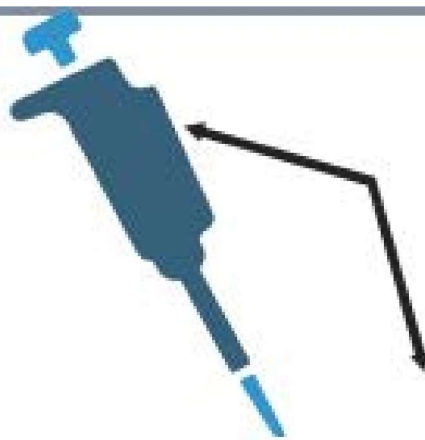


Pipetting at a Glance

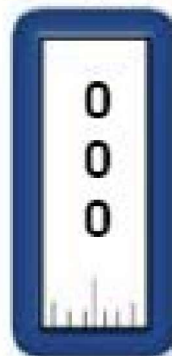


Micropipettes can come in three varieties
The number represents the maximum liquid the pipette can hold

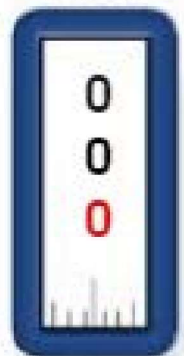
P-1000



P-200



P-20



The **red** number spots indicate a decimal

1000s
100s
10s

100s
10s
1s

10s
1s
0.1s

P-1000

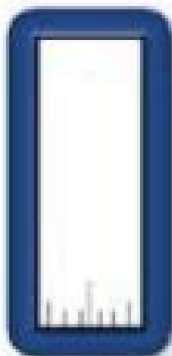


.46ml or 460ul

P-1000



P-20



P-20



P-200



P-200

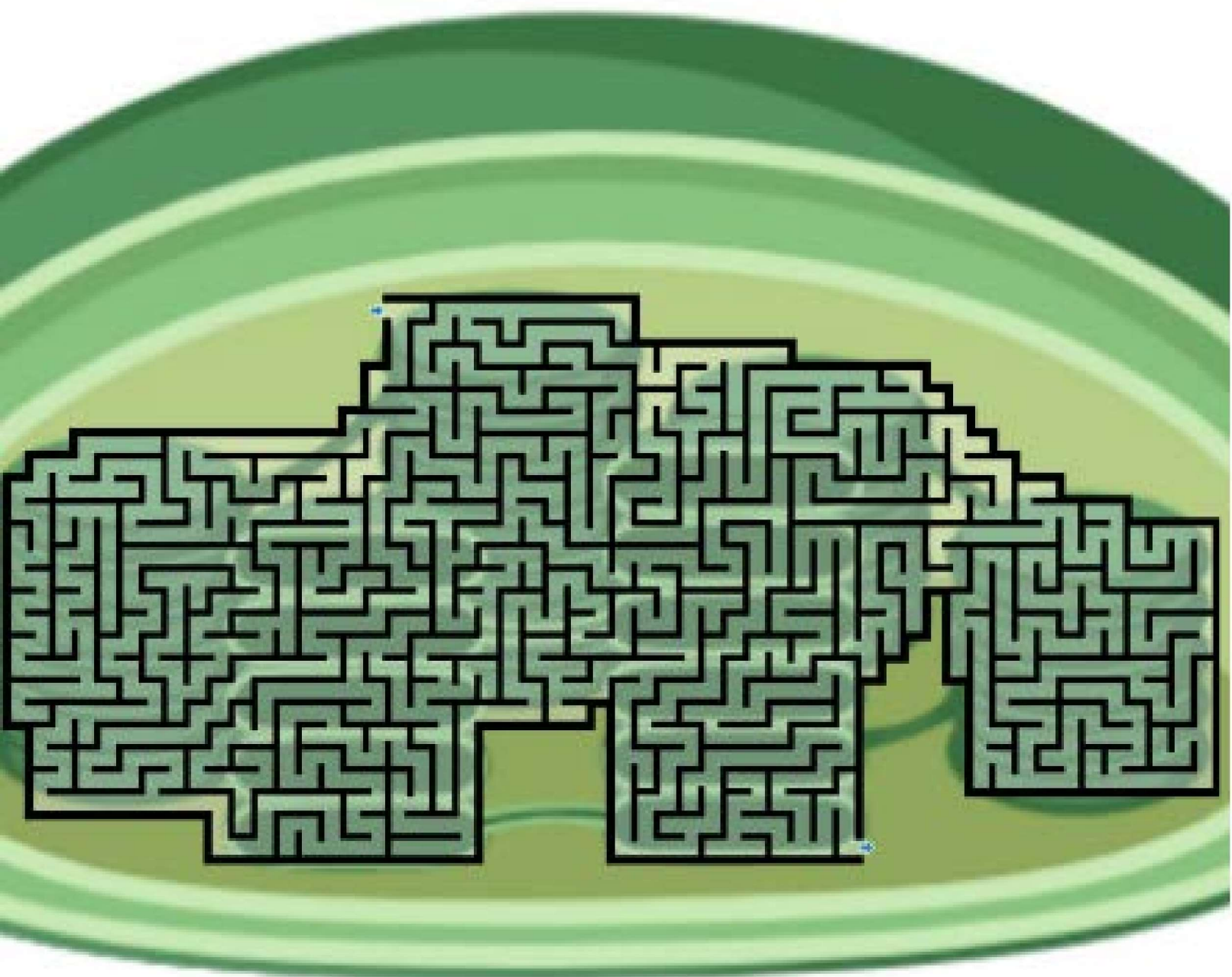


5.4ul

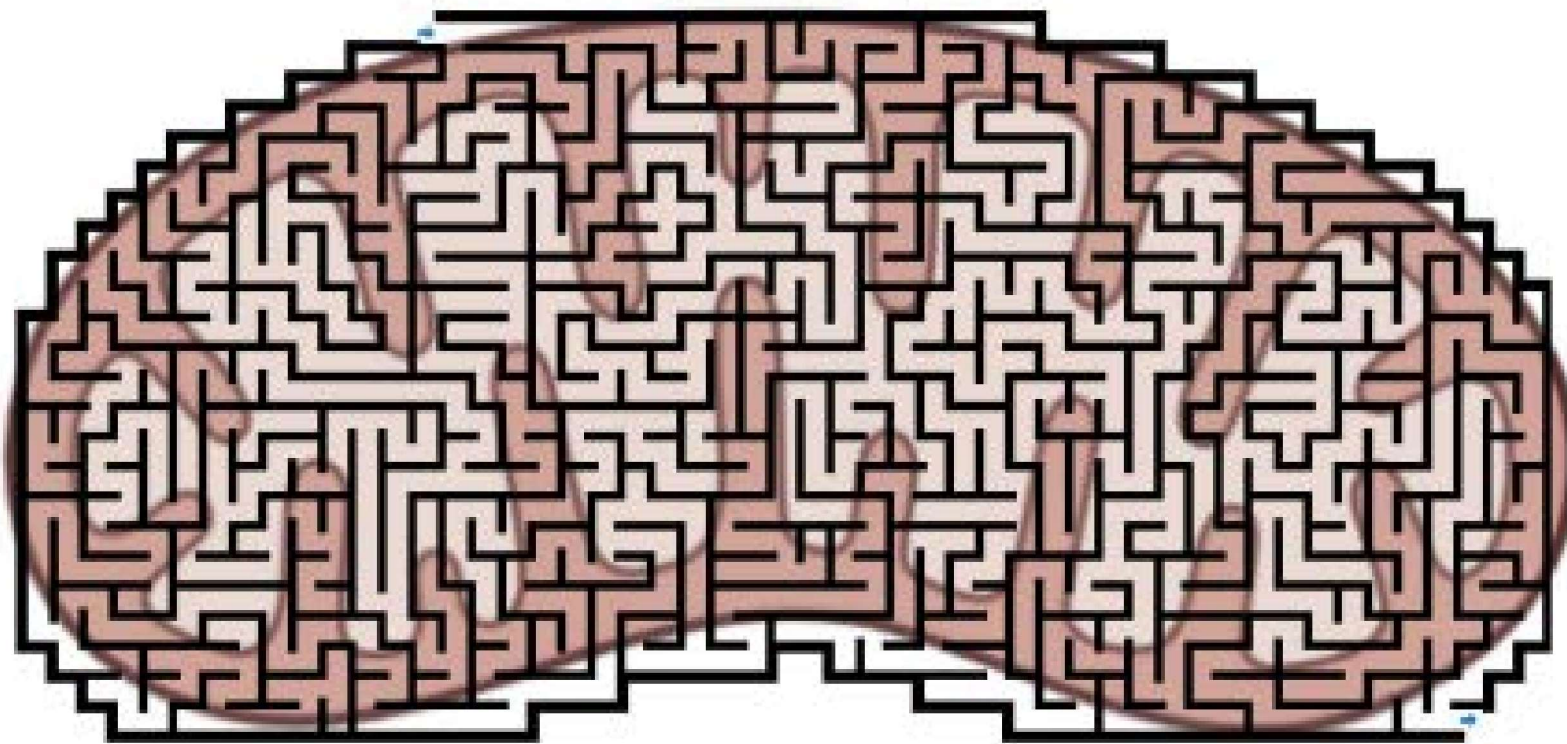
92ul

Fill in either the volume indicator or the blank for the amount given

Thylakoid Maze



Mitochondrial Maze



Immunology Word Search

T I D O P M U P T N Y Q G O H Z U D Z W M E B H V
A S O J Z V D F P K I C M O N O C Y T E V Q B K R
B P I O T S B C H C Q O R B C Y T O T O X I C O G
O L D T Q T G Q A E P B D F M L B D Y G P I D Q M
R J N N E K X H G L B N U S Y F K P W K P U D I O
M I G U E R F P O L D L X F M V W Y Y J B Z E H V
T B I D V U K X C O O C Y T O K I N E D Y B F C O
J C Y N I V T K Y T E O S I N O P H I L C F E O O
A R E B N U W R T I U R I N T E R L E U K I N M O
N F D L C A Y X O F A F J V K R B G P R B A S P S
T G E I L E T E S P E B A S O P H I L L R N I L U
I T N M B M L E I Q H U O J V L Q U L M K T N E M
G G D M L E R L S A N I F B J D E N S A P I P M L
E V R U L M X X S C K T L U O U K U S C X B J E D
N W I N C O R N P X G L P V K H U U K R U O U N D
X M T I E R G R E S P O N S E S U P P O H D T T A
A Z I T O Y U A D A P T I V E Z C W M P C Y S H O
V P C Y N Q T Z G C Q J X E P L X Q W H W Y R H S
S V C L E P L A S M A C E L L E O G B A G W T G P
B T E A C N J C E L R O I L R G L F H G X F E E N
H N L O I L R W C J B L B I N X R P M E L P B Y F
L T L Y M P H N O D E Y L H O Y D F N F Z R F J Y
C V K N G Z V M G R B Y C W E F T B Y N Z C O T P
Z U Z L V I M M U N O G L O B I N H S I K X X G J
N K V R P D V I N E P E O W N N P N S Y E T X P L

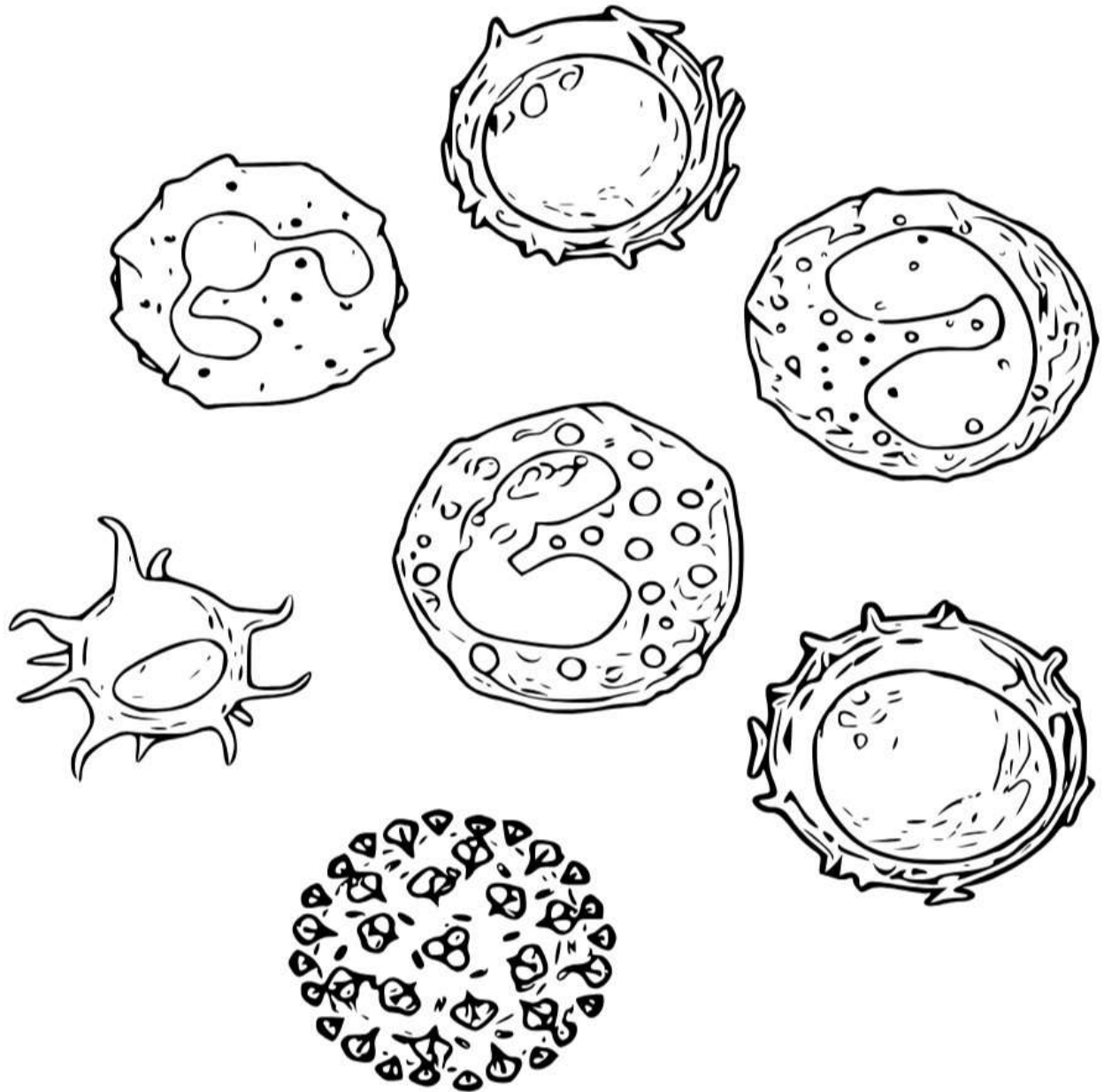
Dendritic Cell	Phagocytosis	Immunoglobulin
Interleukin	Neutrophil	Eosinophil
Macrophage	Plasma Cell	Leukocyte
Cytotoxic	Lymph Node	Immunity
Adaptive	Complement	Basophil
Cytokine	Antigen	Monocyte
Response	Innate	B Cell
T Cell	Antibody	Defensin
Memory	NK Cell	

Microbiology Field Search

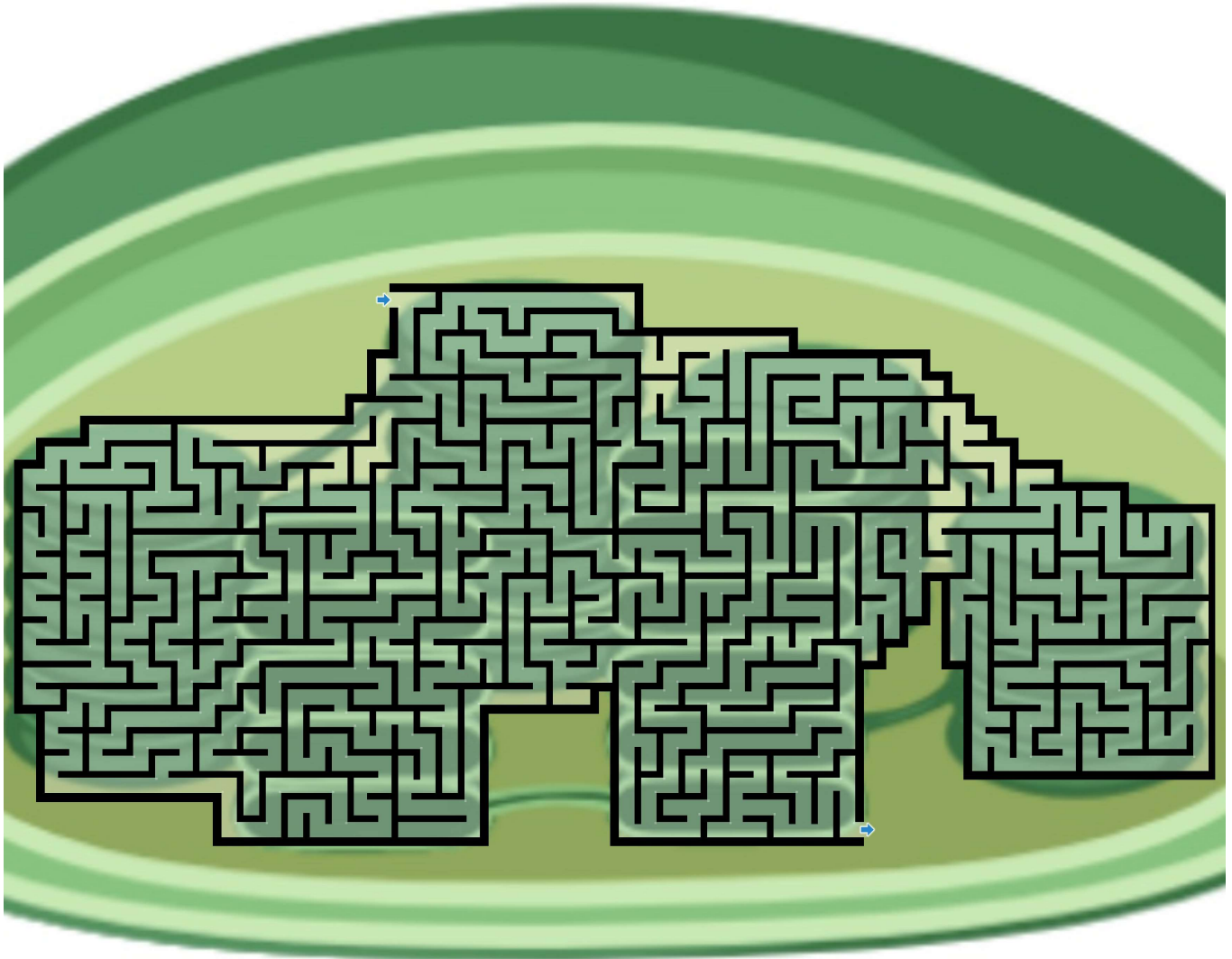
N T P T G H L Q L A T B N X K A H M M E
I Z W I D G R F P N X S O S Z B T D J P
C R A N T I M I C R O B I A L G B L J P
E B B Y W A A B A C L P B Z V Y H V B G
L P I M I C R O B I A L G E N E T I C S
L A X A F D H O N O Y Y Y C T Z Z R M H
U R Q B E Q N I L P E O D E A O E O E L
L A M Y I M M U N O L O G Y R T N L D K
A S T I N E M A T O L O G Y C F V O I A
R I A V C H Y S J W Q M B B H F V G C U
N T X Q D R T D V B C L Y B A O J Y A P
G O O N A A O V Y J M G H Z E O M U L H
M L N H W H E B D O A K E W A D O F A Y
Y O O L S Z M I I S R Z L V E M W U A C
C G M P R O T O Z O O L O G Y I H N O O
O Y Y H Y P R H B V L Y C V I C Y G W L
L H V B F O K M D G V O B I M R M I T O
O R R C R Z C L V K I J G B O O Y B E G
G T R R E V P F Y U W E Z Y Z L O M I Y
Y S R R U Z C U G L F L N Z B B X E D Q

Microbial genetics	Antimicrobial	Parasitology
Protozoology	Immunology	Microbiology
Phycology	Virology	Food micro
Mycology	Nematology	Cellular
Taxonomy	Medical	Archaea
Fungi		

Immune Cells Coloring



Thylakoid Maze



Bacteria/Archaea Word Search

N O D V W R C K C Z H L B A C I L L I E W H U B N
 Z G I C A U T O T R O P H I C B A L Q A E R O B E
 L R N U T T A N T I B I O T I C O F K P N B L U R
 X A S L Q Z R U M B L C B V A P N U N O T G T S W
 C M K T A T B A T B B O Z B I O F I L M W Z S J A
 U N U U N J Z I N B B A R D C O C C U S G V O V H
 R E Y R A E P Y D S G R A M P O S I T I V E Q V T
 F G K E E B I L Q E F Q J K A K D F F E B S R C M
 N A C O R G Y Y A F K O K F I L A M E N T O U S F
 L T I M O L X W R S H H R K K N Q I Q A E O V Z L
 L I L O B T H Y M X M Y I M U G C I X C M Q P E A
 Z V I T E L I H S P U I E A A E Q U U C D Y N R G
 L E A I D P D E L C G V D R C T A G B H C W F E E
 V T A L J Z B W C K Y U W F J M I A U A K V T K L
 N D W E B A C T E R I O P H A G E O O U T B S J L
 Q P A A F L Q V S N V X G A U X O I N W S I N A A
 N I S T A P H Y L O C C O C C U S W V B M T V O O I
 Z H O R I Z O N T A L G E N E T R A N S F E R N G
 X T C M F H W F S P O R E A D D E O X L S D I C E
 C O N J U G A T I O N E X H Q T G M E H P T H J N
 G X O S M W V O V G S C E L W S U P E R B U G E E
 W I H W B X D J M Y I L S T R E P T O C O C C U S
 O N H E T E R O T R O P H I C M K H Q D T Q P Z A
 W S K U V I H Y Z P B G M C S A T W V O G G F Z D
 U A Z K K J B M Q V T R A N S D U C T I O N M U P

Horizontal Gene Transfer

Transformation Cilia

Staphylococcus

Bacteriophage

Heterotrophic

Streptococcus

Gram-positive

Gram-negative

Autotrophic

Filamentous

Transduction

Conjugation

Incubation

Anaerobe

Superbug

Flagella

Plasmid

Coccus

Bacilli

Aerobe

Biofilm

Antibiotic

Spore

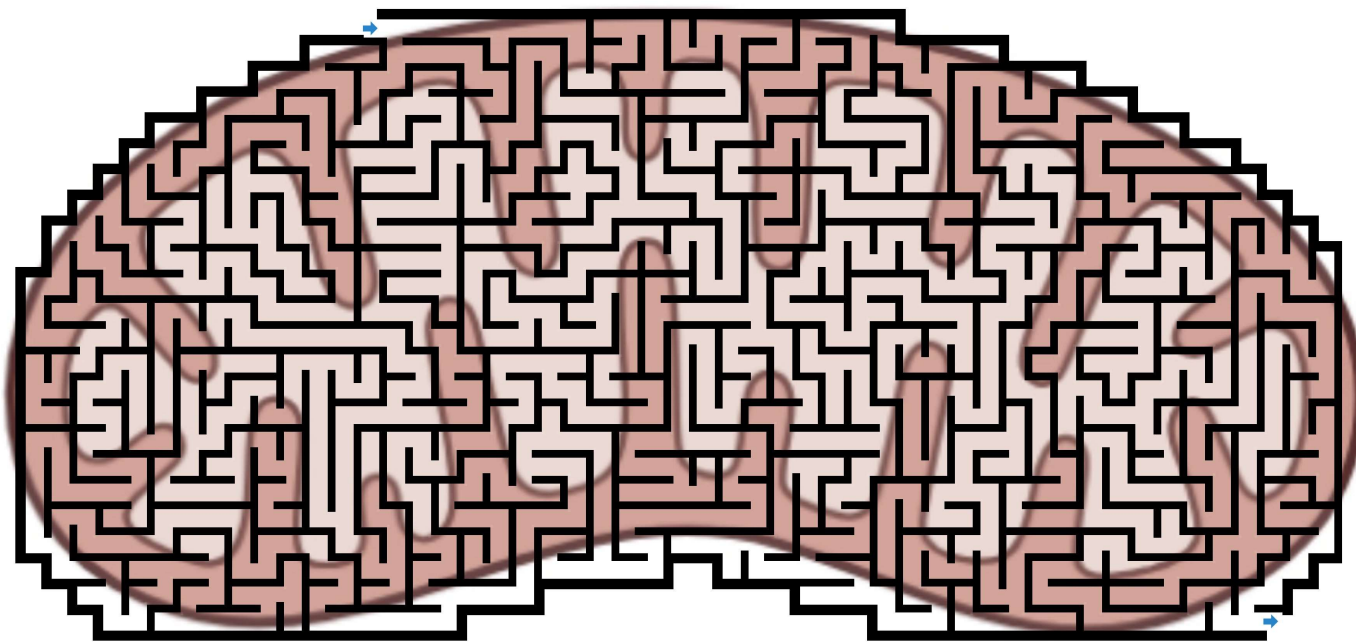
Culture

Motile

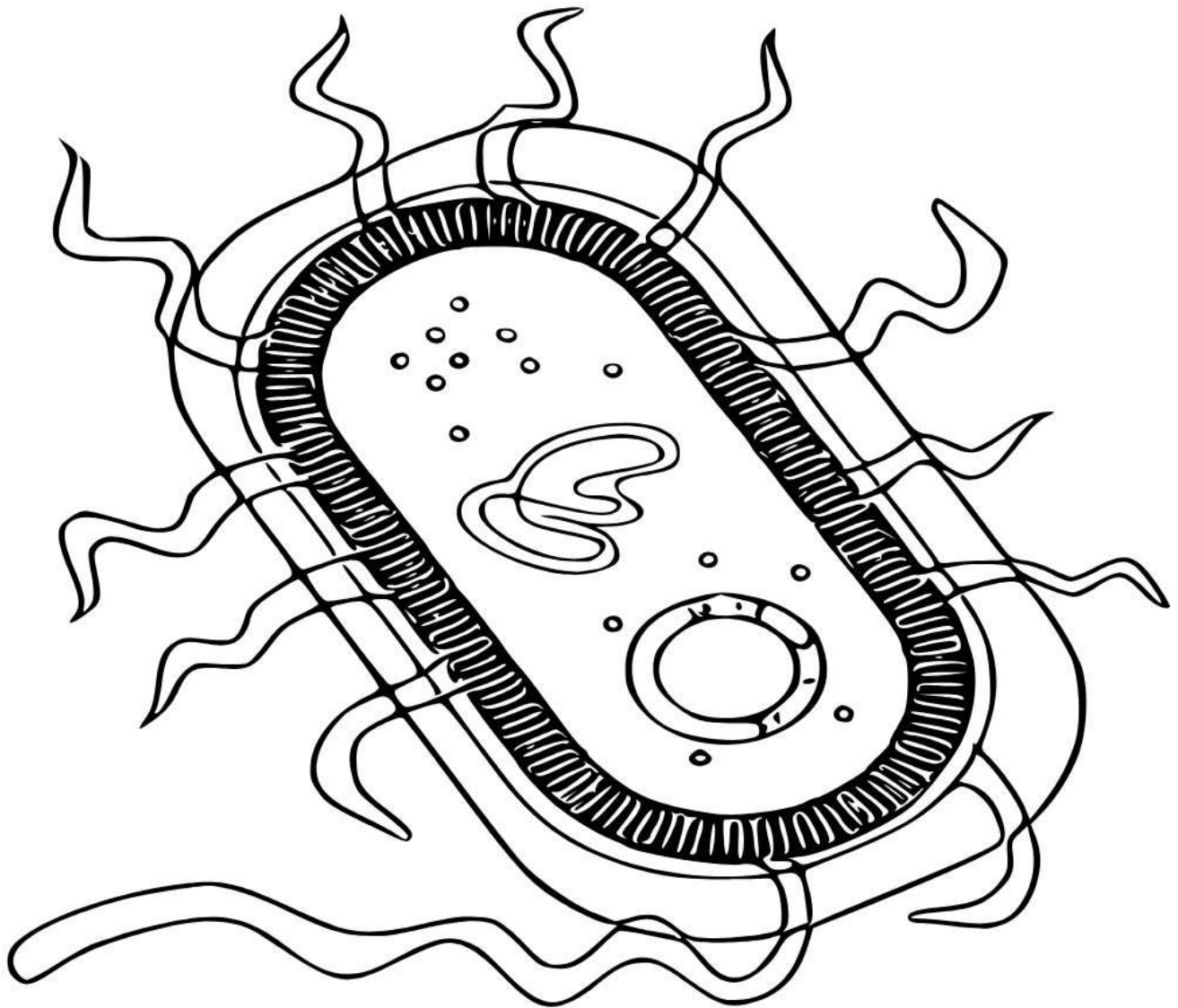
Toxin

Gene

Mitochondrial Maze



Bacterial Cell Coloring



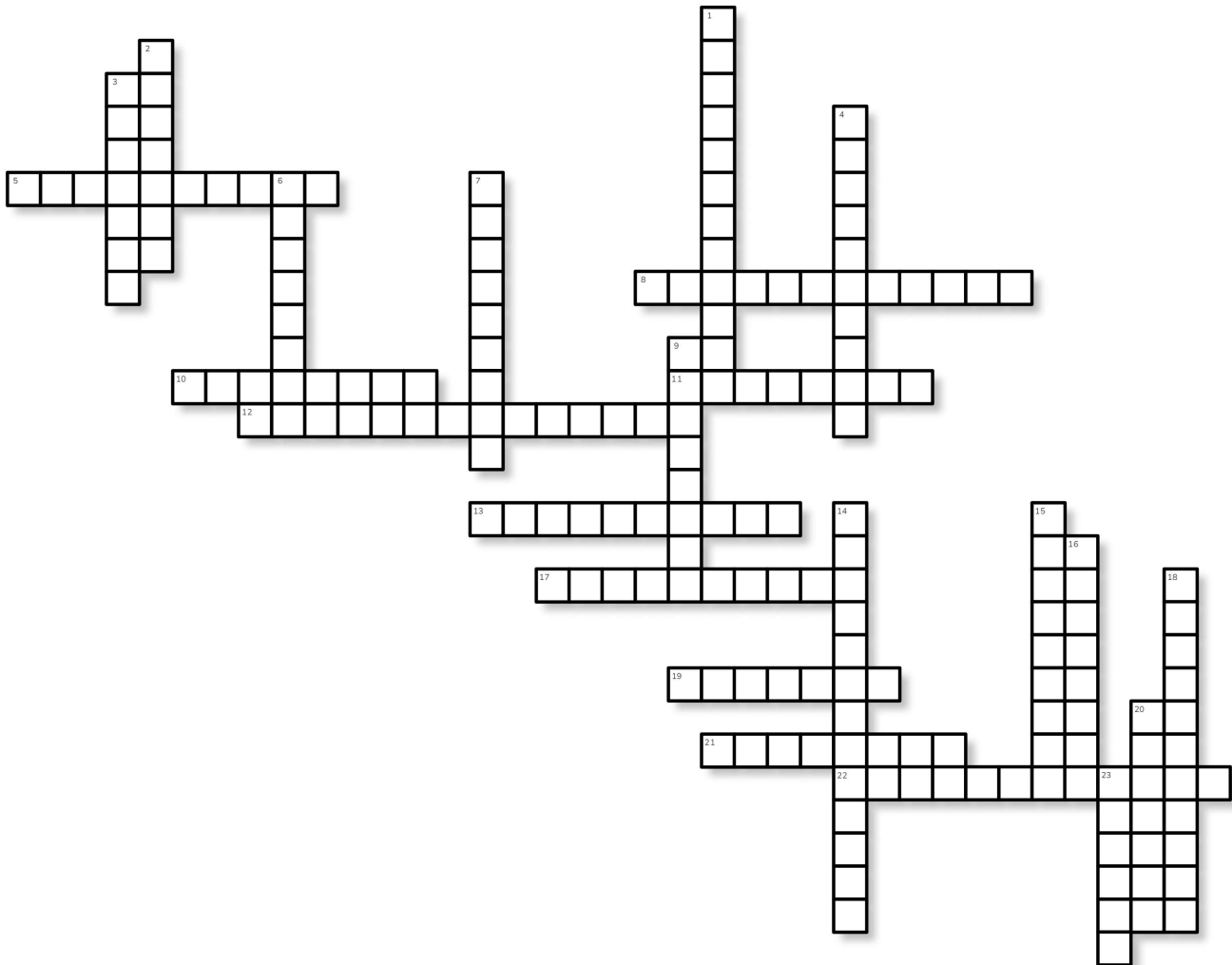
Immunology Crossword

Across

- 5. leukocyte associated with phagocytosis that breaks down digested material
- 8. include neutrophils, basophils, eosinophils, and mast cells and macrophages/monocytes
- 10. tissue cells playing role in hypersensitivity reactions
- 11. immunity that activates when natural immunity is overwhelmed; antigen-specific
- 12. bone marrow where T and B cells are developed; thymus
- 13. monocytes that are found in blood that ingest antigens and present them
- 17. protein system producing inflammatory effects and destroy cells
- 19. type of immunity that the body uses after microbial exposure: non-specific and nonadaptive
- 21. soluble proteins secreted by cells that transmit messages between cells
- 22. system that recognizes microbes as either self or foreign

Down

- 1. response activating specific lymphocytes to combat antigens
- 2. response that produces antibodies that combat antigens
- 3. portion of antigen reacting with antibodies and receptors
- 4. invade certain parasites and control allergic reactions by emitting histaminase
- 6. process of being protected from foreign antigens
- 7. tissue in body filled with lymphocytes that remove microbes from circulation
- 9. release histamines to cause allergic reactions; activated by IgE antibody
- 14. cells that lyse virally infected cells; do not require antigenic stimulation
- 15. enzyme secreted by macrophages that attack some bacterial cell walls
- 16. immunoglobins found in serum or plasma; produced by B cells
- 18. proteins produced in response to viral infections that block viral replication
- 20. immunogens found on surface of particles that cause an immune response from the body
- 23. organ that traps and filters foreign materials out of the blood



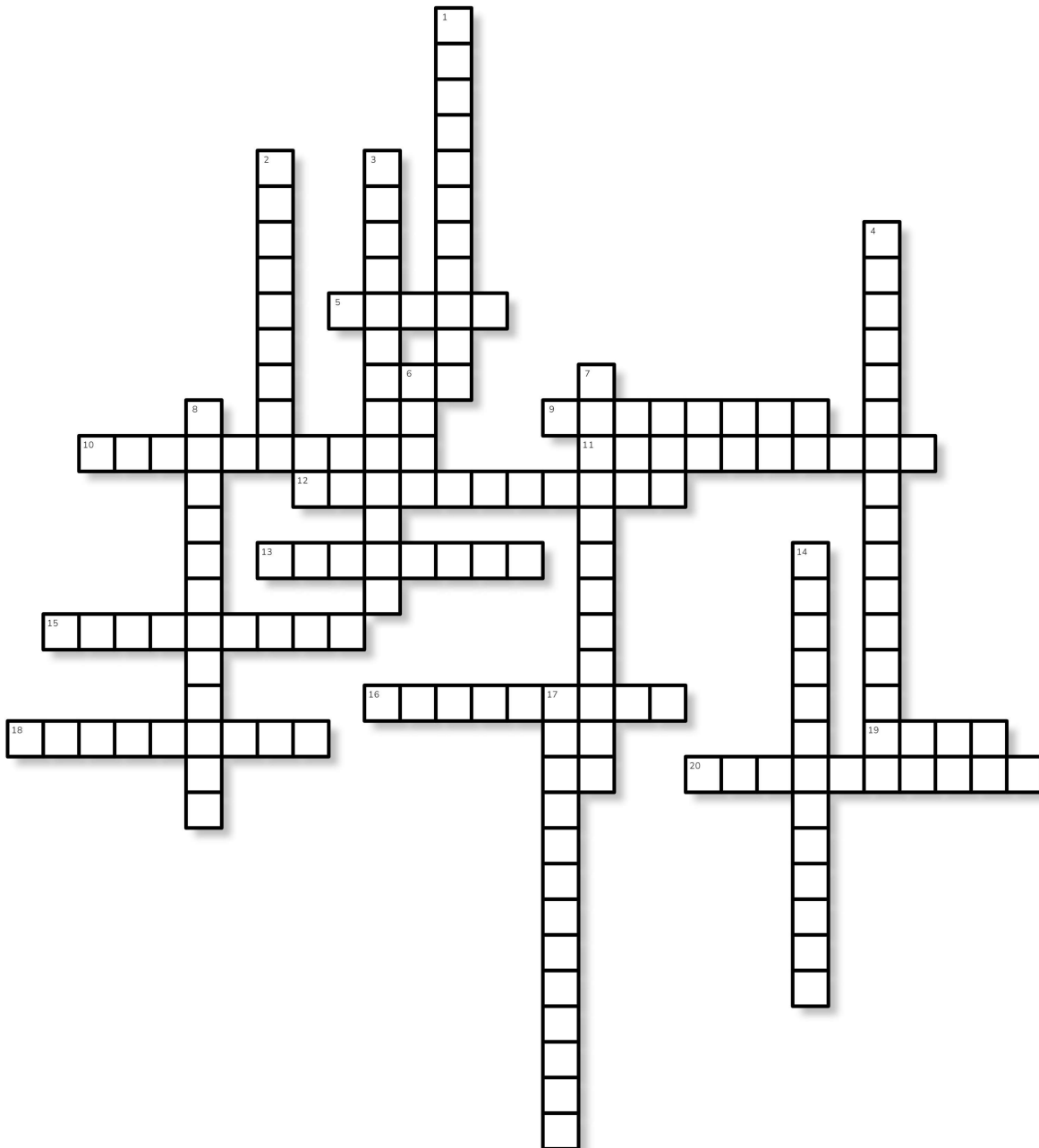
Laboratory and Control of Microorganisms

Across

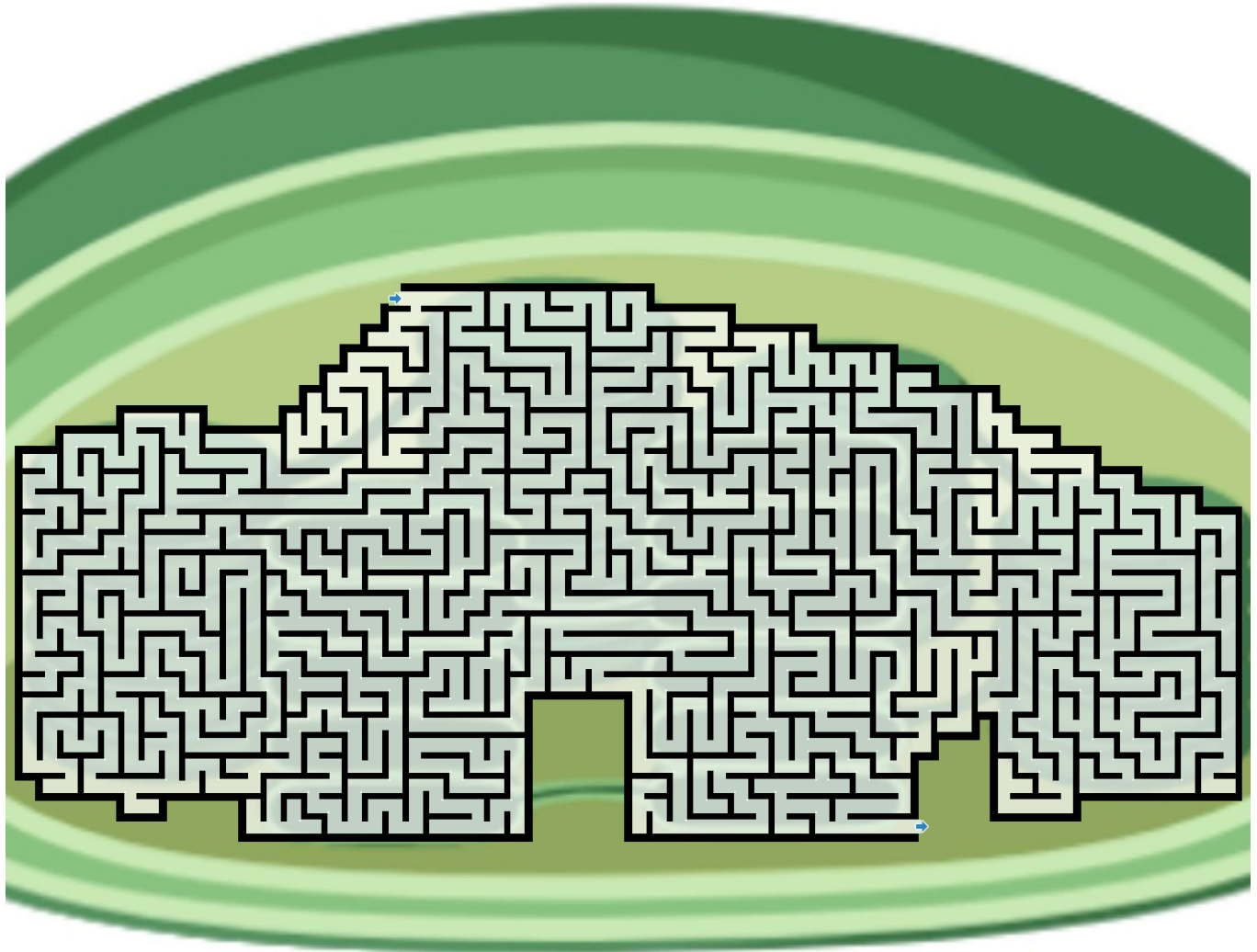
- 5. poisonous substance
- 9. agent that destroys viruses
- 10. preventing or inhibiting the growth of pathogenic microbes
- 11. condition of bacterial growth in the blood
- 12. agent destroying bacteria, but not necessarily their spores
- 13. protein toxin excreted by microbe into surroundings
- 15. agent destroying fungi and their spores
- 16. agent destroying bacterial and mold spores
- 18. produced by gram-neg bacteria that is confined in the body of a bacterium until the bacterium is broken and toxin freed
- 19. kills microbes by denaturing their proteins
- 20. ability of organism to defend against infection and disease

Down

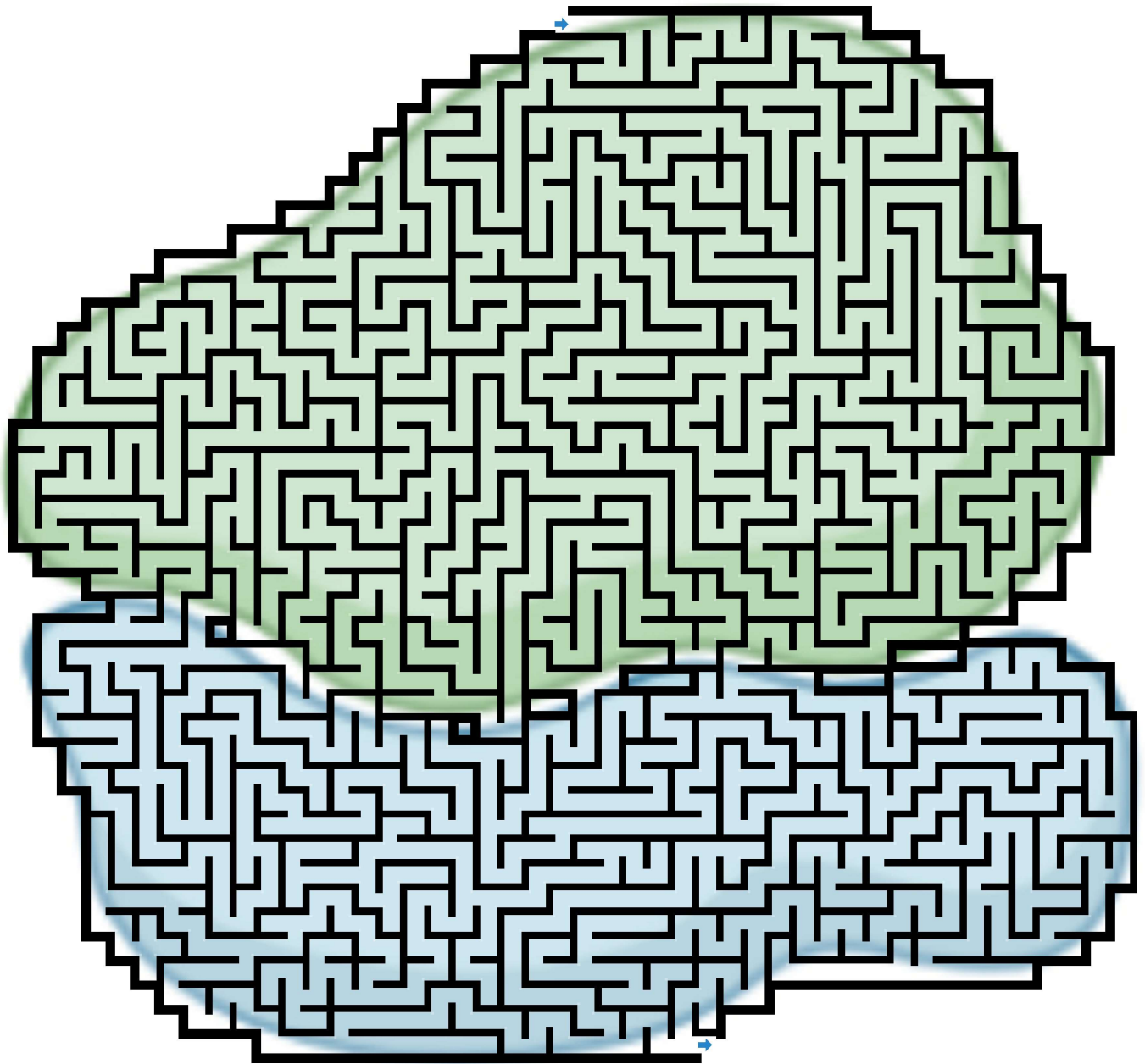
- 1. dilution or weakening of a microbe's virulence to reduce or abolish pathogenicity
- 2. power and degree of pathogenicity possessed by organisms to produce disease
- 3. state of producing or being able to produce pathological changes and disease
- 4. non-ionizing radiation effective at controlling growth of microbes
- 6. organism used by microbe to obtain nourishment
- 7. destruction of infectious agents by chemicals or physical means directly applied to inanimate objects
- 8. study of the biology of microscopic organisms
- 14. process of completely removing or destroying all life forms and their products on or in a substance
- 17. introducing organisms into an area or substance



Thylakoid Maze

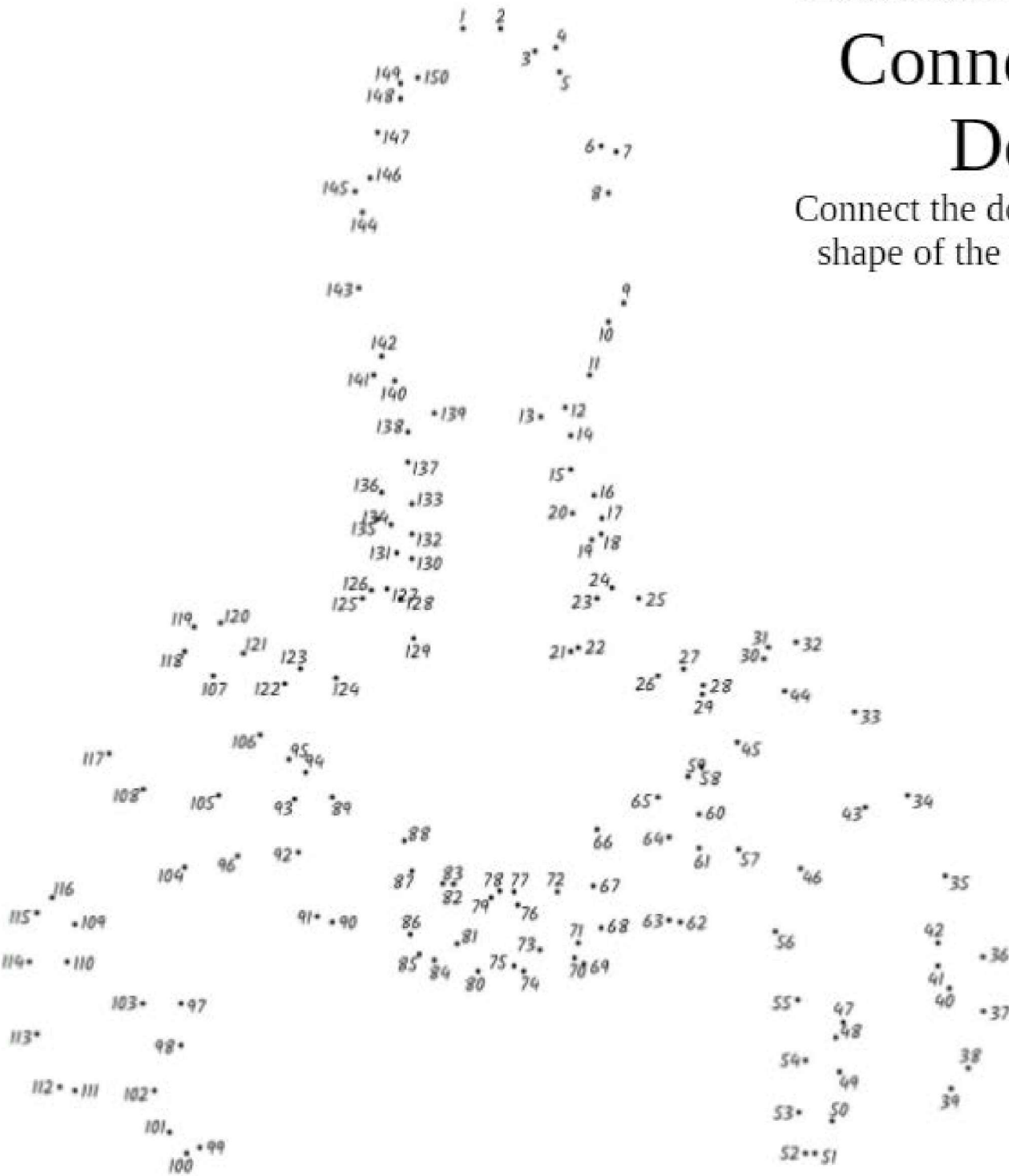


Ribosome Maze



Bacteriophage Connect the Dots

Connect the dots to reveal the
shape of the bacteriophage



Proteins and Receptors

Connect the Protein on the left to its Receptor on the Right by following the lines



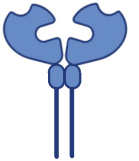
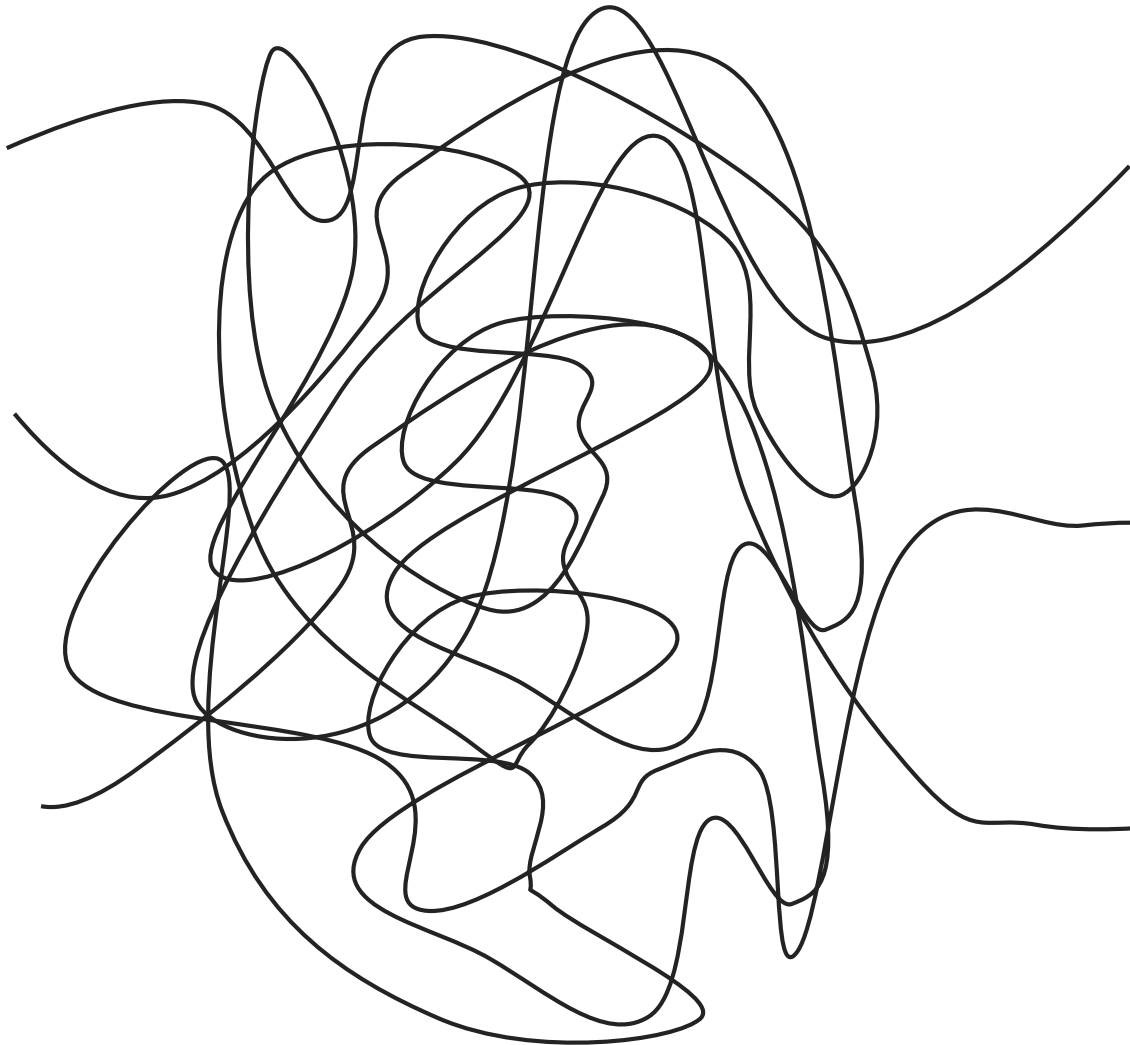
CD4 Protein



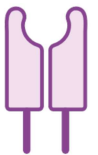
Spike Protein



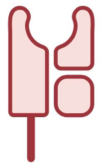
CD8 Protein



ACE2 Receptor



MHC I



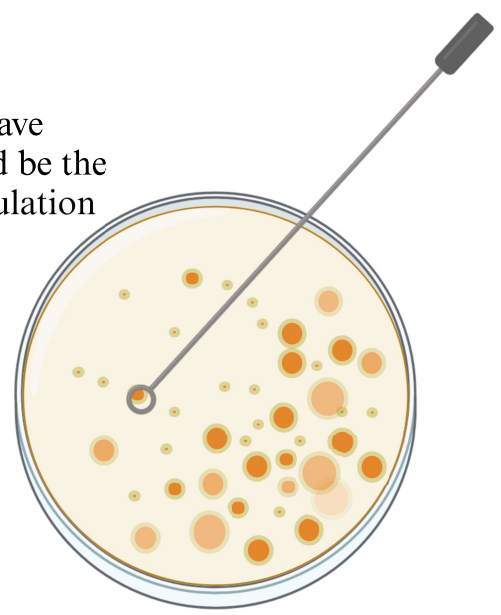
MHC II

Streaking A Petri Plate

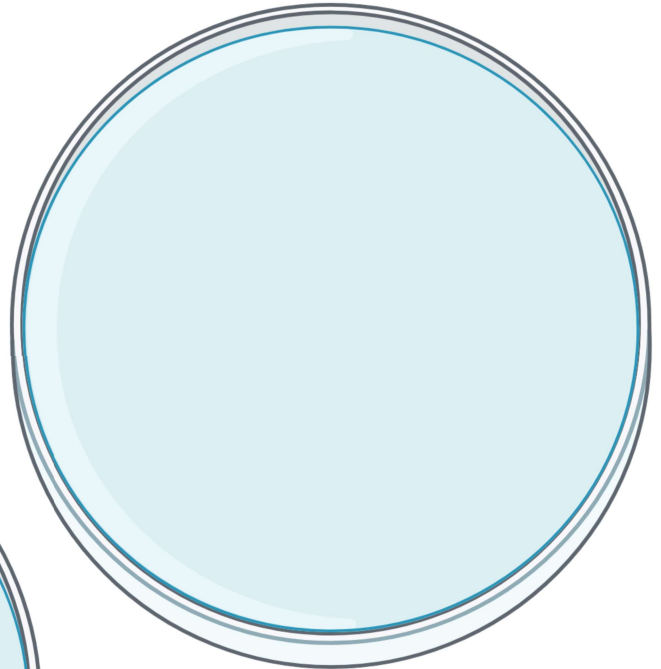
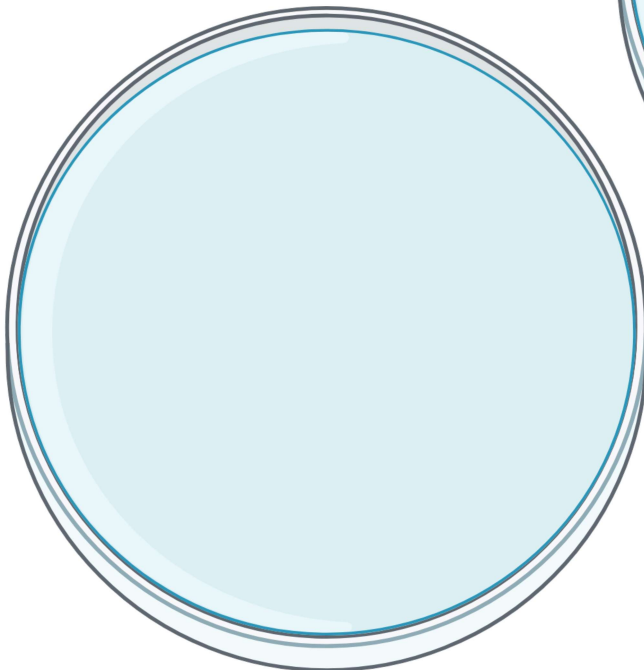
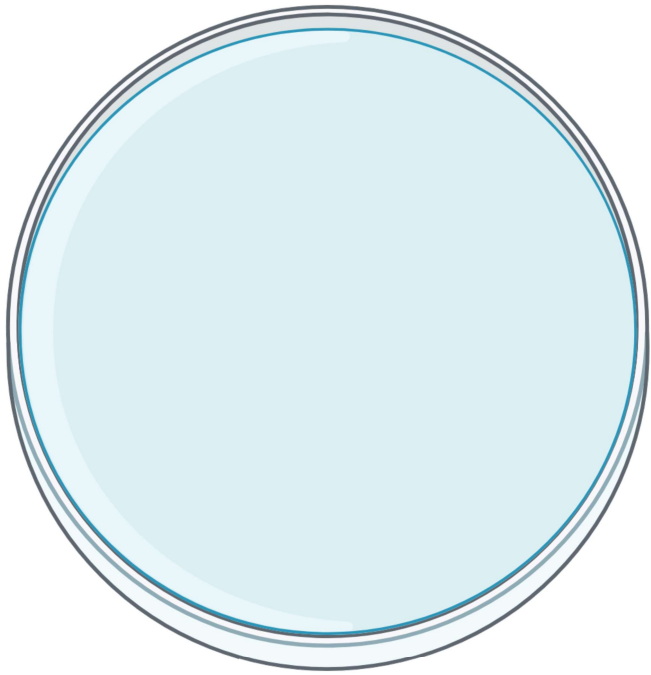
Petri plates are streaked to produce a single colony that is made of one species; typical streaking is done in the manner below:



This area should have sparse colonies and be the best place for inoculation



Practice Streaking on the Plates Below



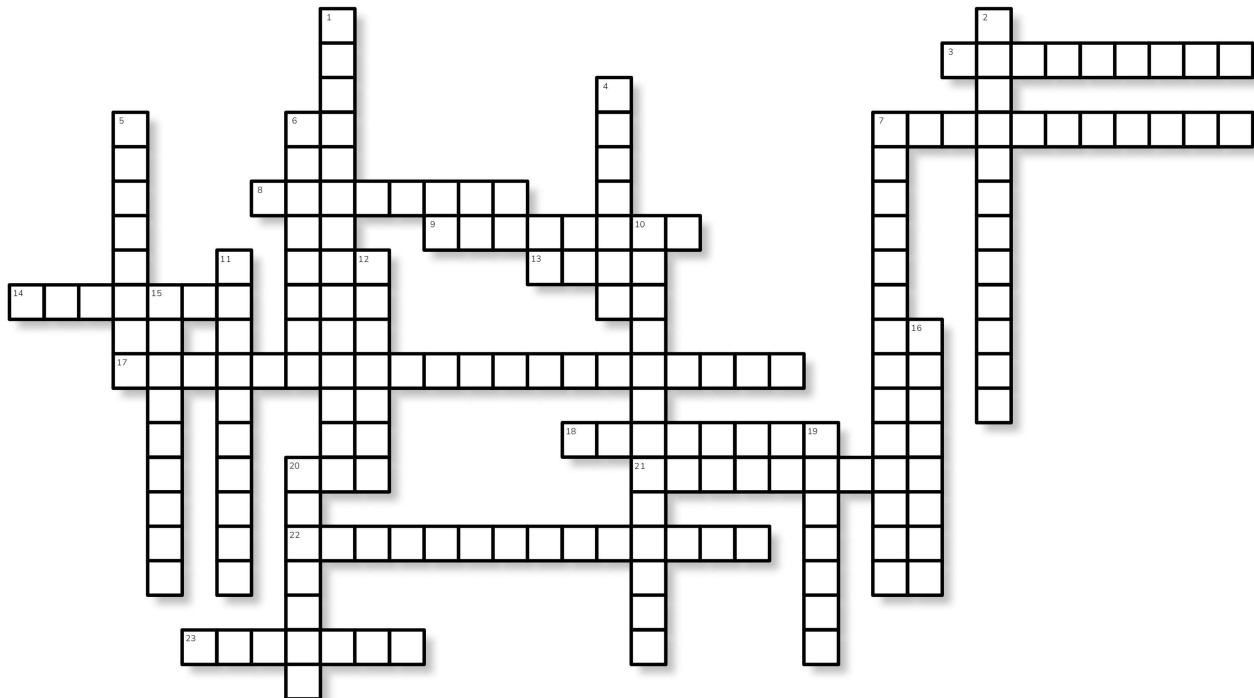
Cellular Structures (Prokaryotic and Eukaryotic)

Across

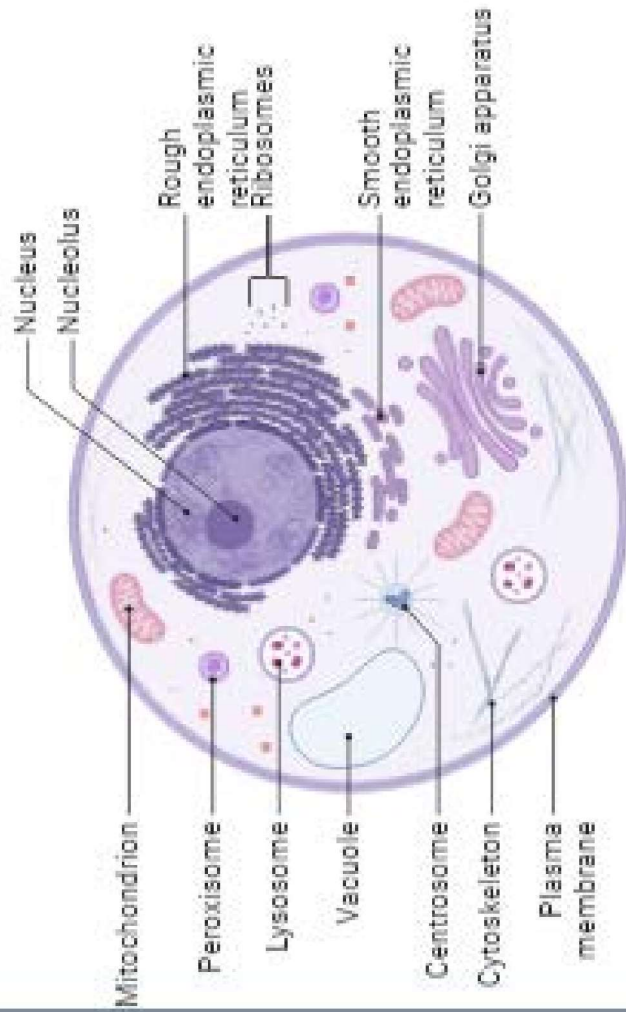
- 3. gel-like fluid inside cell; medium for chemical reaction
- 7. contain chlorophyll and function in photosynthesis
- 8. tail-like structures that whip around to allow motility
- 9. sac compartment in cell containing enzymes that break down cellular components
- 13. can hold bacterial cells together or help bacterium move around environment (example: type IV)
- 14. can fuse with other membranes in cell system; function in storage and transport
- 17. network of sac-like structures and tubes in cytoplasm
- 18. lipid production and detoxification
- 21. dense region of RNA; site of ribosome formation
- 22. encloses cell body; consists of phospholipids
- 23. control center of the cell

Down

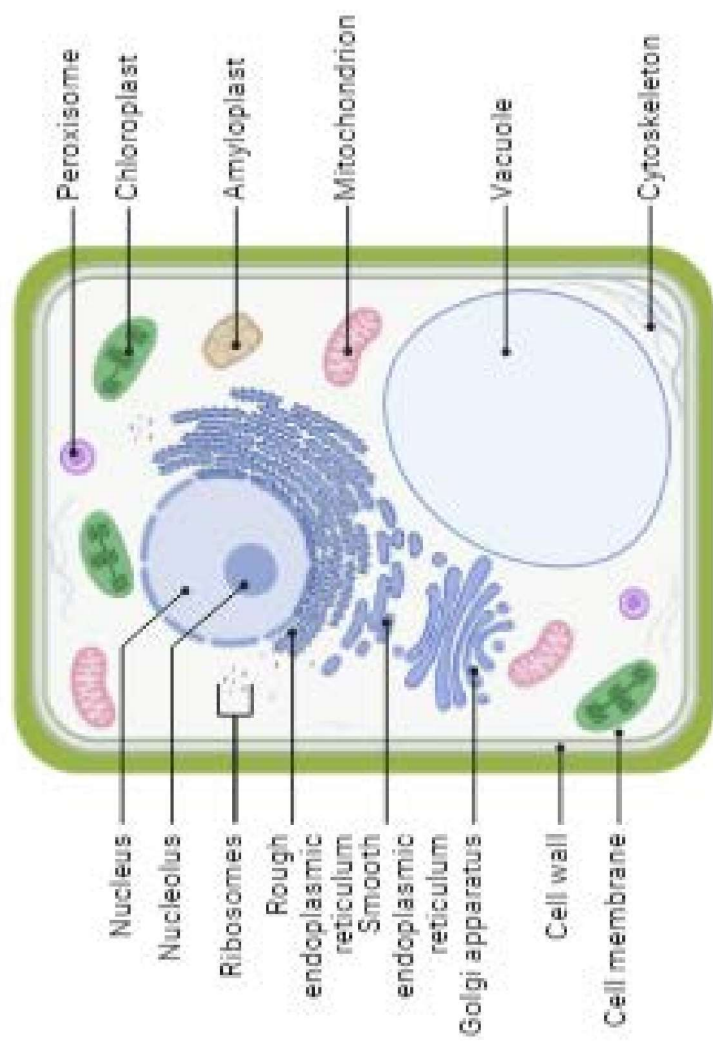
- 1. stack of small flat sacs that prepares proteins and lipids for use in and outside of the cell
- 2. filamentous proteinaceous structures running through cytoplasm; organizes and maintains cell shape
- 4. does not fuse with membranes of other cellular components; function in storage and transport
- 5. filaments used for adhesion of a prokaryote
- 6. structure maintains cell shape, protects interior, and prevents bursting with water intake; contains peptidoglycan
- 7. membrane-bound structure filling most of the plant cell; maintains shape and storage of food, water, and wastes
- 10. produce energy for cell via cellular respiration
- 11. contains oxidative enzymes used lipid destruction
- 12. small rings of dsDNA that contain nonessential genes copied independently of chromosome inside cell
- 15. organelles involved in cell division; help organize chromosomes
- 16. small organelle where proteins are made
- 19. protein production
- 20. sticky outermost layer made of polysaccharides; facilitates clinging together



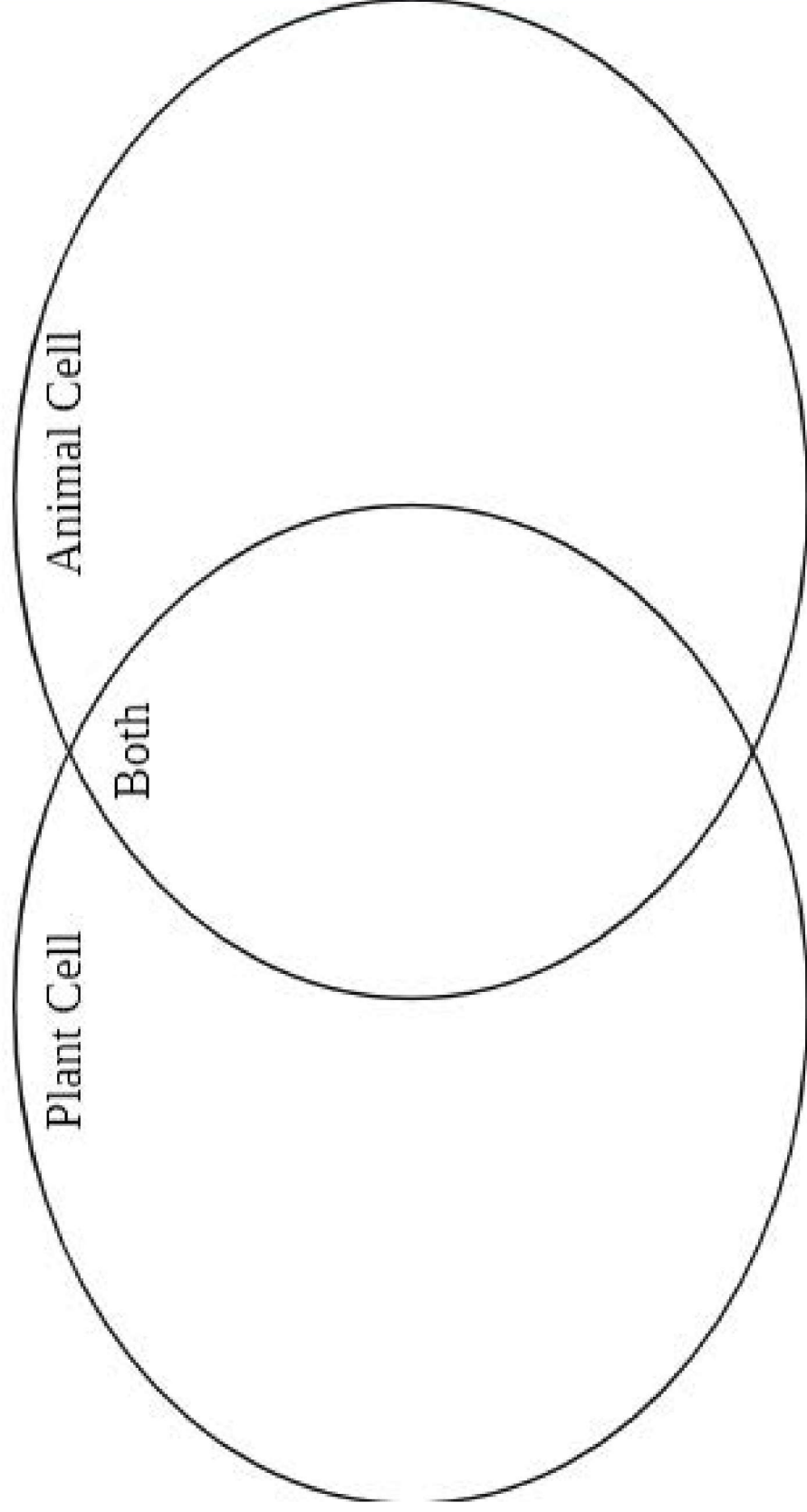
Animal cell



Plant cell

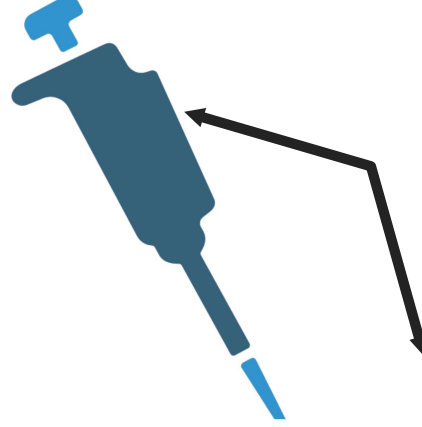


Comparing Plant and Animal Cell Structures

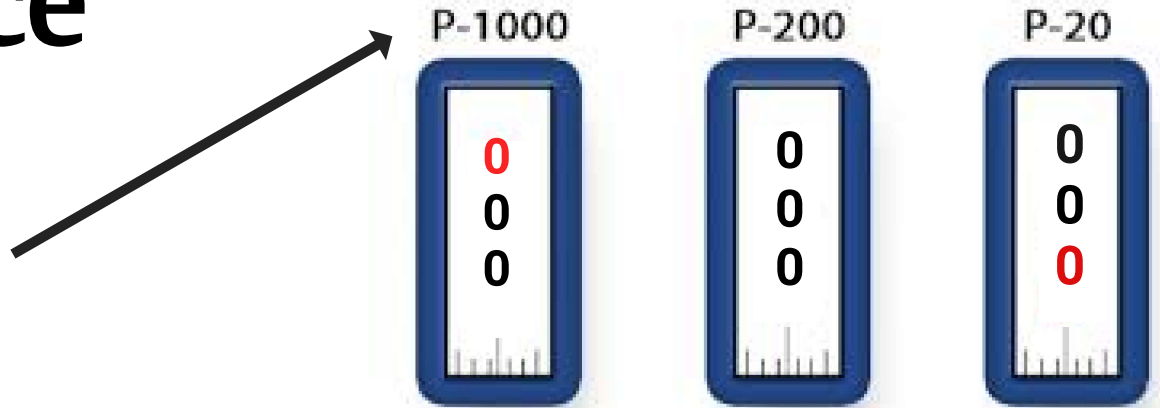


Using the diagrams from the previous page, fill in the Venn diagram with structures specific to plant cells, animal cells, and both cell types

Pipetting at a Glance



Micropipettes can come in three varieties
The number represents the maximum liquid the pipette can hold

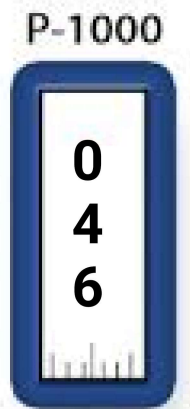


The **red** number spots indicate a decimal

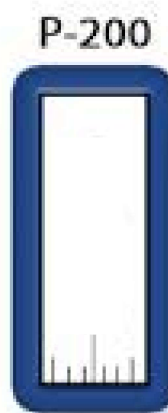
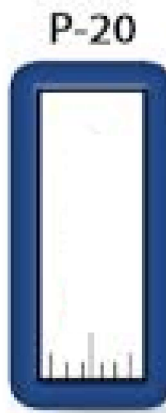
1000s
100s
10s

100s
10s
1s

10s
1s
0.1s



.46ml or
460ul



5.4ul

92ul

Fill in either the volume indicator or the blank for the amount given

Endoplasmic Reticulum

Connect the Dots



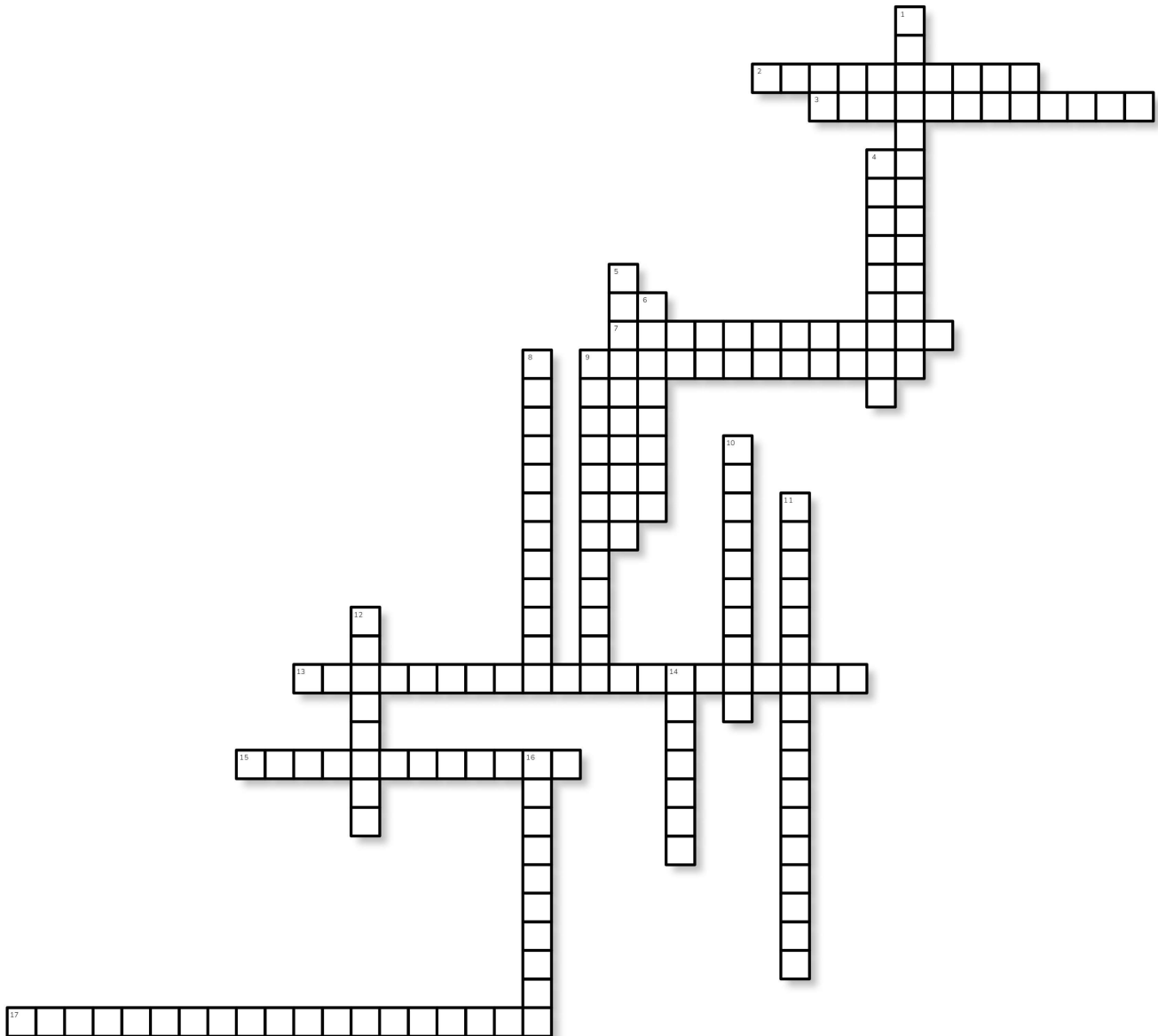
Microbiology Fields Crossword

Across

- 2. study of how microbial cells function
- 3. study of bacteria
- 7. study of microorganisms
- 9. study of parasites
- 13. study of how microbes diversified throughout time
- 15. study of pathogens
- 17. study of pathogenic microbes in humans & animals

Down

- 1. scientific manipulation of organisms at molecular and genetic levels
- 4. study of algae
- 5. study of nematodes or roundworms
- 6. study of viruses
- 8. study of agriculturally relevant microbes
- 9. study of protozoans
- 10. application of microbes for industrial usage (antibiotics and fermentation)
- 11. study of the genome of microbes
- 12. study of fungi
- 14. study of microbial diversity, populations, and their effects on surroundings
- 16. study of the immune system



Tardigrades: Water Bears

Tardigrades are microscopic organisms known for their more common name "Water bears." They can survive being completely dried out, being frozen to just above absolute zero (-458°F), and heated over 300°F. They can also withstand radiation and the vacuum of space. These organisms are found in all environmental conditions ranging from extreme to mild, and their ability to survive the harshness makes them extremophile.

A sugar known as trehalose is produced by the organism and works with proteins to allow the tardigrades to survive in extremely harsh waterless conditions. Another protein called Dsup (damage suppressor) protects DNA from harmful conditions. They can also enter cryptobiosis, an inactive state triggered by dry environments, as needed. Tardigrades have eight legs and have been around for about 600 million years.

Connect the Dots below to reveal the shape of tardigrades.

