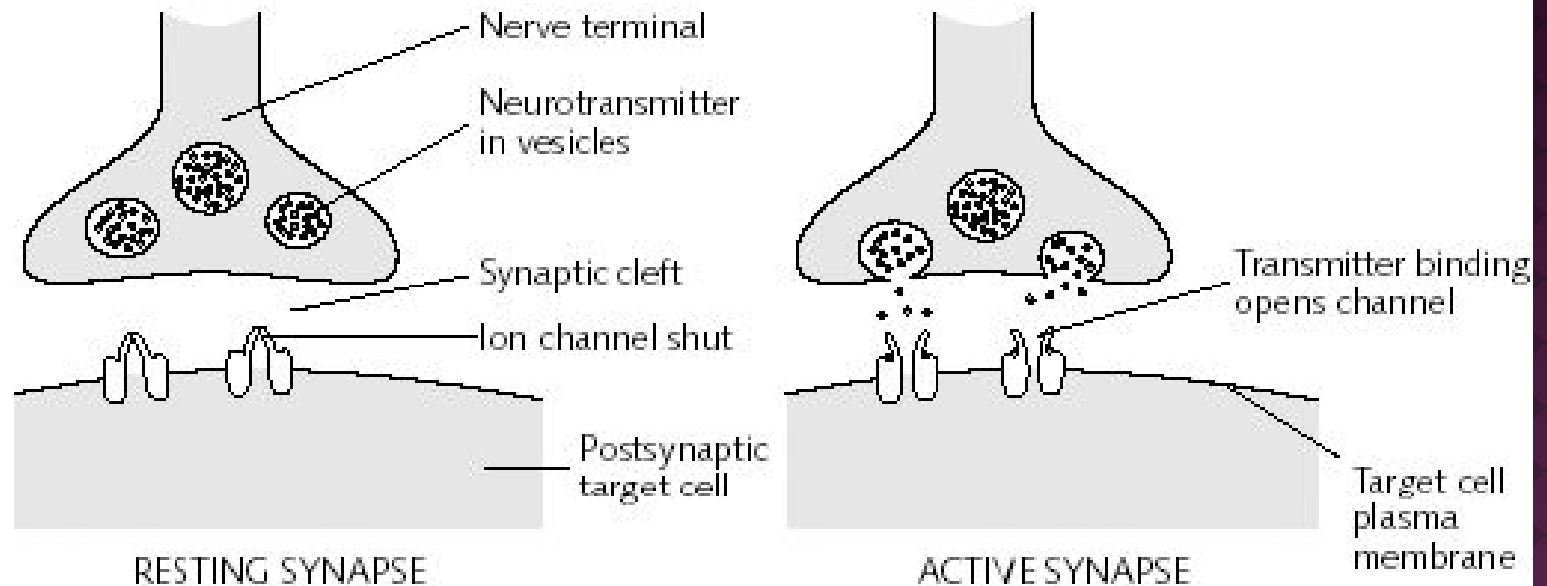
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- Pores connect the two cells.
- Ions from the presynaptic action potential diffuse directly into the postsynaptic neuron.
- These signals are transmitted *fast!*

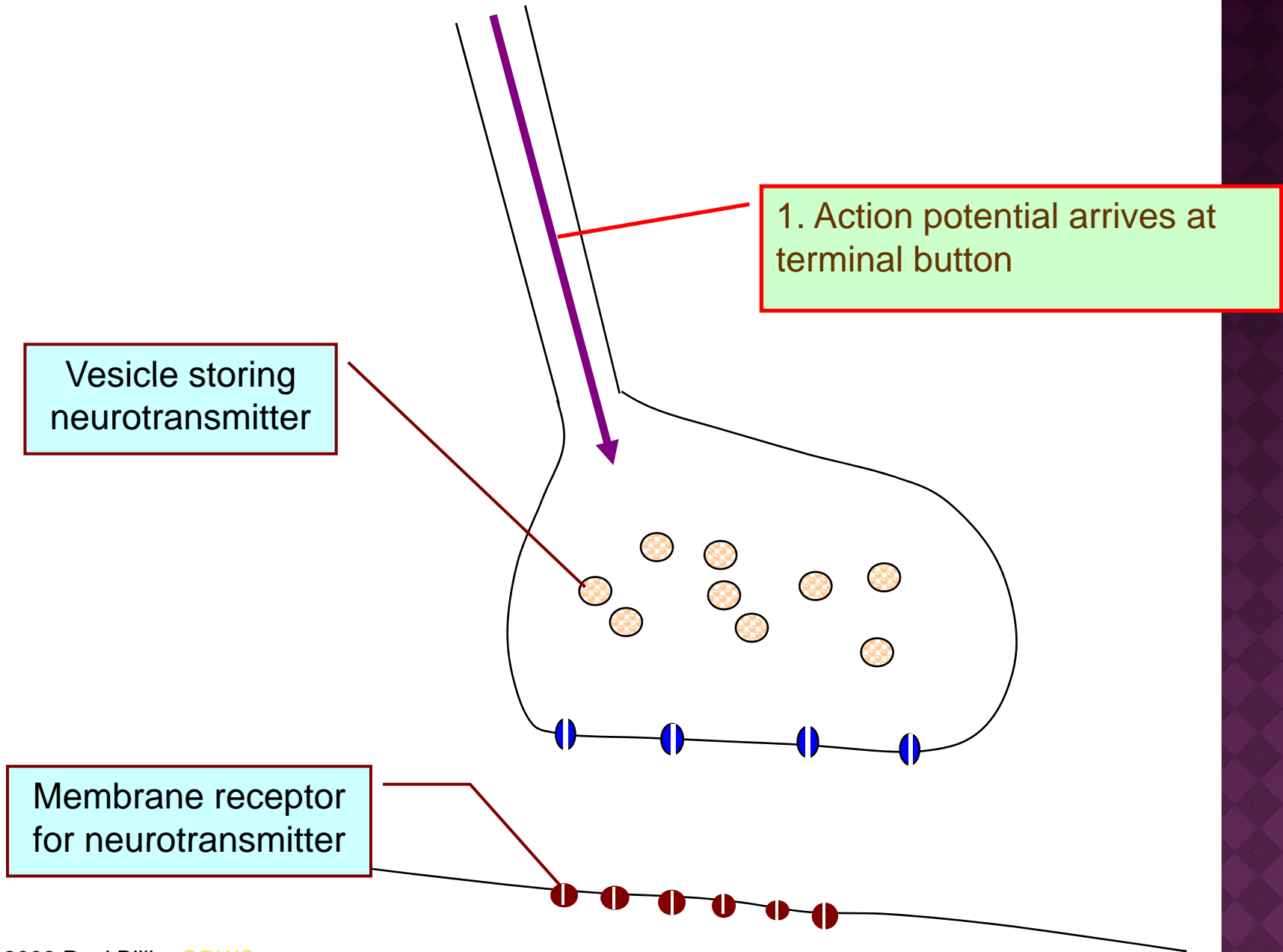
CHEMICAL SYNAPSE

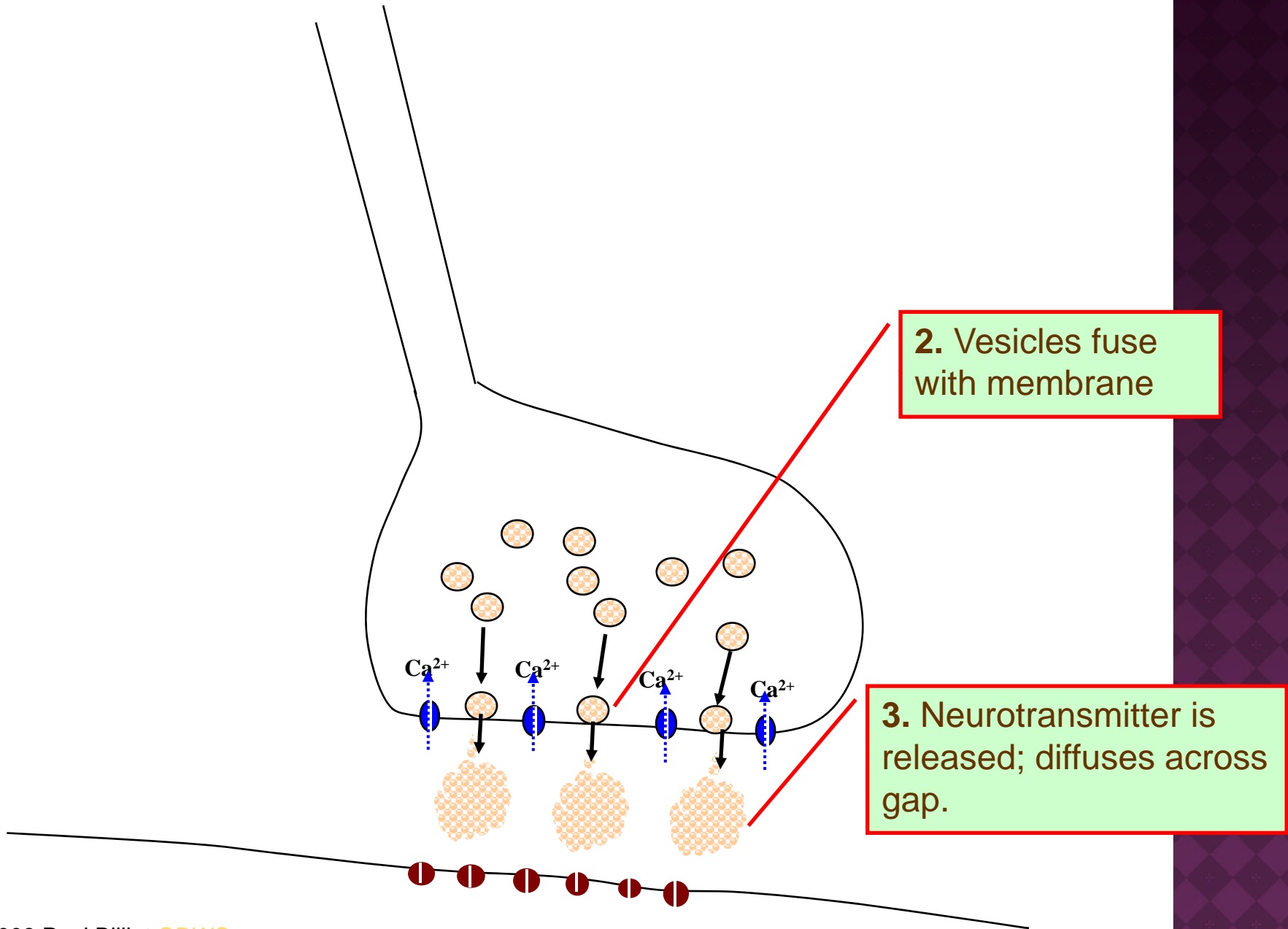
- ◉ When the action potential reaches the synapse, it triggers the release of little bubbles called vesicles.
- ◉ The vesicles contain chemical signals called neurotransmitters. They are bigger, and diffuse slower, than ions.
- ◉ Neurotransmitters must be received by specific receptors in the post-synaptic neuron.

CHEMICAL SYNAPSE



1. Action potential in presynaptic neuron.
2. Vesicle release is triggered.
3. Neurotransmitters release into synapse.
4. Neurotransmitters bind to receptors.
5. Ion channels are triggered to open.



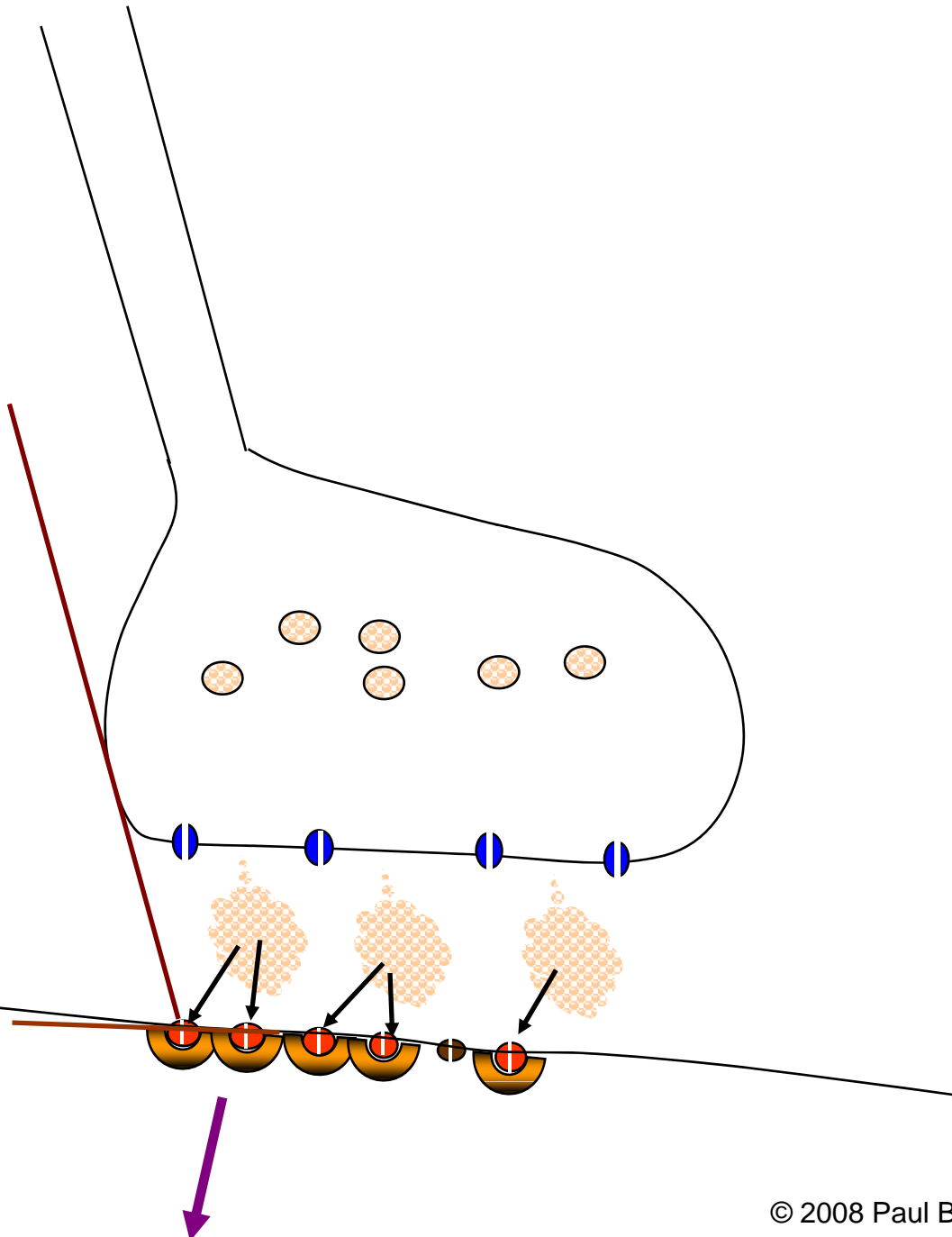


2. Vesicles fuse with membrane

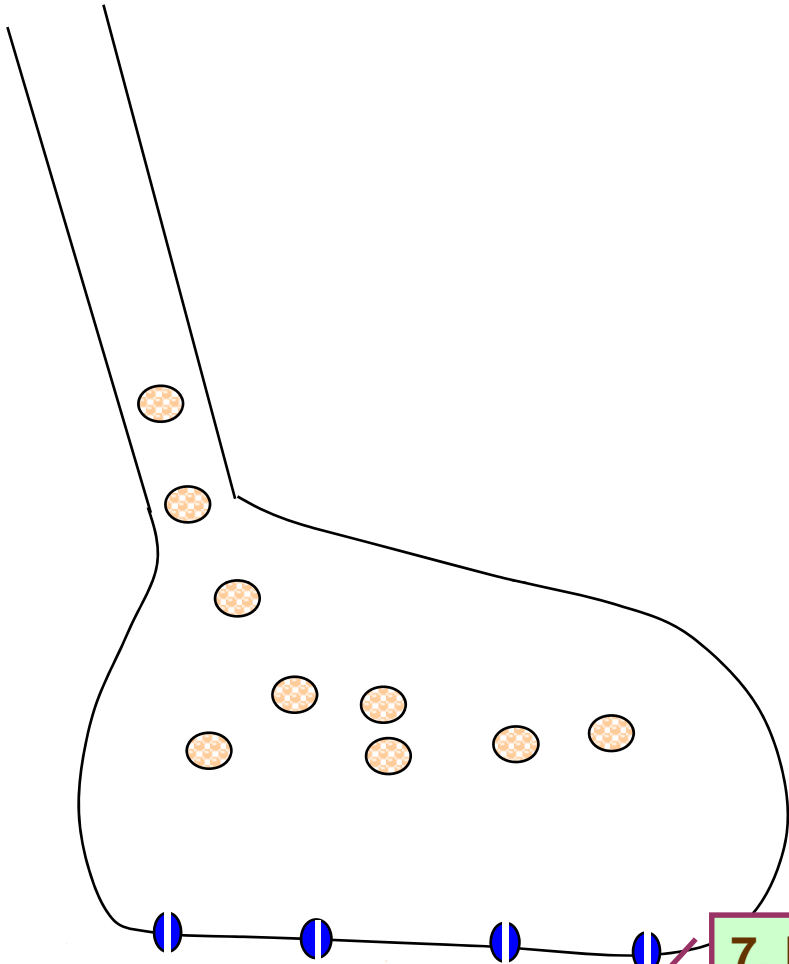
3. Neurotransmitter is released; diffuses across gap.

4. Neurotransmitter binds to receptors on the postsynaptic neuron

5. Ion channels are triggered to open



6. Action potential generated which travels down the postsynaptic cell.



7. Neurotransmitter destroyed by enzymes in the cleft. Stops signal being perpetuated.

