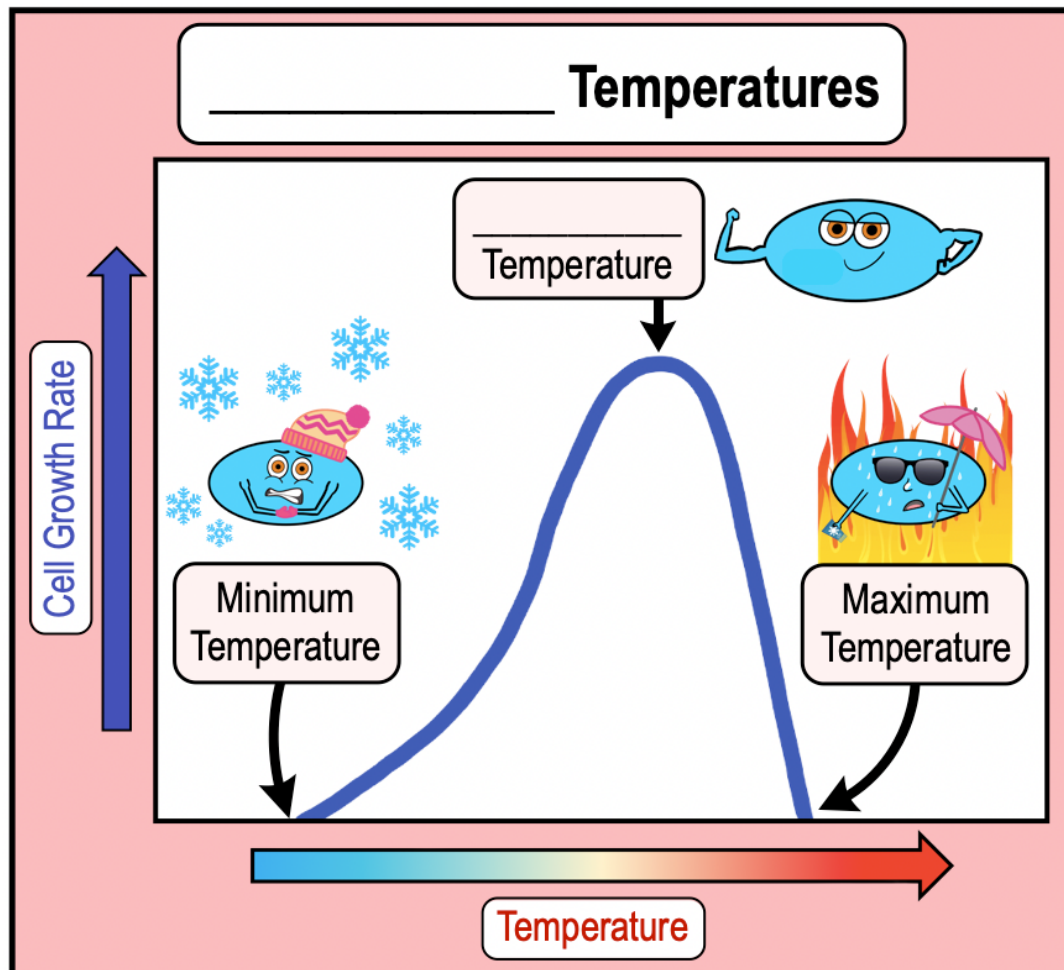


CONCEPT: TEMPERATURE REQUIREMENTS FOR MICROBIAL GROWTH

- Different microbial species have *specific* _____ ranges in which they can grow.
 - Includes *minimum* & *maximum* growth temperatures.
- **Cardinal Temperatures:** characteristic temperature values that define the _____ in which a microbe can grow.
 - _____ Temperature: lowest temperature an organism can grow at (ineffective growth).
 - *Optimal Temperature*: the _____ temperature for an organism where it multiplies *most rapidly*.
 - _____ Temperature: highest temperature an organism can grow at (ineffective growth).



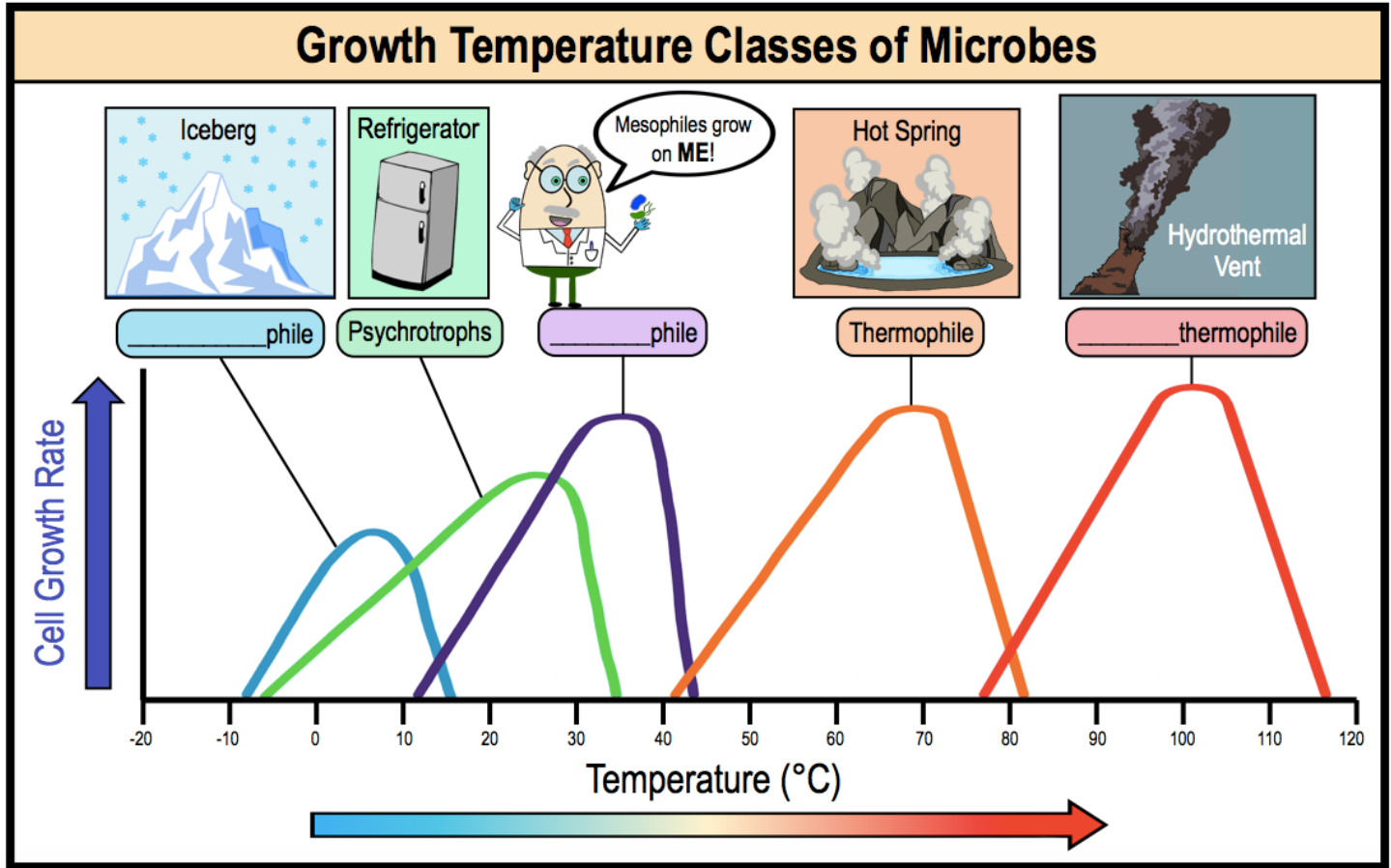
PRACTICE: Which bacterial culture will have the highest growth rate?

- E. coli* bacteria being grown between the temperatures of 37°C & 40°C (optimal temperatures).
- E. coli* bacteria being grown between the temperatures of 15°C & 20°C (minimum temperatures).
- E. coli* bacteria being grown at 45°C (maximum temperature).
- E. coli* bacteria would grow at the same rate at any temperature.

CONCEPT: TEMPERATURE REQUIREMENTS FOR MICROBIAL GROWTH

Classification of Microbes by Growth Temperature

- Microbes are classified into _____ groups based on their *cardinal temperatures*.



PRACTICE: What is the optimum growth temperature of mesophiles?

- a) 0-10 °C. b) 0-20 °C. c) 20-30 °C. d) 50-60 °C.

PRACTICE: A thermophile or a hyperthermophile species would have thermo-stable proteins & enzymes that:

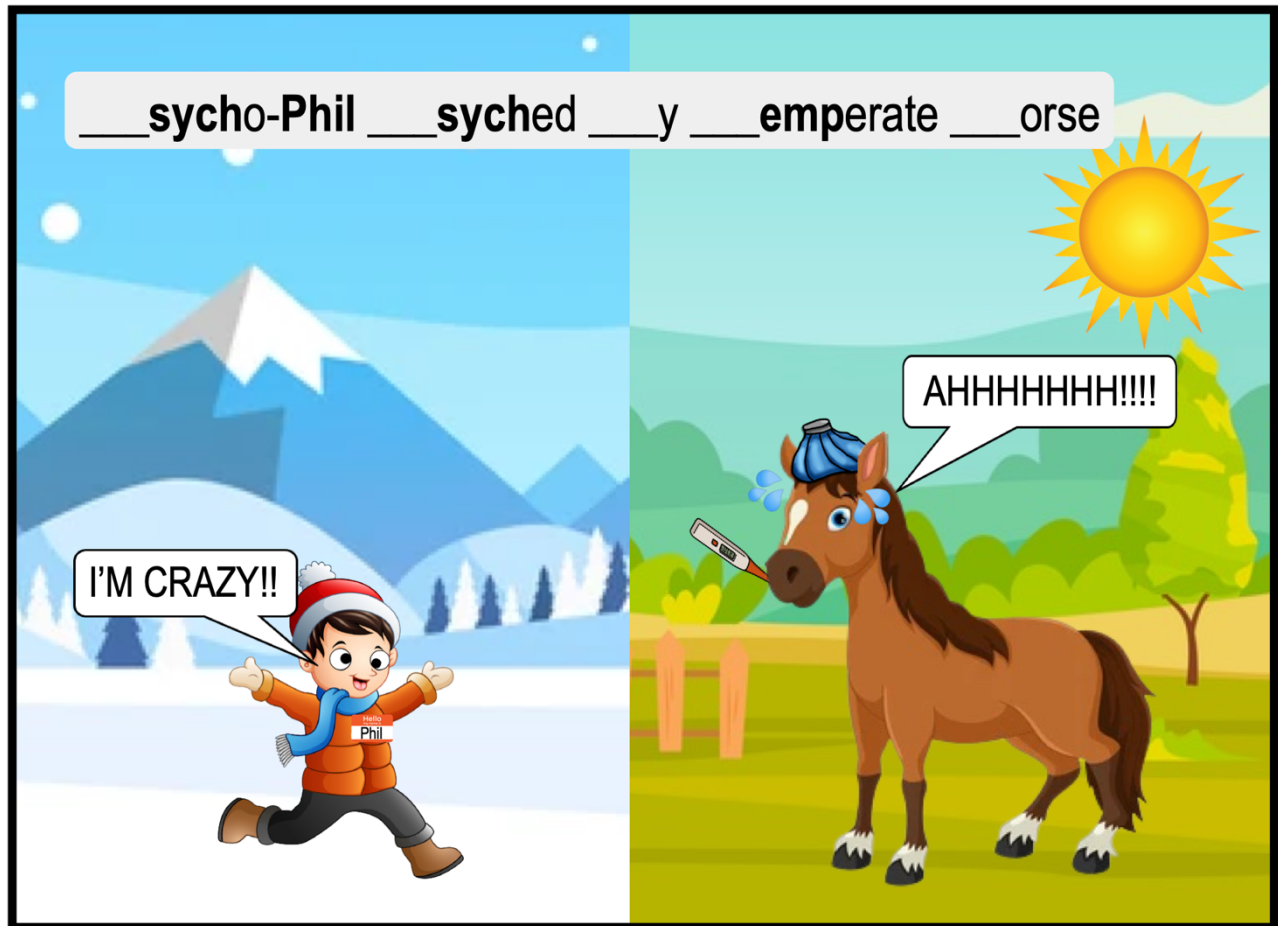
- a) Resist denaturation in extremely high temperatures.
b) Perform more efficiently in cool temperatures.
c) Easily denature in extremely high temperatures.
d) Have a particular amino acid sequence that restricts bond formation.

CONCEPT: TEMPERATURE REQUIREMENTS FOR MICROBIAL GROWTH

How to Memorize the Classification of Microbes by Growth Temperatures

- To remember the order of microbe classes from *lowest* to *highest* growth temperatures, use the following phrase:

(*Psychrophile* > *Psychrotroph* > *Mesophile* > *Thermophile* > *Hyperthermophile*)



PRACTICE: A hot tub that is approx. 40°C would most likely contain which type of microbe?

- a) Psychrophiles. b) Psychotrophs. c) Hyperhermophiles. d) Mesophiles.

PRACTICE: The temperature of a human body is anywhere from 35-40°C. What type of pathogen can infect humans?

- a) Thermophile.
b) Hyperthermophile.
c) Psychrophile.
d) Mesophile.