

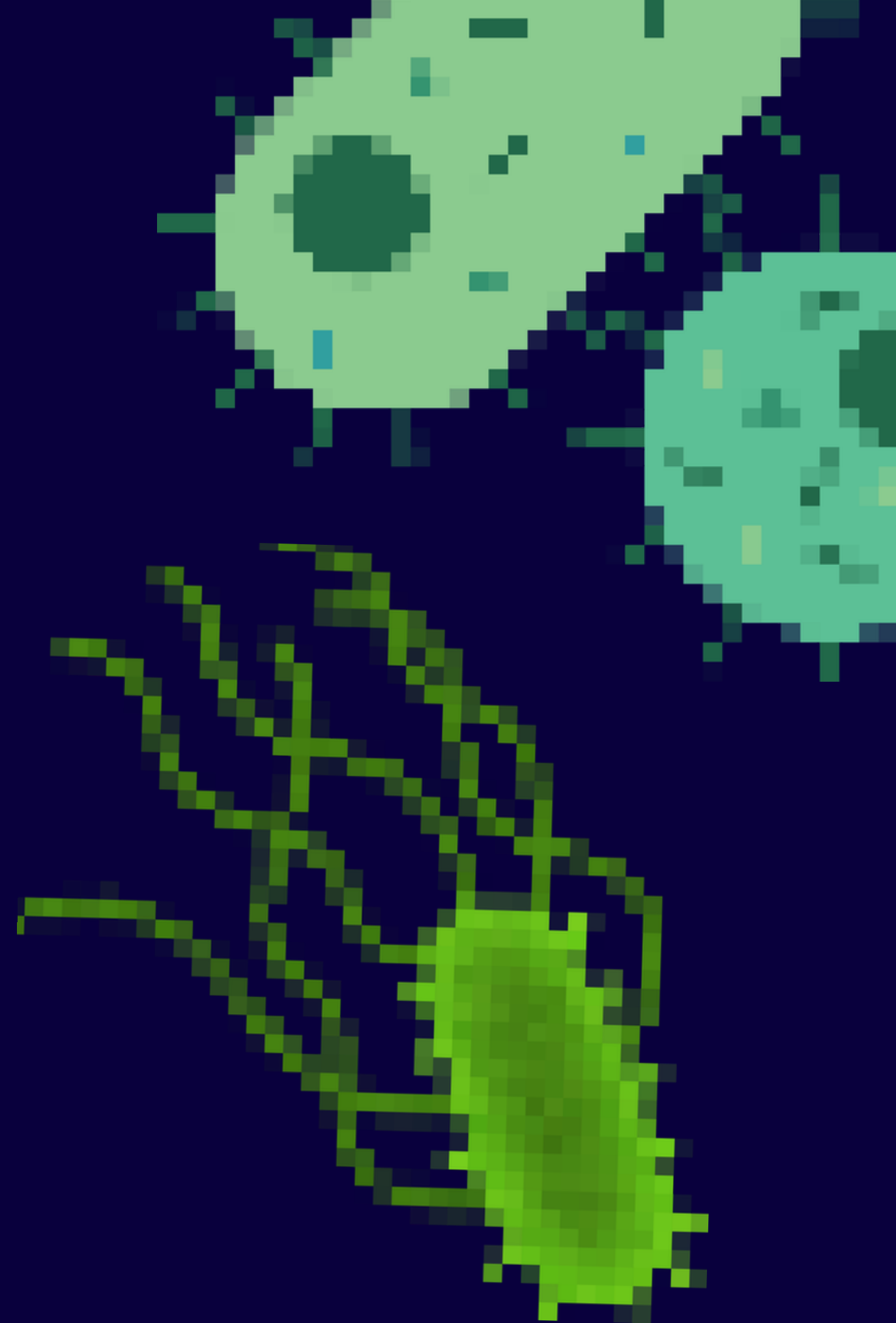


evolution in action

ANTIBACTERIAL RESISTANCE

LET'S PLAY!

Imagine
you're a
deadly
bacteria in
somebody's
body...





GOAL

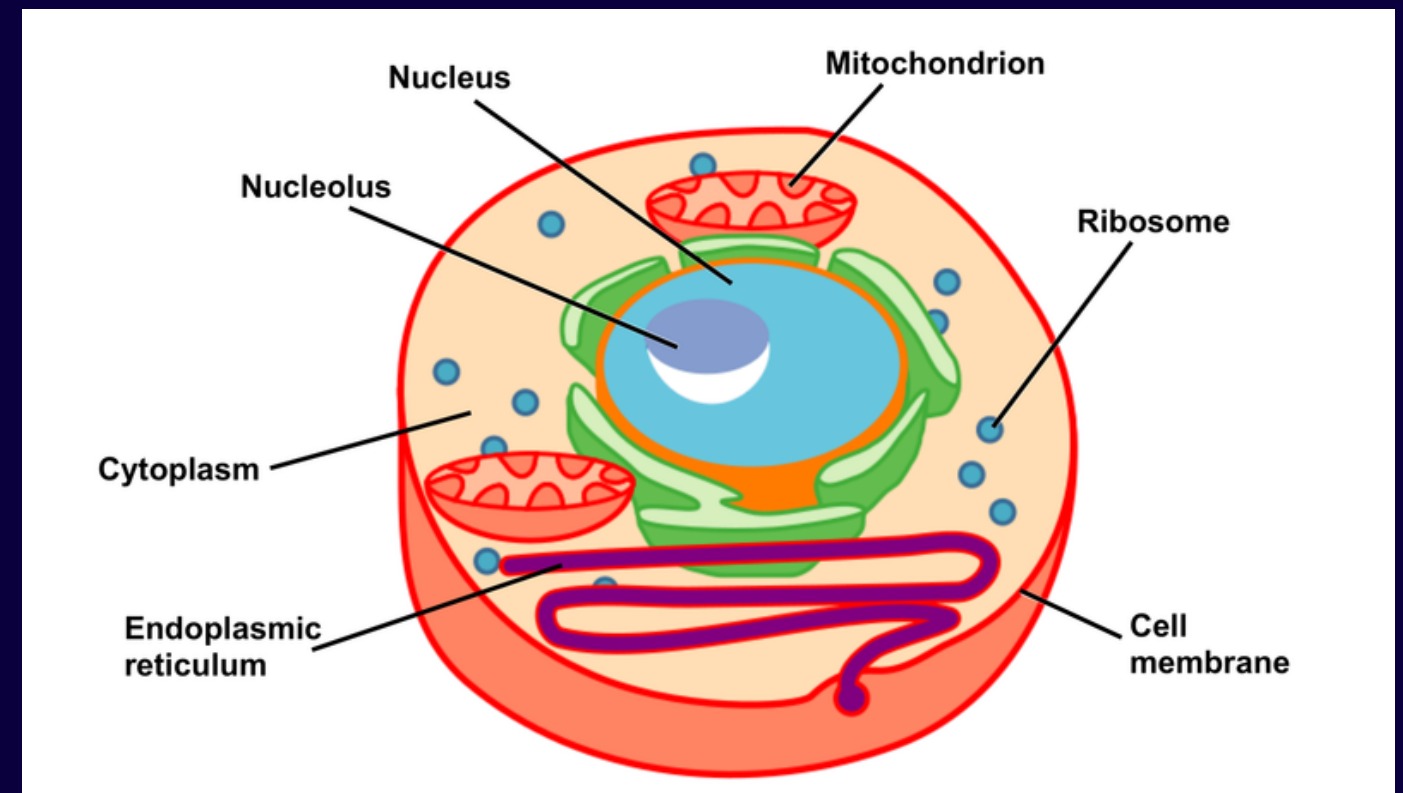
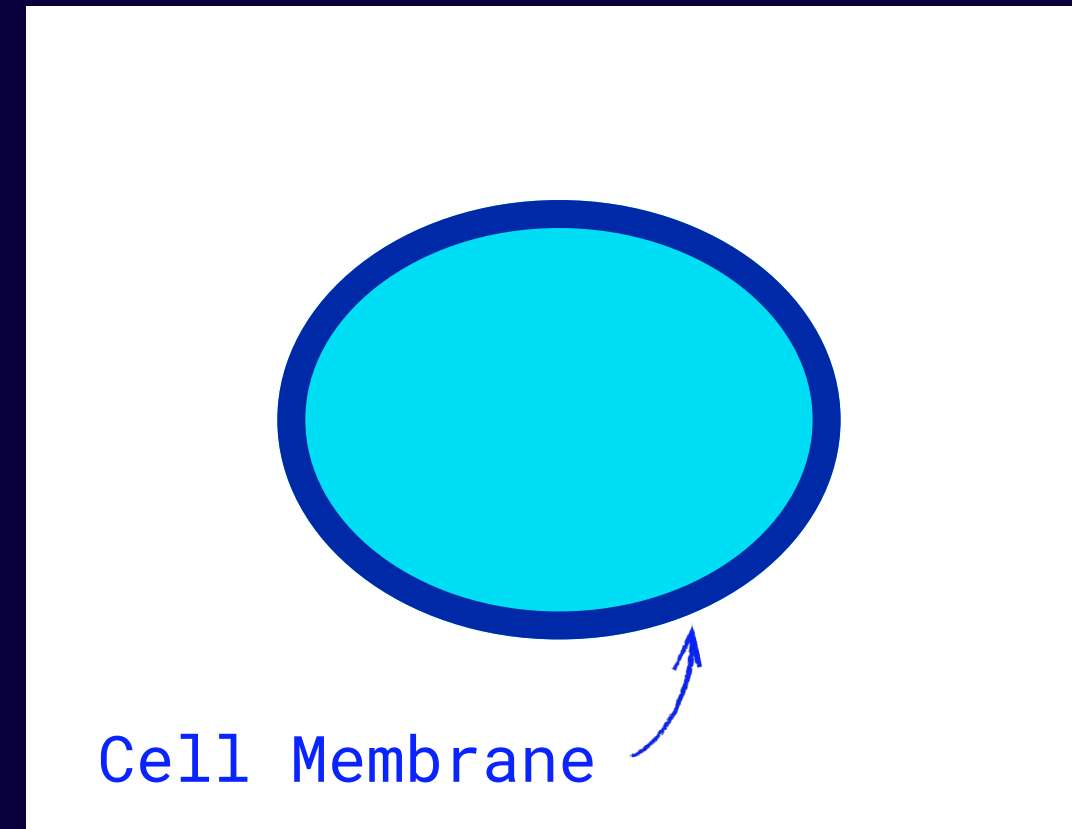
Survive through
all rounds and
gain resistance



Activity



1. Begin with drawing a circle on your piece of paper – this will your cell membrane
2. Start by taking 4 M&Ms to represent your bacterial population
3. Name your bacteria!





Activity



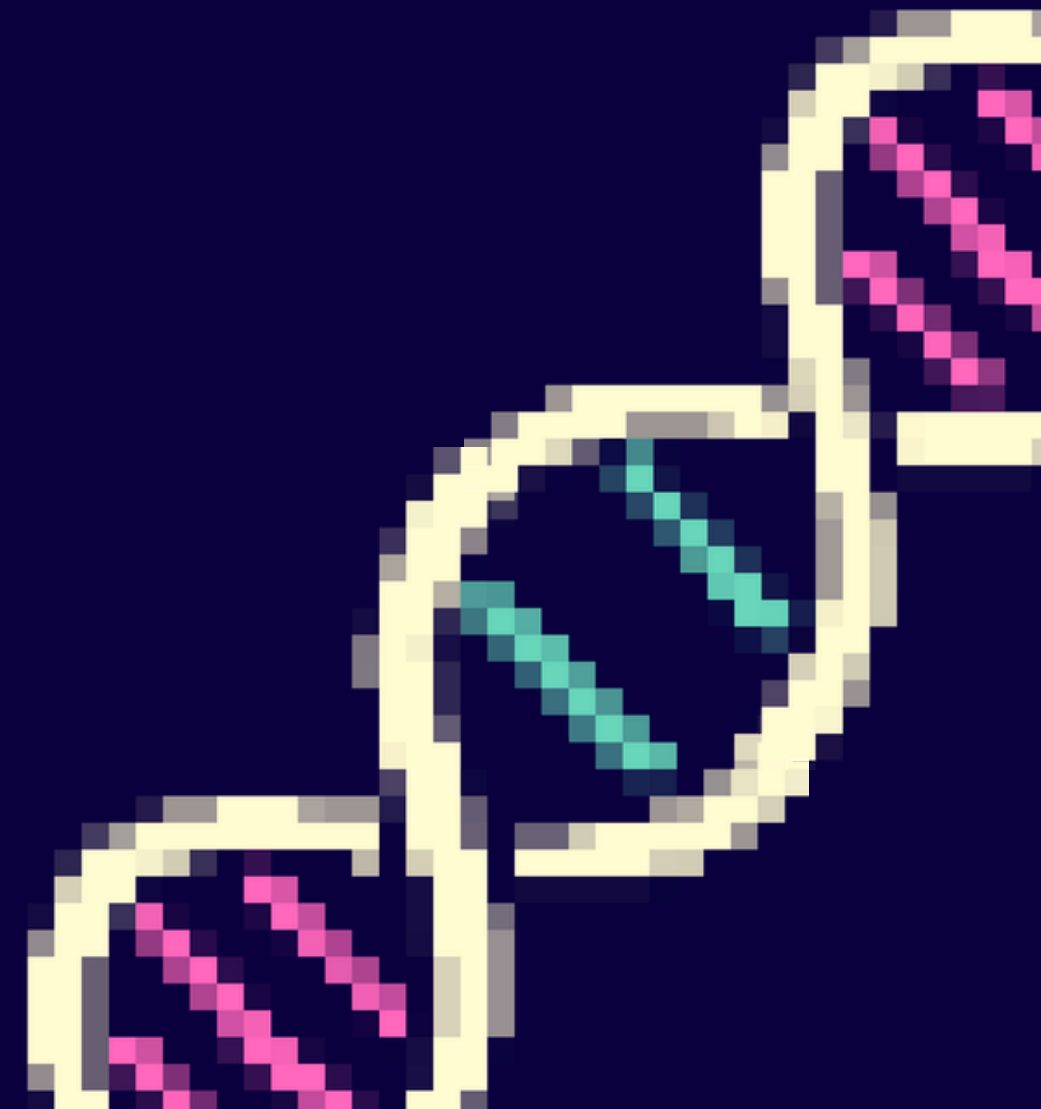
Roll the die twice:

1-3: No mutation

4-5: Mild resistance - draw 1 trait card

6: Full resistance - draw 2 trait cards

Draw the prompts associated with these cards onto each of your bacteria and color them with a different color!

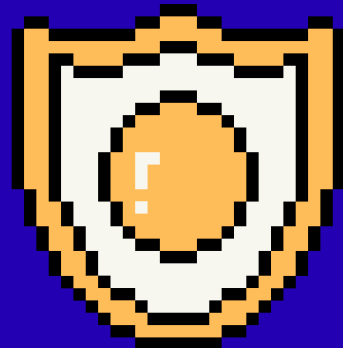


Trait Cards



ARMOR

Strengthens the cell wall to stop antibiotics from entering the cell

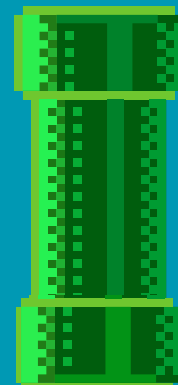


PROMPT

Draw a thick, spiked outline on the cell membrane of your bacteria

PUMP

Pumps in the cell membrane that spit antibiotics out as they come in

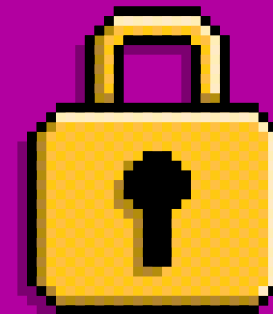


PROMPT

Draw little tubes crossing your cell membrane with arrows pointing out

LOCK

Change the shape of the protein that antibiotic normally attacks



PROMPT

Draw little stars inside of your bacteria

ENZYME

Produce enzymes that seek out and destroy antibiotics before they cause harm



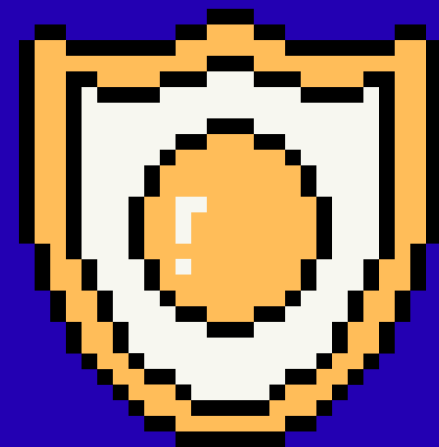
PROMPT

Draw little Pac-Man characters inside your cell

ARMOR

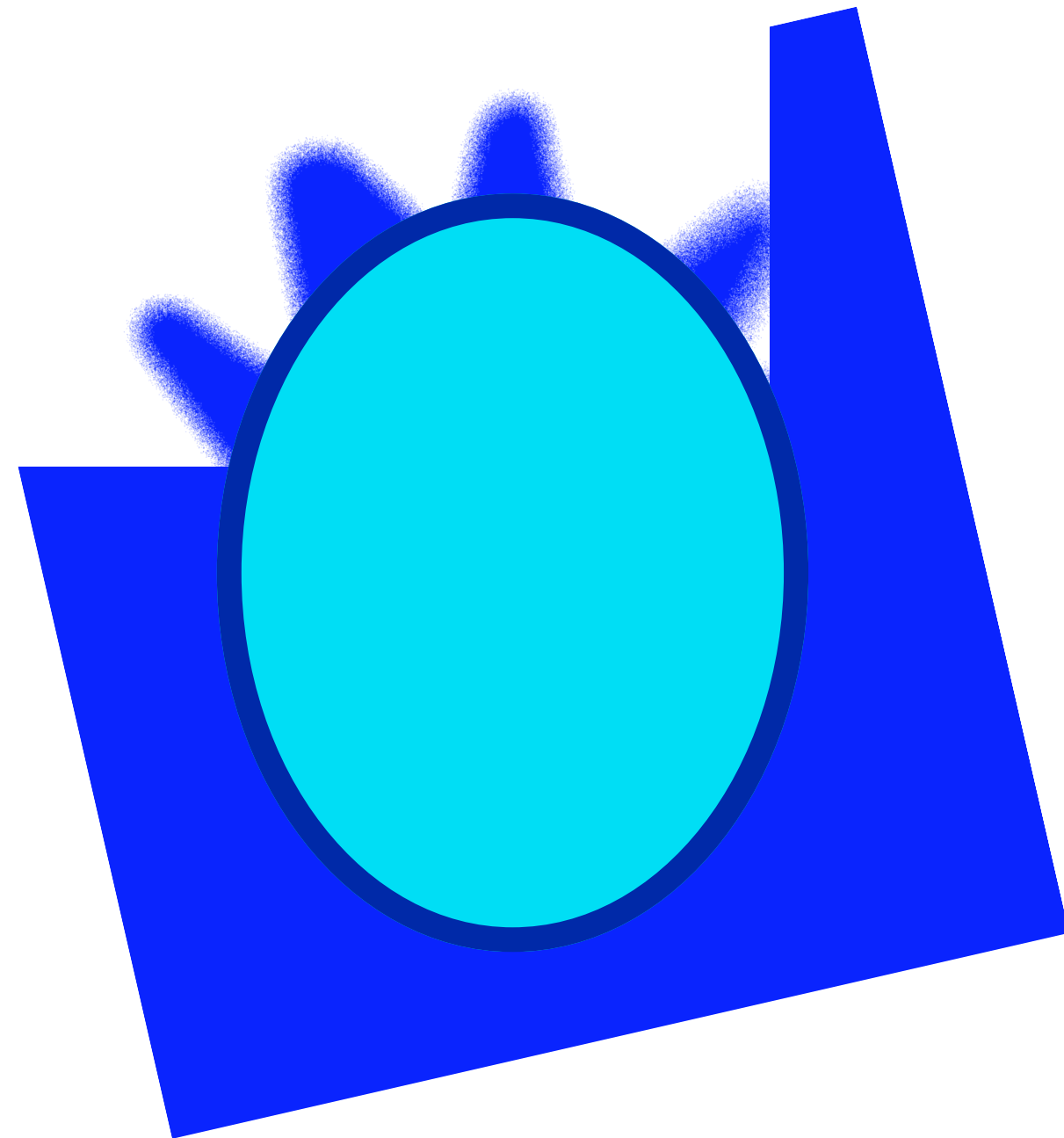
.....

Strengthens the cell
wall to stop antibiotics
from entering the cell



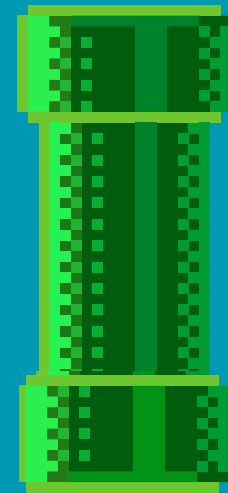
PROMPT

*Draw a thick, spiked
outline on the cell
membrane of your bacteria*



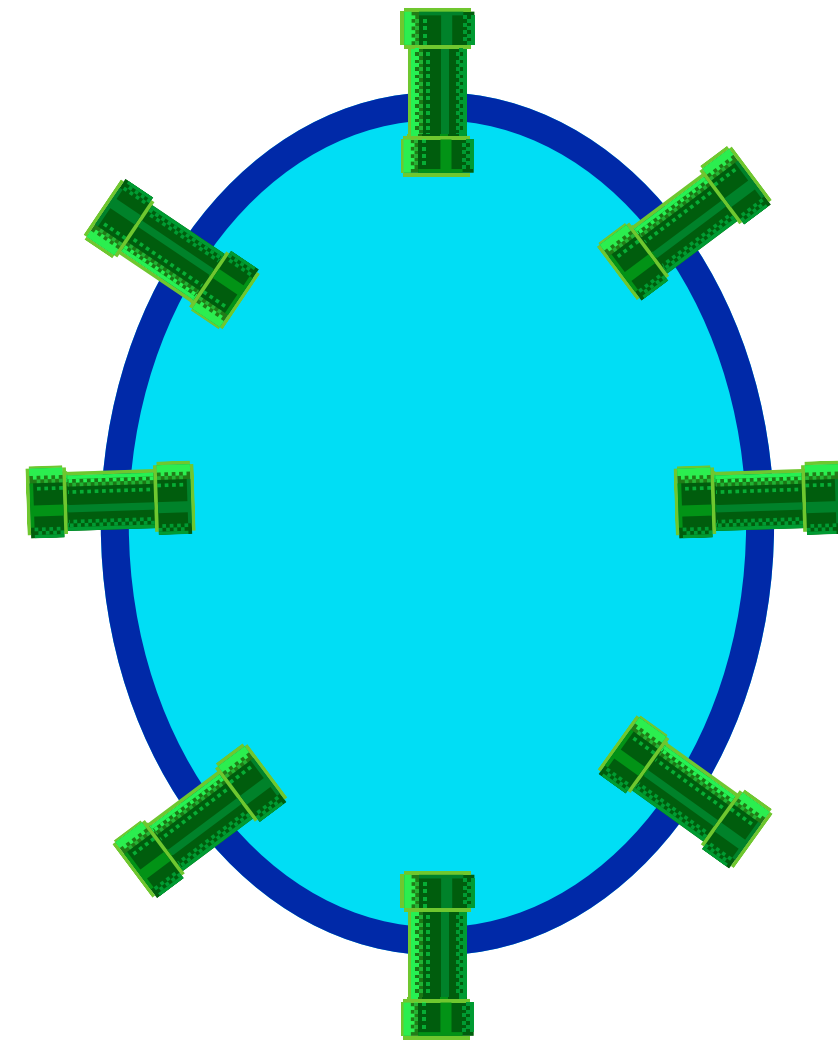
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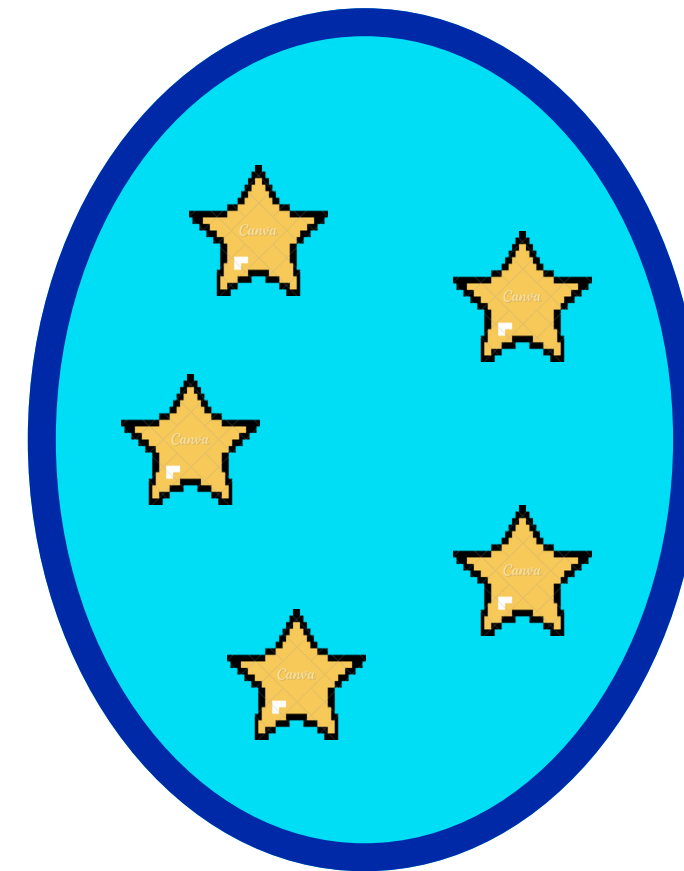


Change the shape of the
protein that antibiotic
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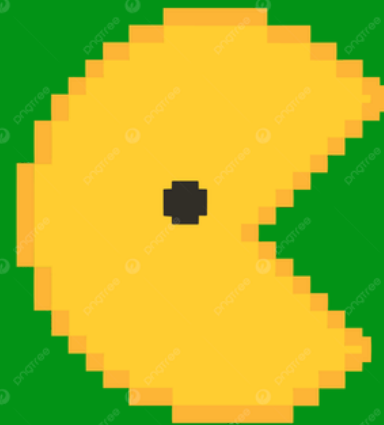
PROMPT

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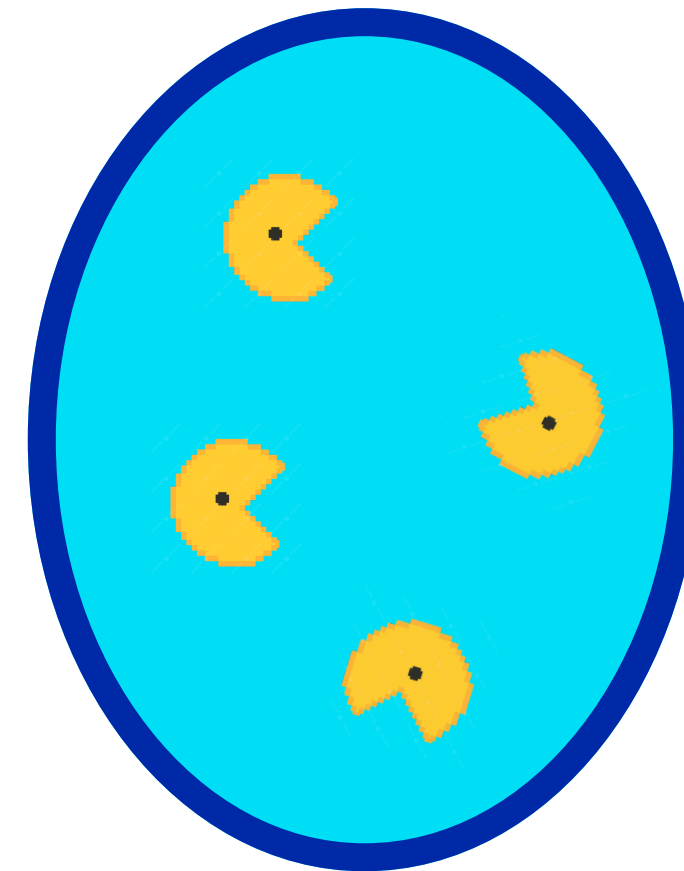
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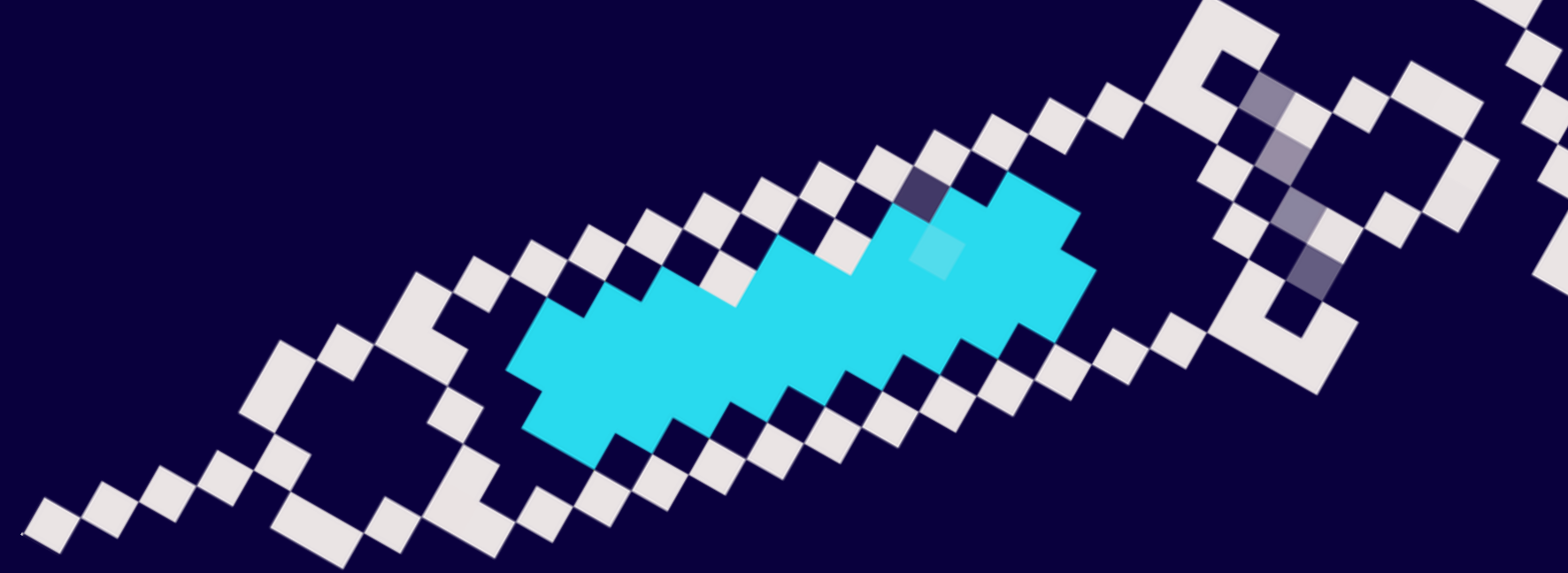
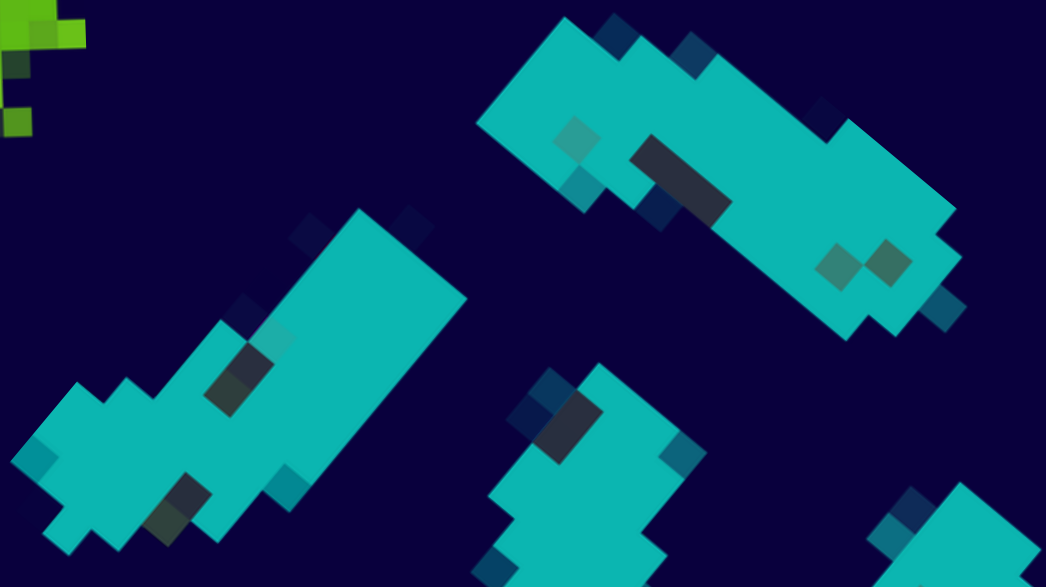
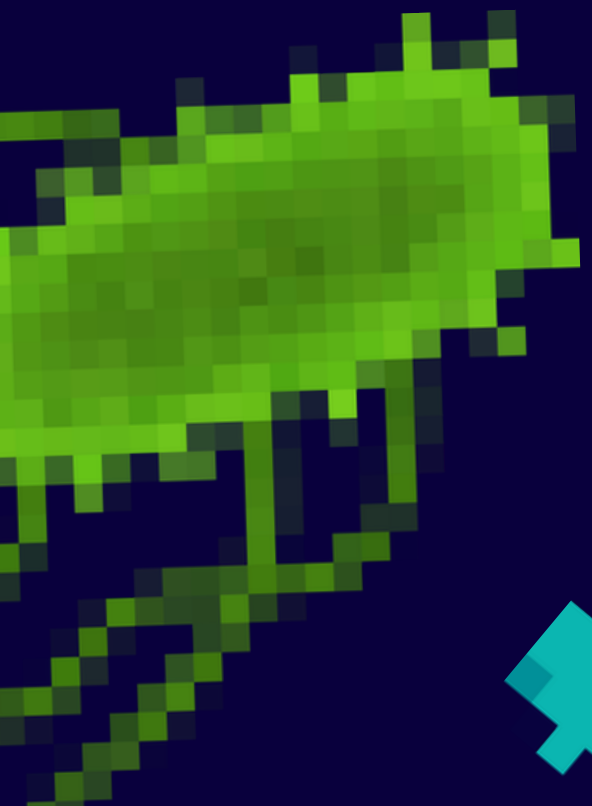
PROMPT

*Draw little Pac-Man characters
inside your cell*





Penicillin Attack!

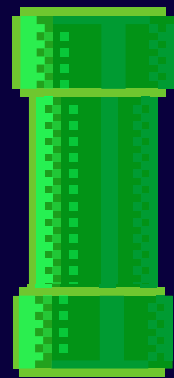




Activity



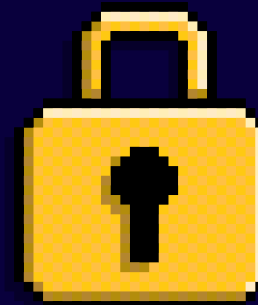
Sum up all resistance points: need 4+ pts for all to survive



Pump:
+1 pts



Armor:
+2 pts



Lock:
+1 pts



Enzyme
+1 pts

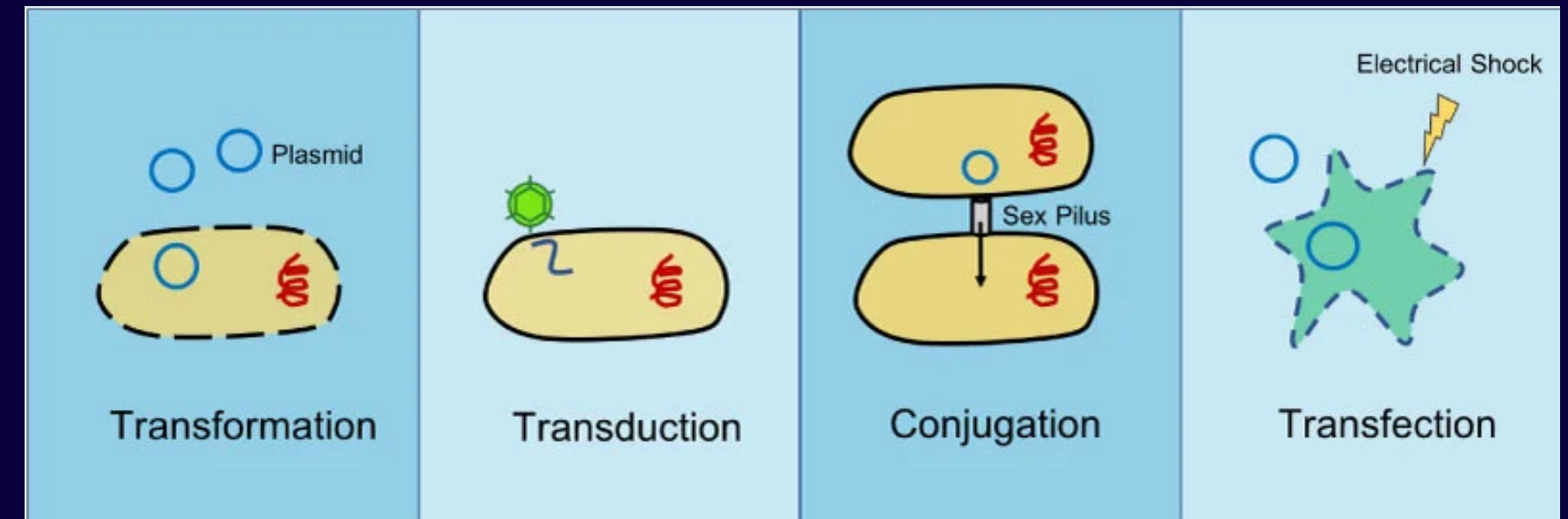
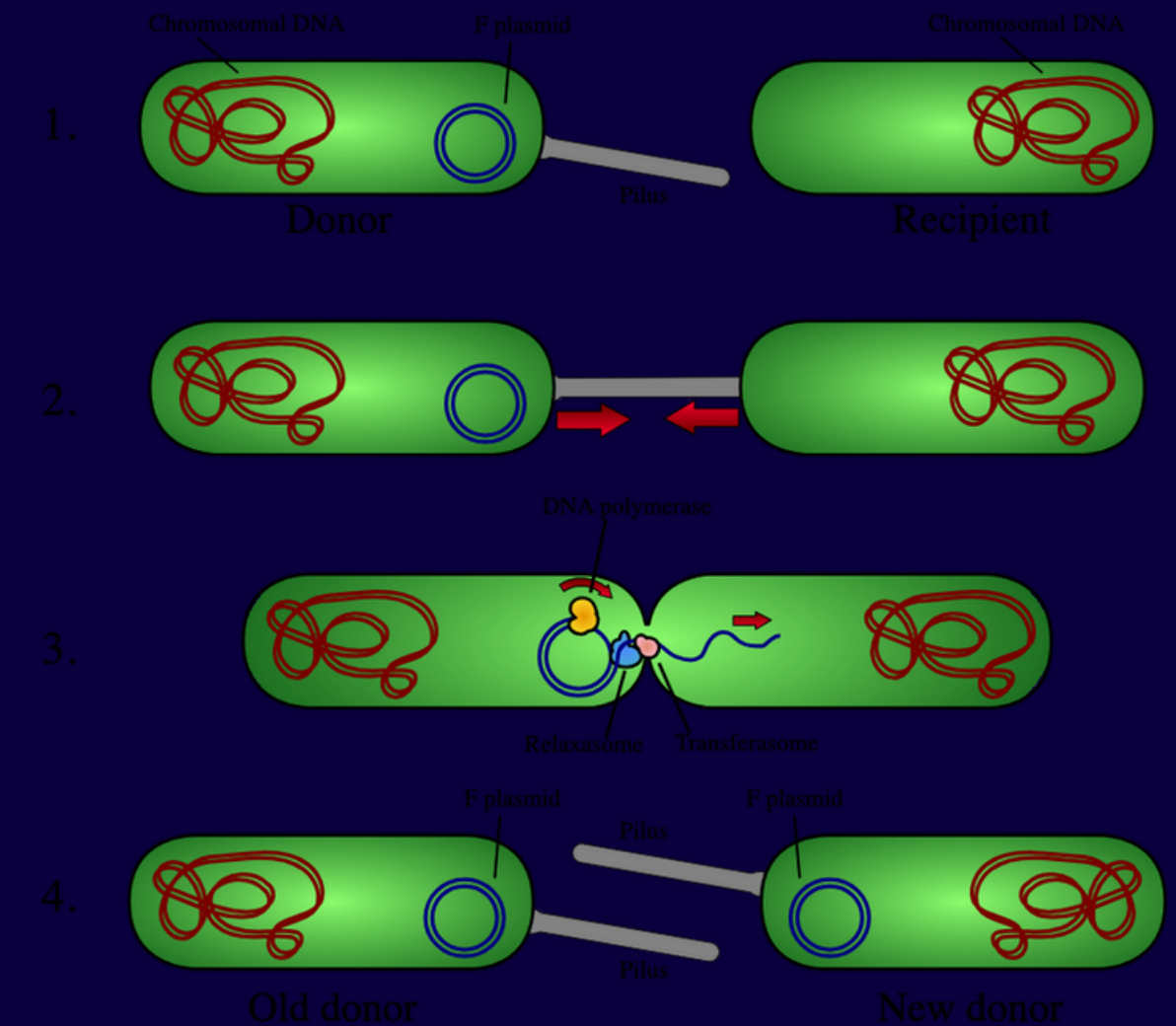


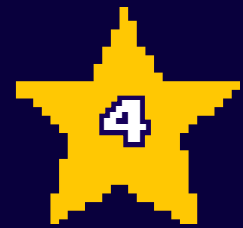
If you have less than 4, remove half your bacteria!

Horizontal Gene Transfer:

sharing genes across bacteria

- **Conjugation:** Bacteria connect through a tube-like structure and pass DNA plasmids (circular DNA) directly
- **Transformation:** Bacteria pick up DNA from dead bacteria in their environment
- **Transduction:** Viruses accidentally transfer DNA between bacteria





Activity



- Finds another person from another table and **blindly** draws one trait card FACEDOWN from the other person.

Reveal the new card and draw that feature onto your bacteria.

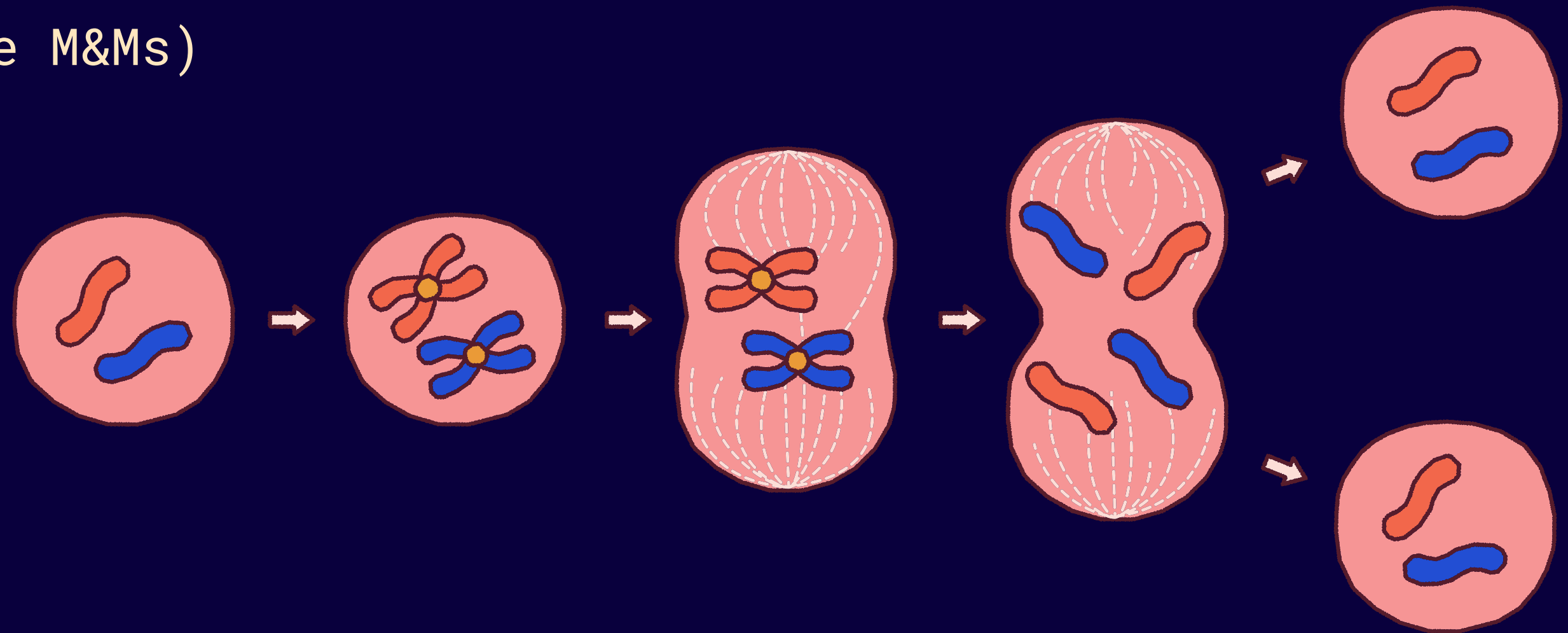




Activity



Double the number of
your current bacteria
(grab more M&Ms)





Activity



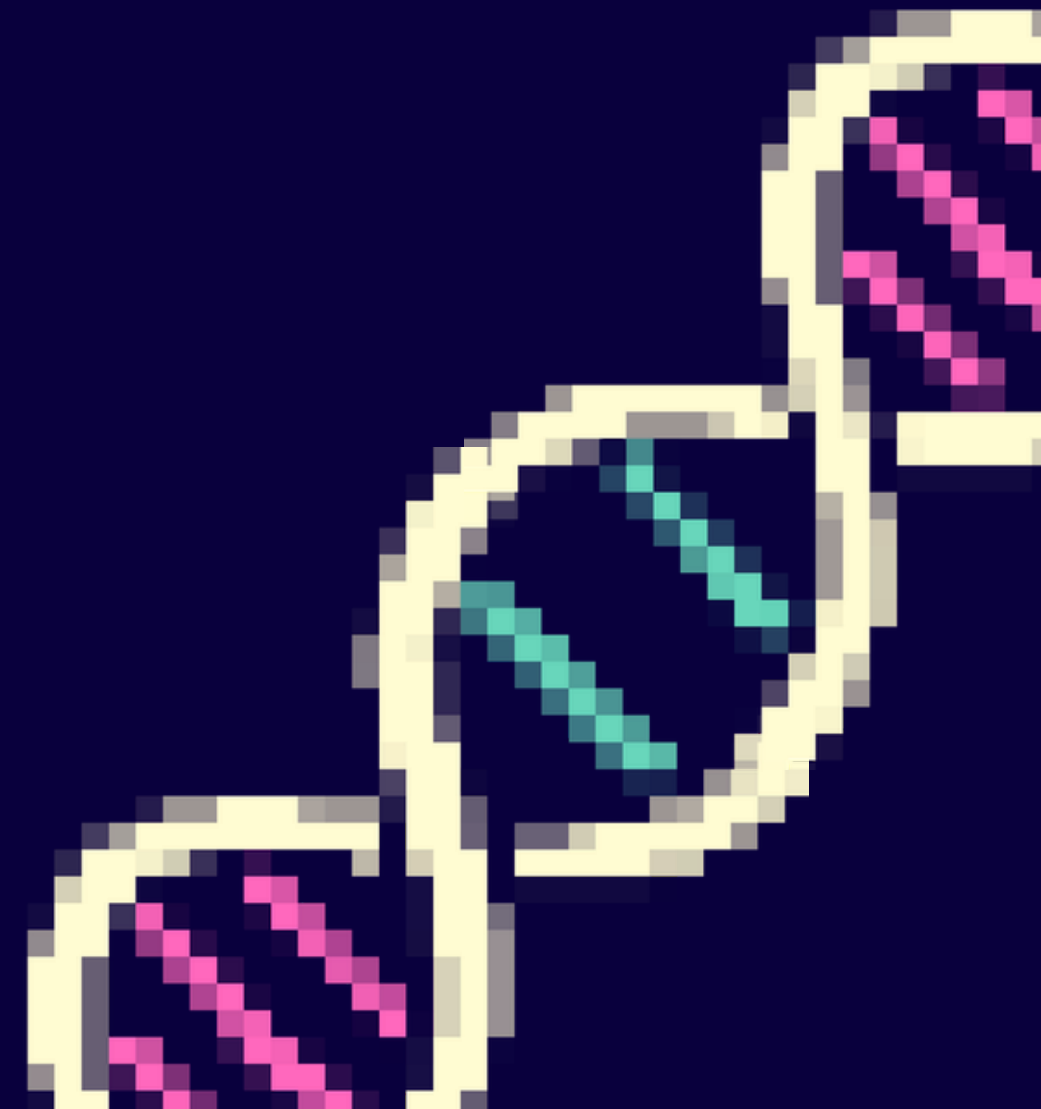
Roll the die twice:

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4-5: Mild resistance - draw 1 defense card

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Draw the prompts associated with these cards onto each of your bacteria.





Carbapenam
Attack!

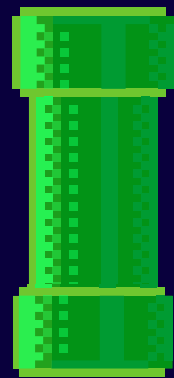




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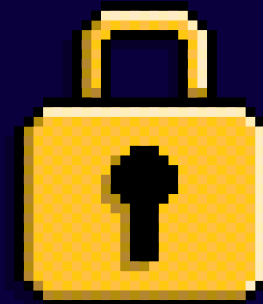
Sum up all resistance points: need 8+ pts for all to survive



Pump:
+1 pts



Armor:
+1 pts



Lock:
+1 pts



Enzyme
+2 pts



If you have less than 8, remove half your bacteria!

When do antibiotics stop working?



- Not finishing prescriptions, stop taking them as you feel better
- Taking antibiotics for viruses
- Sharing antibiotics

Consequences

- Common infections (strep throat, UTIs, skin infections) become harder or impossible to treat
- Longer hospital stays and more expensive treatments
- In severe cases, people can die from infections that used to be easily curable
- **We all need to use antibiotics responsibly!**