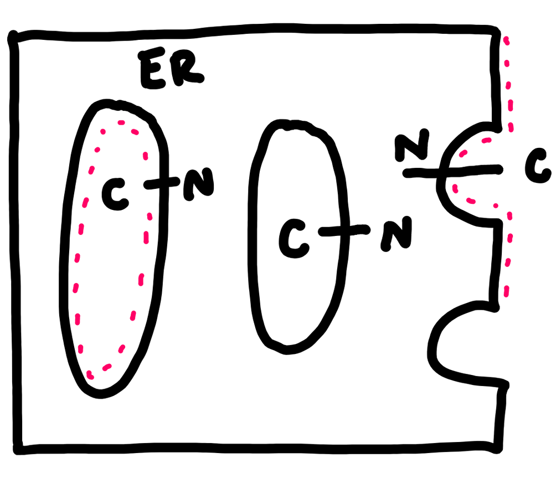
Vesicle Trafficking

Thursday, February 12, 2026 9:32 AM

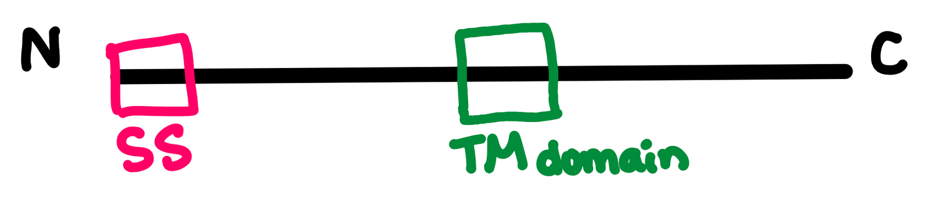
ER Protein Transport

· Topology

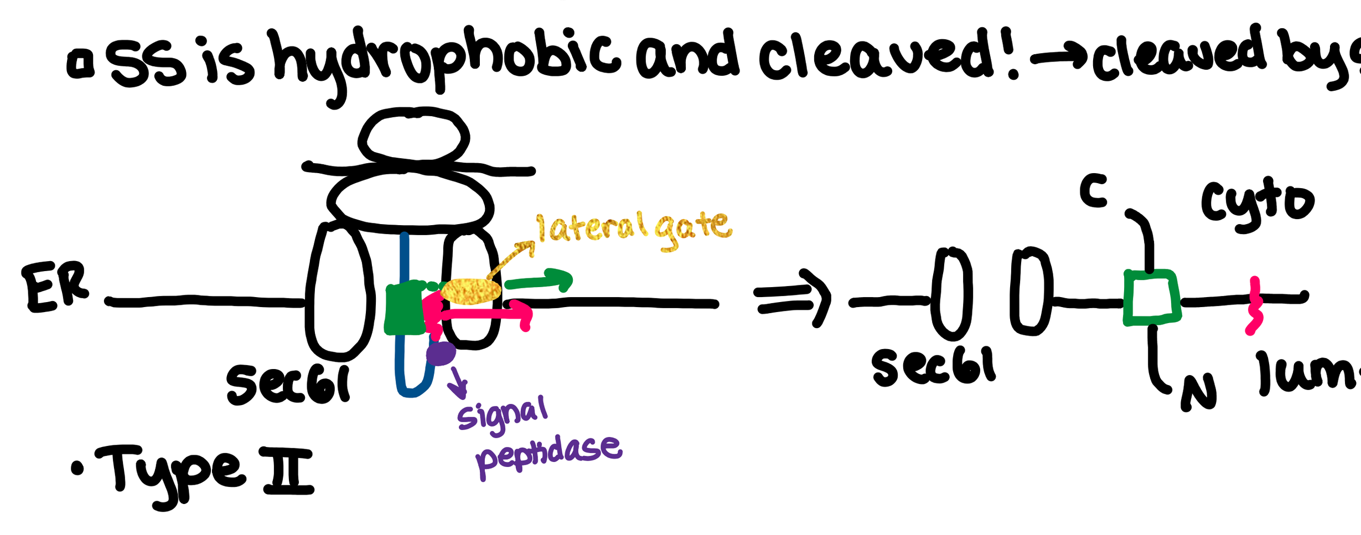


- vesicles make sure secreted/membrane proteins fold and stay folded
- can be modified in ER
- orientation set up in ER

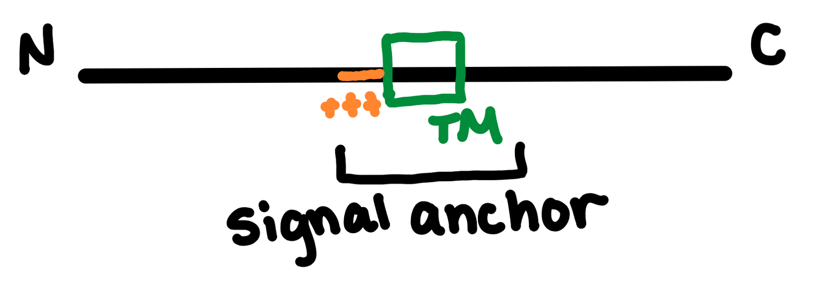
· Type I transmembrane protein



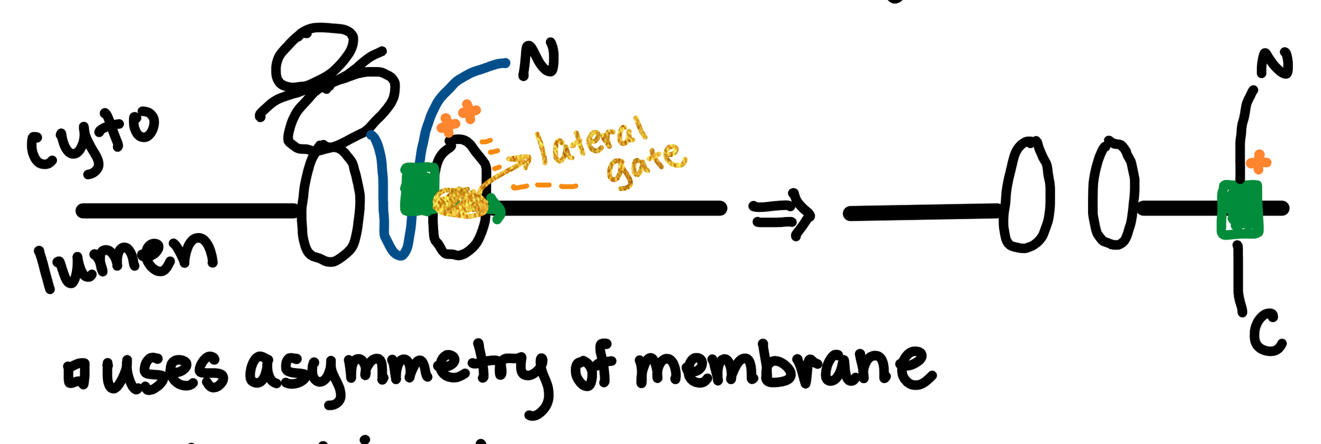
- TM has lots of hydrophobic of 20-25 aa (4 nm)
- SS is hydrophobic and cleaved! → cleaved by signal peptidase



· Type II



- no N-terminal cleavable signal sequence



- uses asymmetry of membrane and protein charges
- TM pushes through lateral gate opening
- for multipass proteins, just keep feeding one TM at a time, orientation switching every TM

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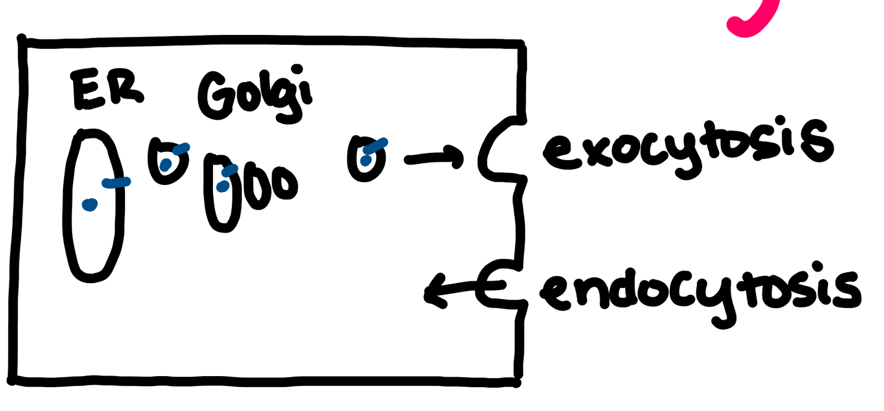


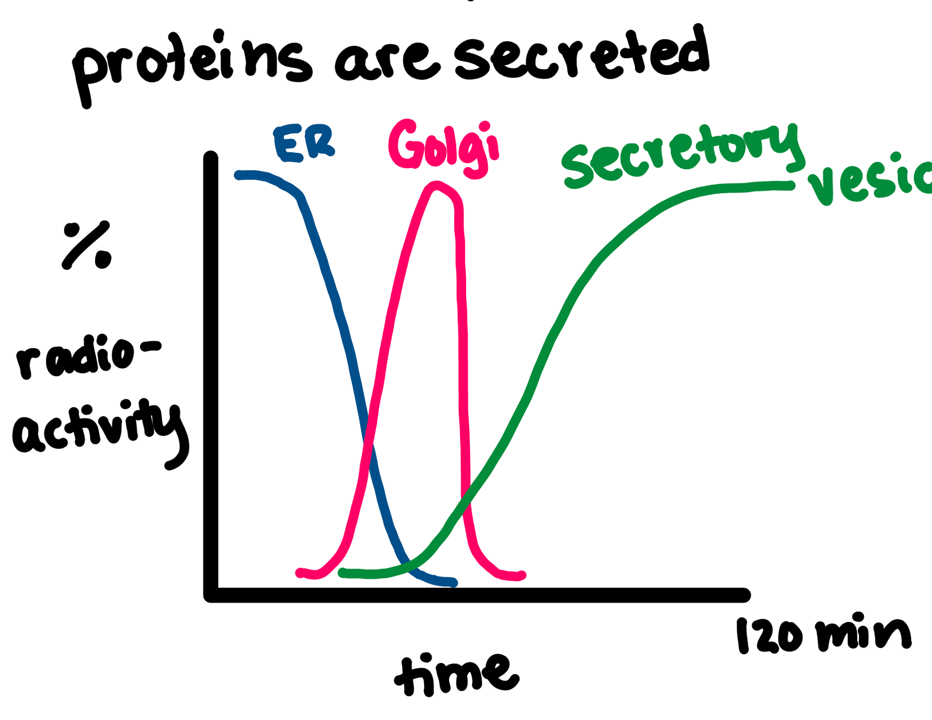
1. don't want cargo crossing membrane after ER
2. Soluble/TM proteins
3. Repeated cycles

Why does the vesicle not fuse to every organelle?
In a crowded cell, how does it know where to go?

· Pulse-Chase Assay
- quantify protein dynamics

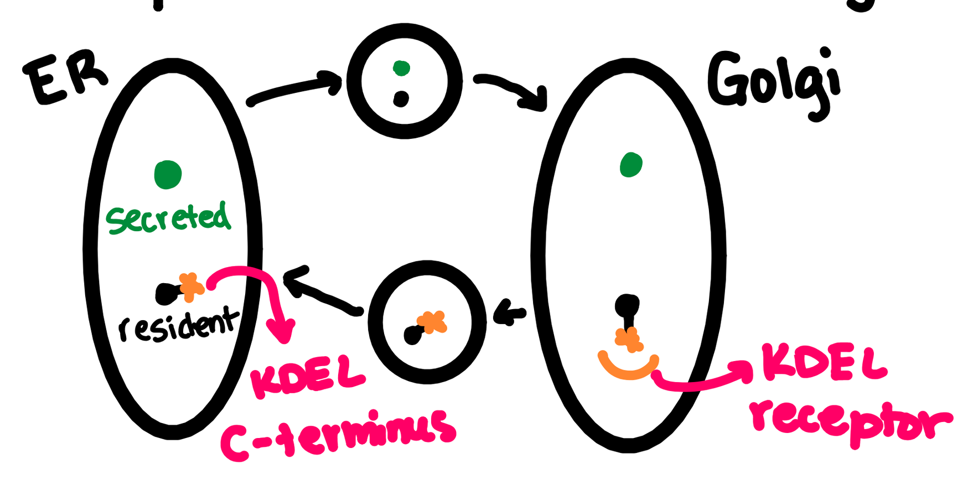
1. Label newly synthesized proteins
   Pulse ($t=0$) = $+{}^3$H-Leu
   ↳ only enters proteins synthesized at this time
   Chase ($t=3$ min) = + Leu
2. Fix at different times

- best done in pancreatic cells bc most proteins are secreted

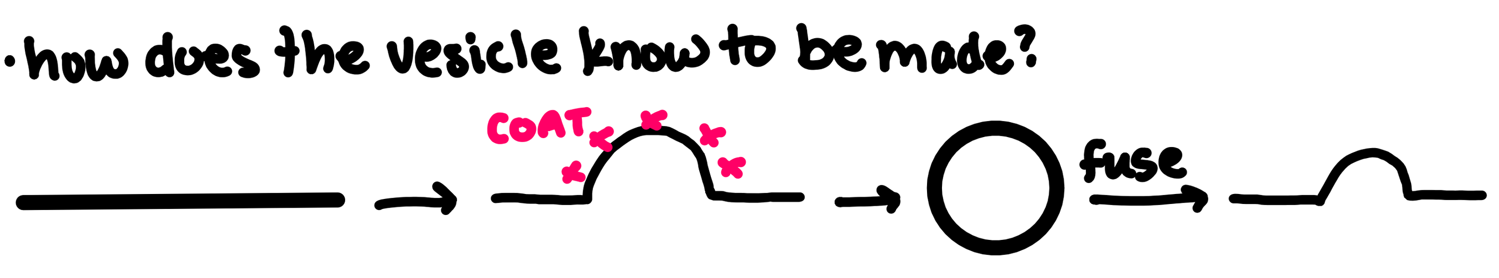


Order and Specificity

· Sequences within the cargo



· how does the vesicle know to be made?

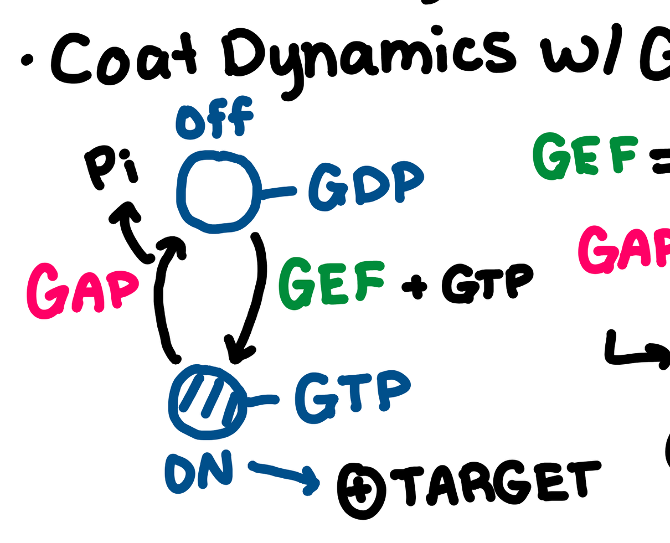


1. Coat Proteins
   - deform membrane
   - concentrate cargo

   e.g. COPI, COPII, Clathrin
   - different coats for different routes

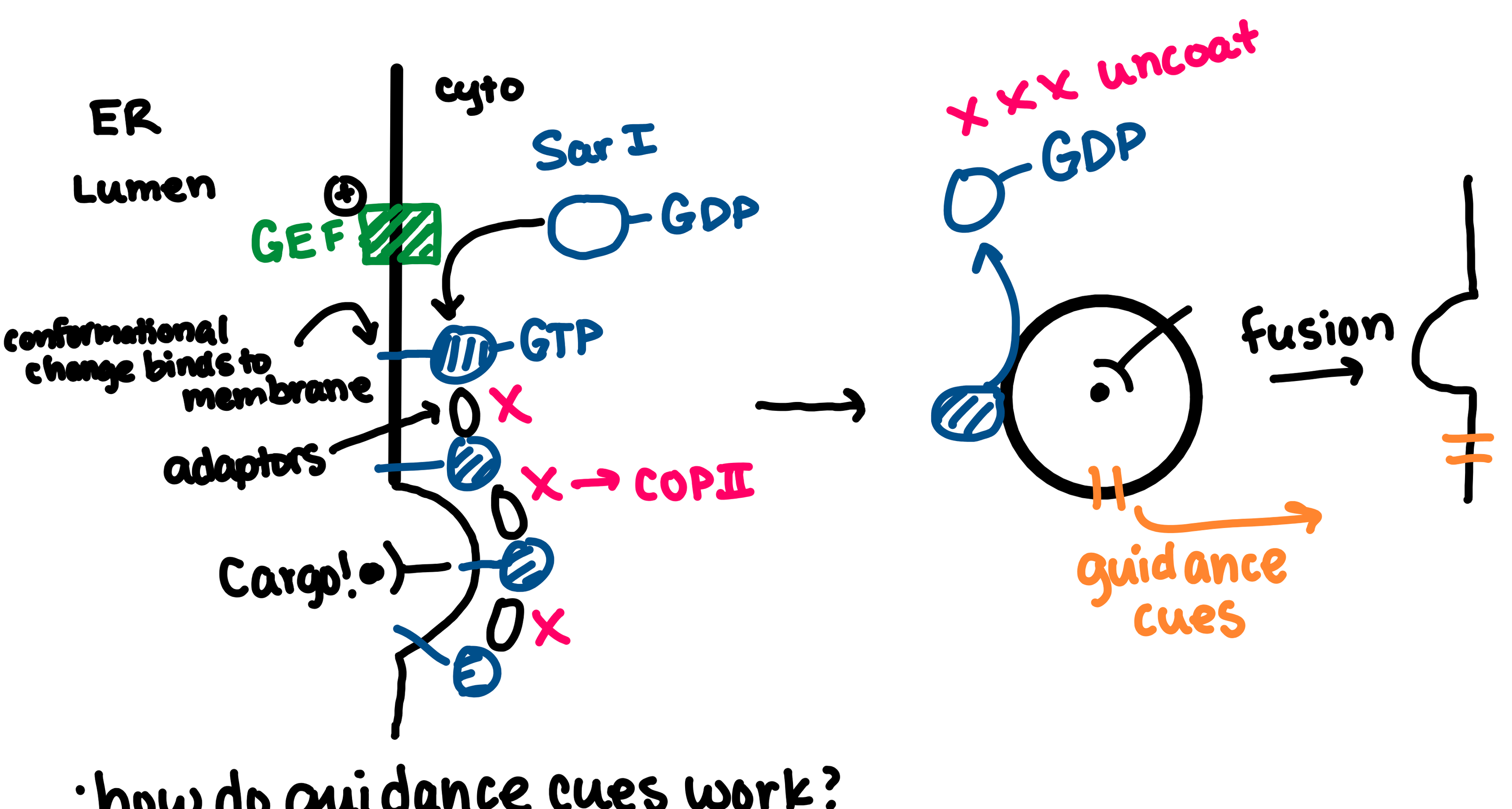
   ER → Golgi : COPII
   Golgi → ER : COPI
   PM : Clathrin
2. Rabs / SNARES
   (>60) (>35)
   - specificity

· Coat Dynamics w/ Gproteins (GTPases)



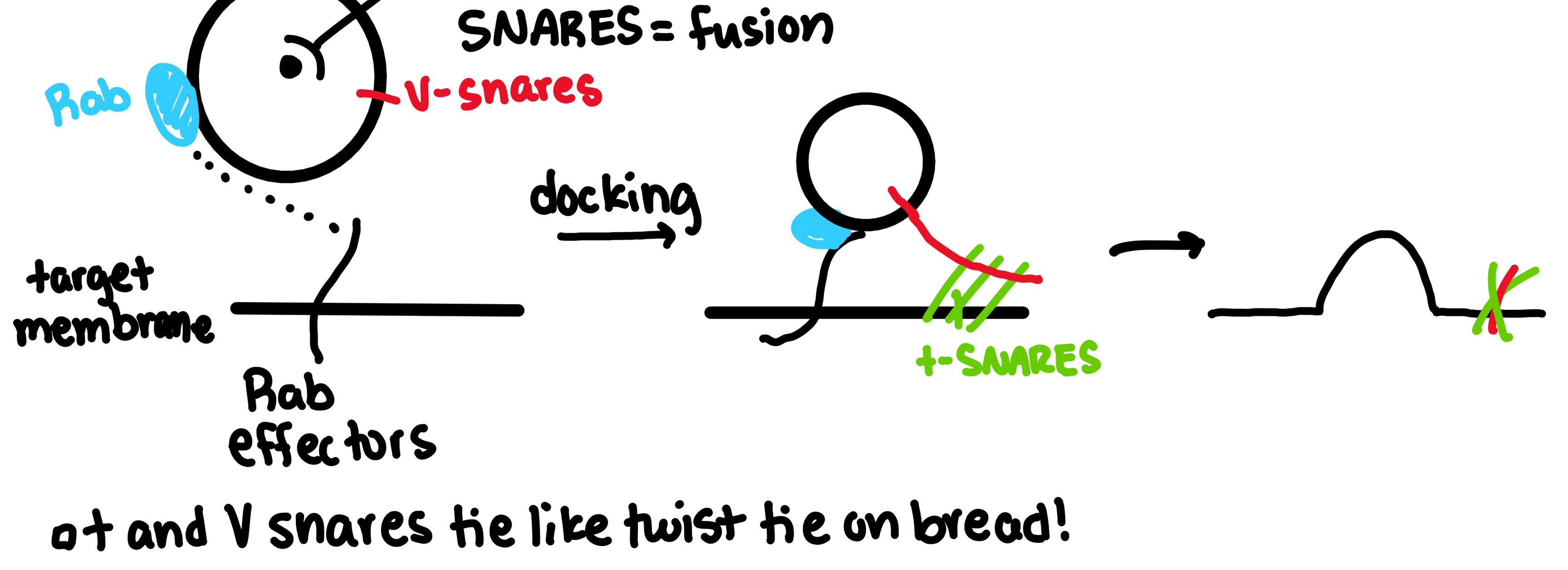
GEF = guanine exchange factor
GAP = GTPase activating protein
↳ not GTPase itself, but activates GTPase activity in Gprotein

G-protein	Coat
Arf	COPI
Sar I	COPII



· how do guidance cues work?
- dock and fuse with Rabs

Rab = subcellular specificity
SNARES = fusion



- t and V snares tie like twist tie on bread!
- all packaged originally with the cargo
- SNARES are very specific!