

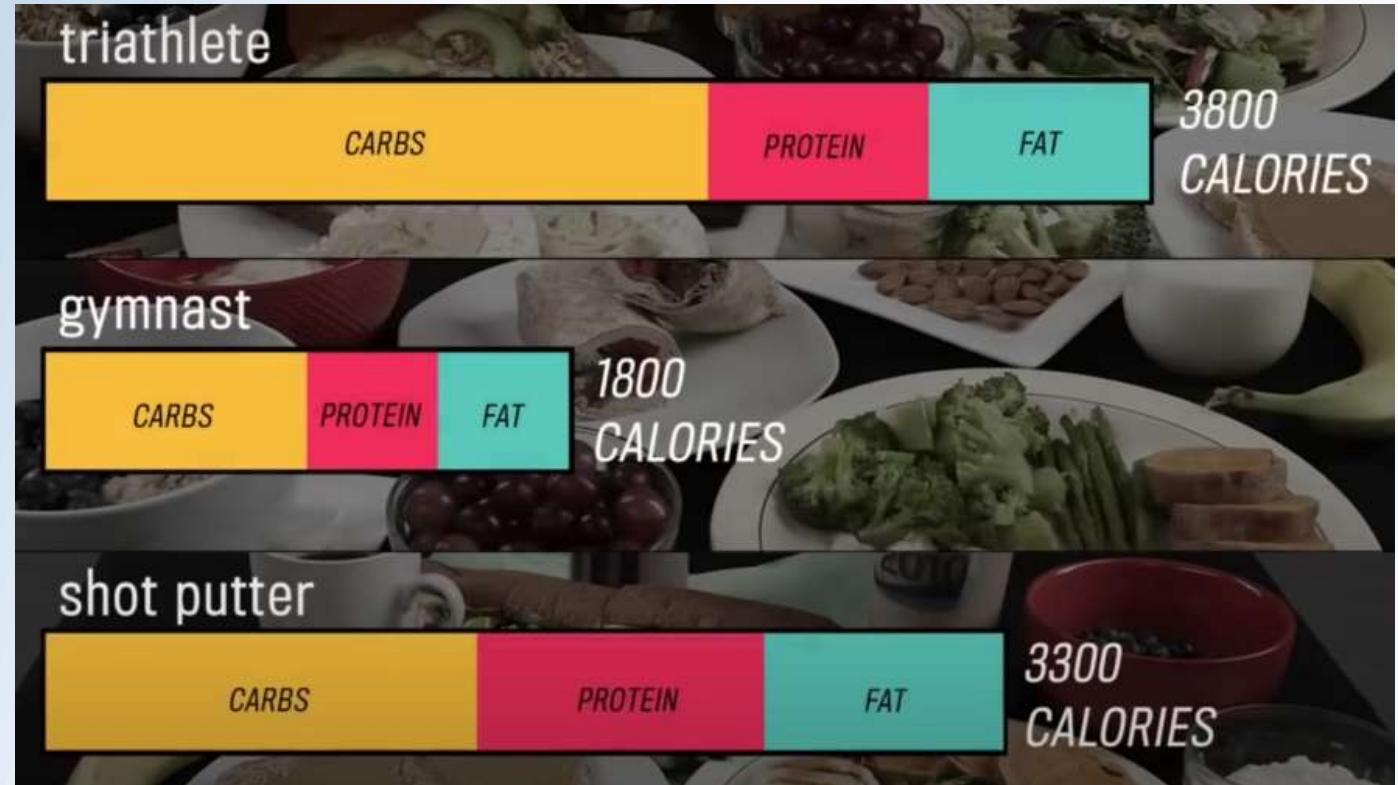
WUHS Biology: Animals Unit

Week 1 – What
happens to food when
consumed?

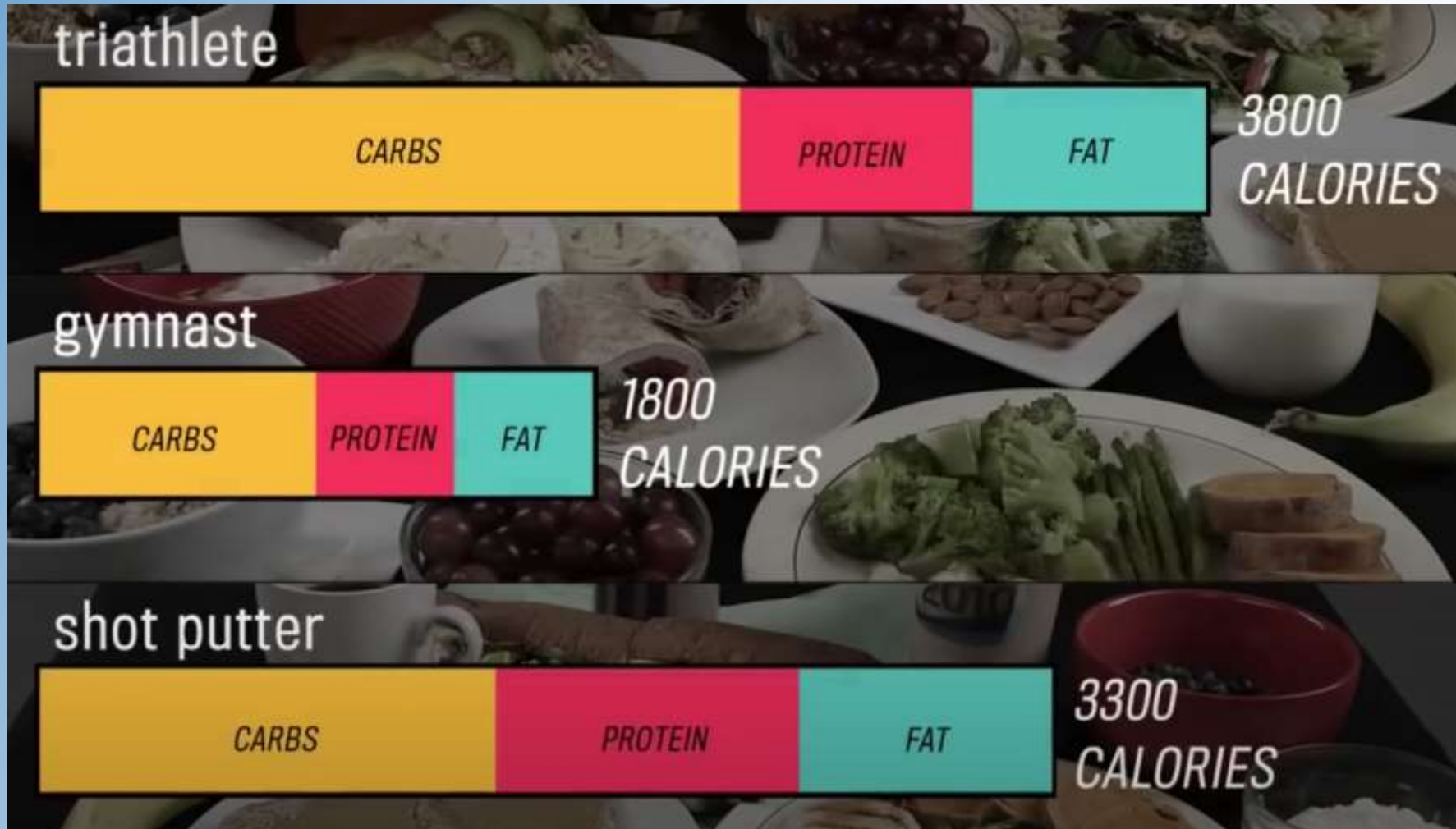


Animas Unit – W1 Driving Question

- **Driving Question: What happens to food when it is consumed?**
- What are the cells of animals made from?
- How are cells similar and different from molecules (and macromolecules)?
- How do cells use the matter and energy in our food?



Part 1 Recap



- What claims can we make based on the data above?
- Why do different athletes need different diets?

Discussion Question

- **What are animals made from?**
- **What makes a living animal different from non-living things?**
- Discuss within your small groups.
- Be prepared to defend your ideas with evidence and reasoning.



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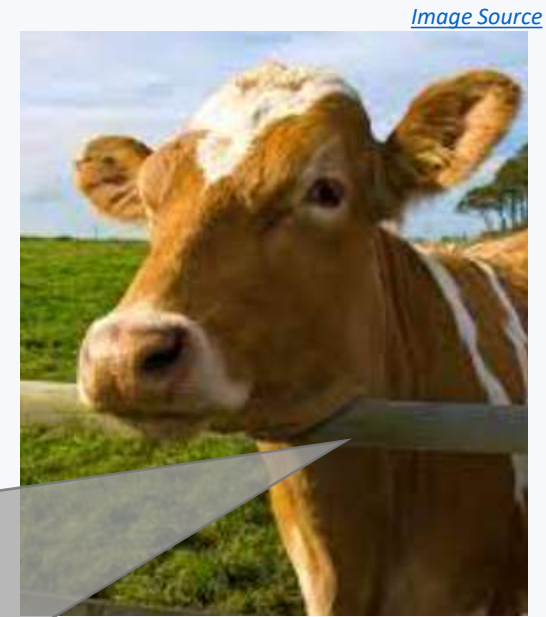


Introducing: Cells!

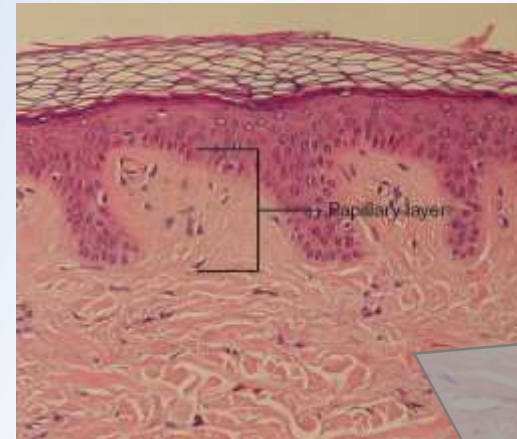
WUHS Biology

Zooming Into Cells

- If we could increasingly shrink ourselves down, how would animals appear as we became smaller?
 - If we shrunk to one meter (about 3 feet), we would still see an animal.
 - If we shrunk down to a millimeter (1/1000 of a meter), we would see that an animal's body is made of small connected 'bubbles'.
 - If we shrunk down to 0.000005 meters ($1/20^{\text{th}}$ of a millimeter), we be the same size as one of these bubbles.

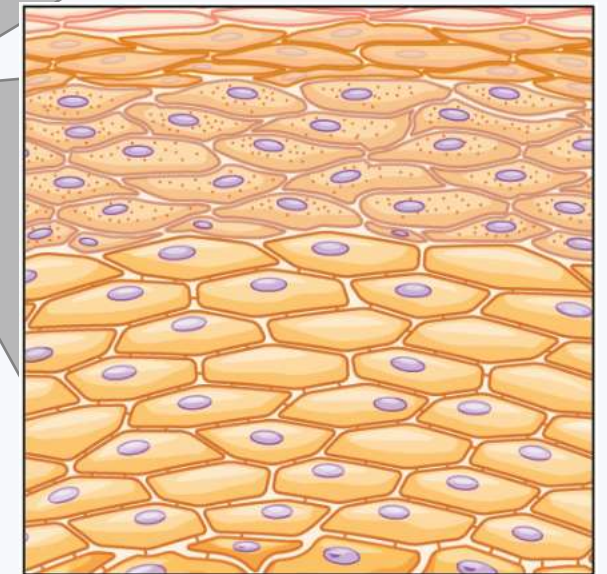


[Image Source](#)



A meter is roughly 3 feet.

At one millimeter, we would see that all animal tissue is made of tiny 'bubbles'.

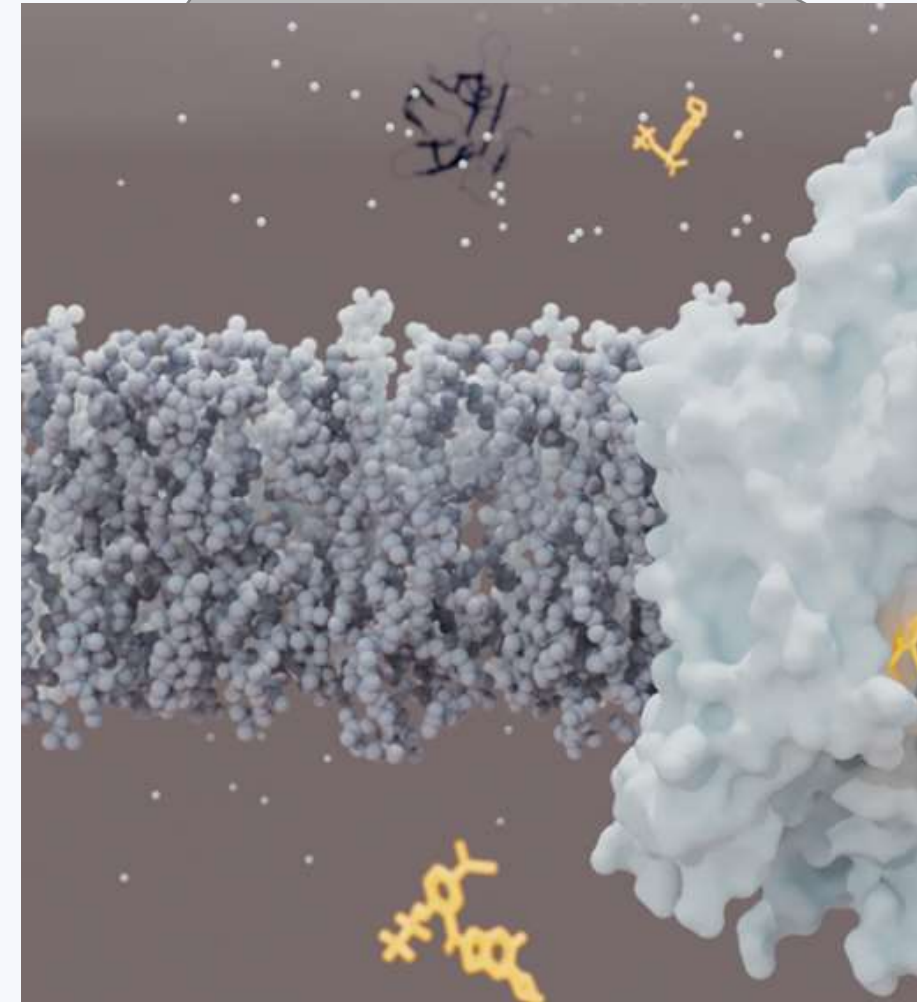
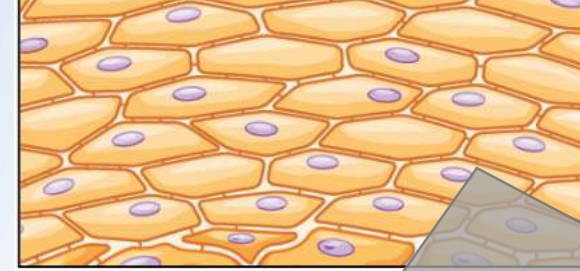


At about $1/20^{\text{th}}$ of a millimeter, we would be the size of one a bubble.

[Image Source](#)

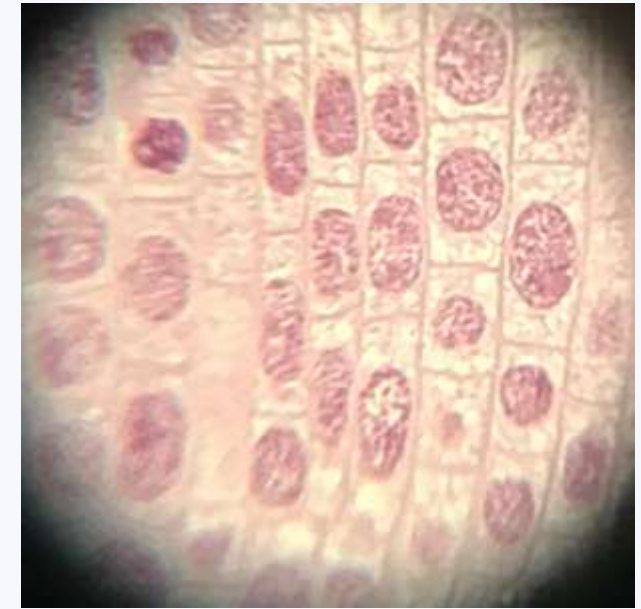
Zooming Into Cells

- At 0.00000001 meters (1/100,000th of a millimeter), we would see that each tiny bubble is made of large molecules.
 - Each of these large molecules is comprised of individual atoms.
- We would be able to observe that each bubble consists of similar kinds of structures.
 - Each of these structures is also made of atoms and molecules.

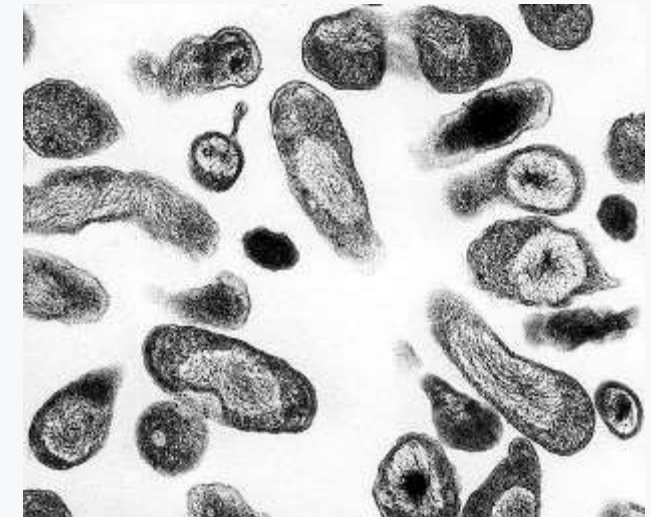


Cells

- **All living organisms (animals, plants, fungi, bacteria, etc.) are comprised of cells.**
 - As with all matter (solids, liquids, and gases), cells are made from atoms that bond to form molecules.
 - A cell is the smallest thing that can be alive.
 - A cell consists of a fatty membrane surrounding protein structures & fluid.
- **The amount of cells in each living organism varies.**
 - While most animals are comprised of trillions of cells, some organisms have only one cell.



Cells as seen under a microscope.



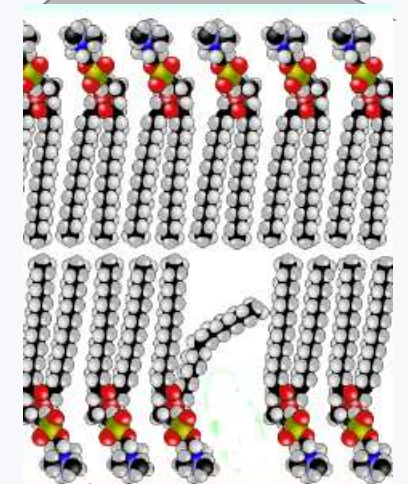
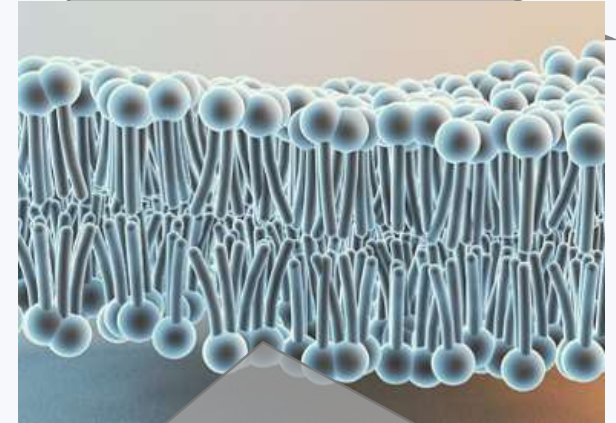
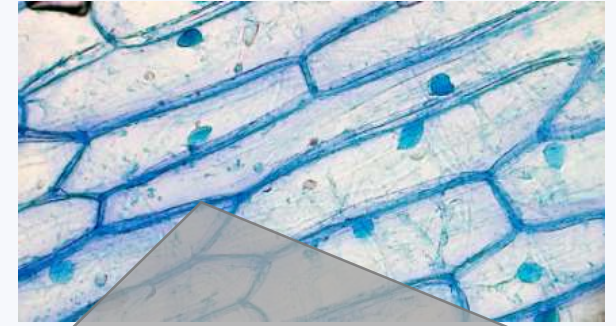
Bacteria are single-celled – they only have one cell.



While a human body has 50 trillion cells, a blue whale's body has 100 quadrillion cells.

Cells

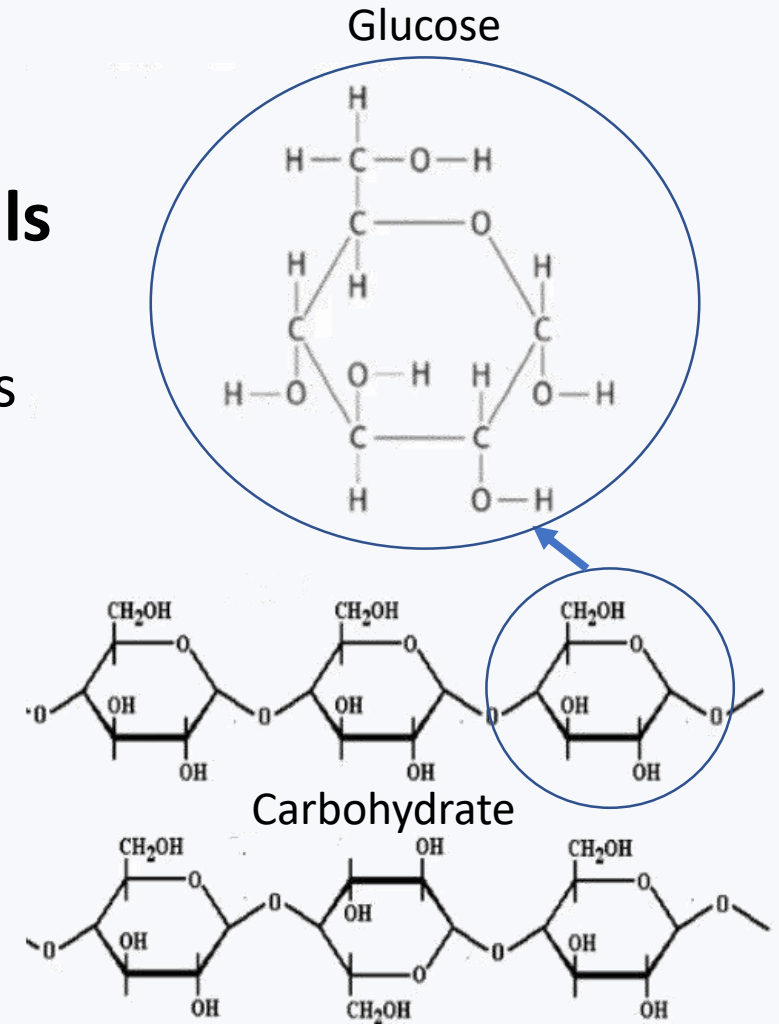
- **Animal cells are primarily made from two kinds of molecules – protein and fat.**
 - The membranes of cells (the outer covering) are mostly made from fatty molecules.
 - The structures inside cells are primarily made from proteins.
- **Cells also obtain the chemical energy they need to function from molecules called carbohydrates.**
 - Carbohydrates contain large amounts of high-energy bonds (C-C and C-H bonds).
 - They provide the cell with a source of chemical energy needed to function.



Cell membranes are comprised of fatty molecules called lipids.

Macromolecules

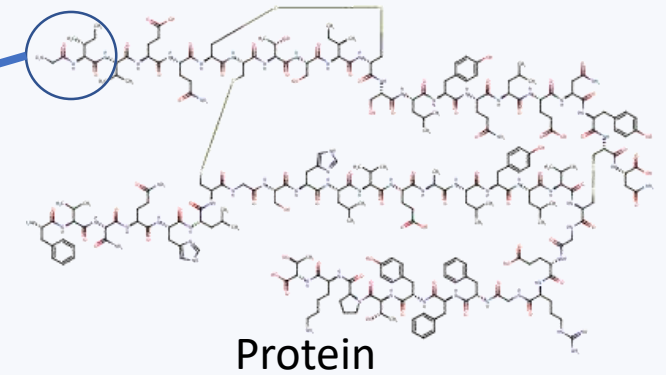
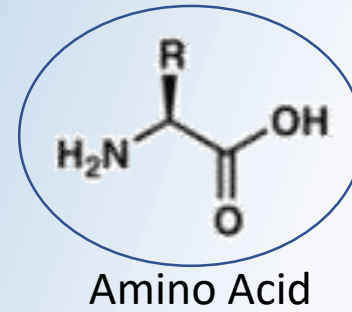
- **The fats, proteins, and carbohydrates found in cells are all examples of *macromolecules*.**
 - A macromolecule is a long chain of individual molecules bonded together.
 - A macromolecule is a molecule made from molecules.
- **Fats, proteins, and carbohydrates are each made from different kinds of individual molecules.**
 - Fats are made from long chains of fatty acid molecules.
 - Proteins are made from long chains of amino acid molecules.
 - Carbohydrates are made from long chains of glucose molecules.



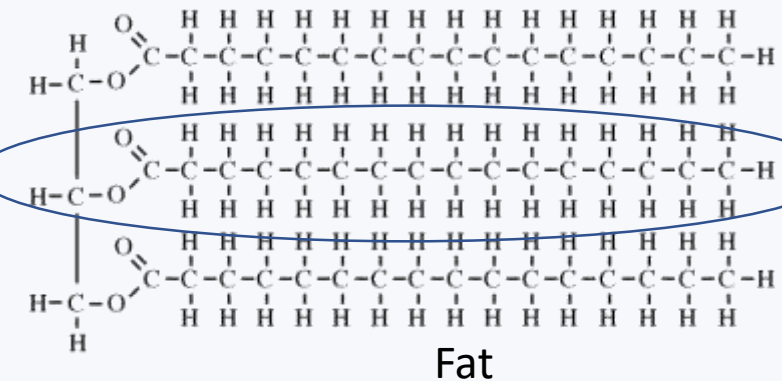
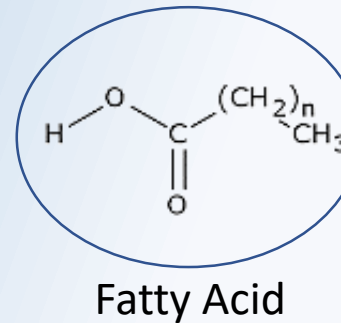
A carbohydrate is a macromolecule made from chains of glucose molecules.

Macromolecules

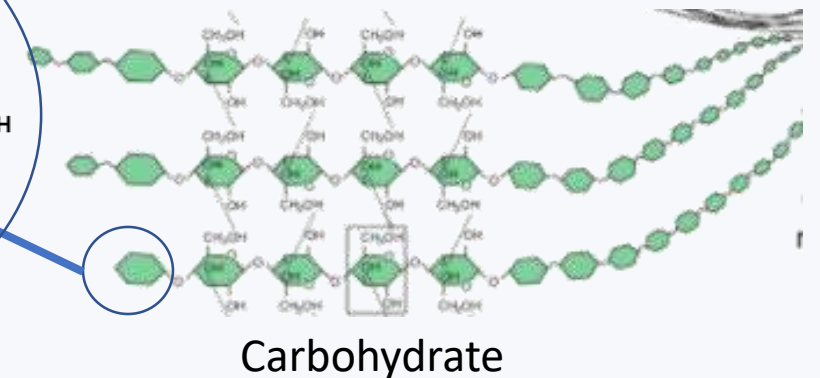
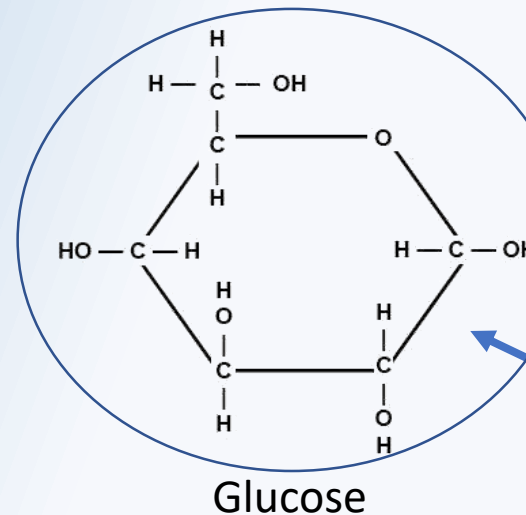
• Amino acid molecules combine to form *proteins*.



• Fatty acid molecules combine to form *fats*.



• Glucose molecules combine to form *carbohydrates*.



Roles of Macromolecules

- **Fats, proteins, and carbohydrates each provide a different function for the cells of living organisms.**
 - Each macromolecule type is necessary for a cell to function.
- **Fats are used to form the membranes of cells.**
 - Fatty molecules form barriers to protect the insides of cells.
 - Fats also provide long-term storage of chemical energy.
- **Proteins are the functional parts of cells and do most of the work of the cell.**
 - Proteins are like tiny molecular machines.
- **Carbohydrates provide a quick source of chemical energy to power cellular functions.**
 - Carbohydrates have large amounts of high energy bonds.

Fats form the membranes that protect cells. Fats store chemical energy

Proteins are molecular machines that do the work of the cell.

Carbohydrates provide the main source of chemical energy for the cell to power cell activity.

Cells & Organelles

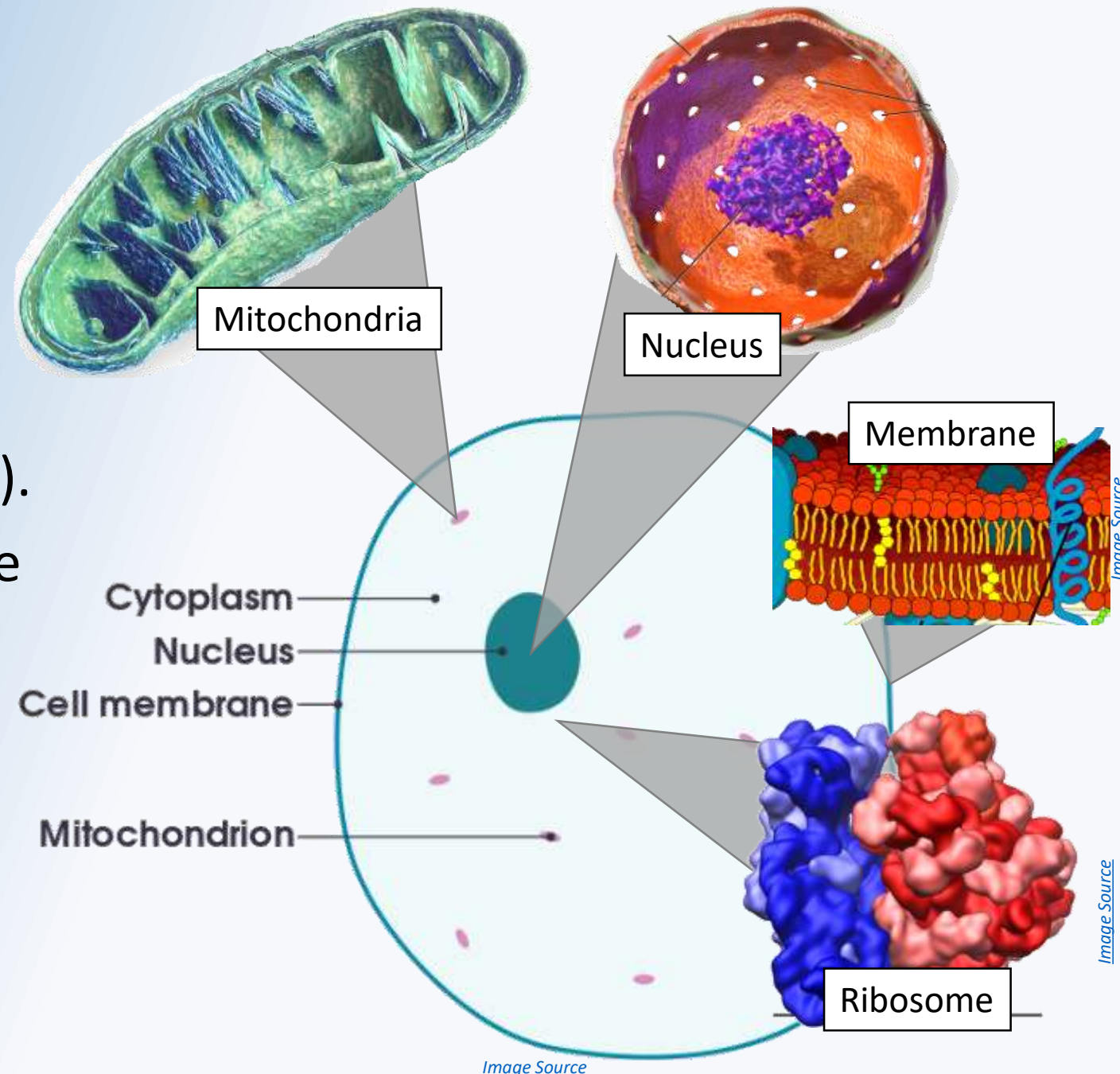
- **Animal cells contain structures called organelles.**
 - An organelle is a specialized structure within a cell that has a specific job needed for the cell to function.
- **Most organelles have their own fatty membranes and functional proteins.**
 - Organelles often function like a 'cell within a cell'
- **Key organelles in animal cells include...**
 - The mitochondria, which transforms the chemical energy from food into forms the cell can use.
 - The nucleus, which stores information needed for assembling proteins that do the work of the cell.
 - The ribosomes, which assemble proteins from amino acid molecules found in food.



The nucleus of each cell in this image can be seen as a dark spot. The smaller spots in each cell are other organelles like the mitochondria and ribosomes.

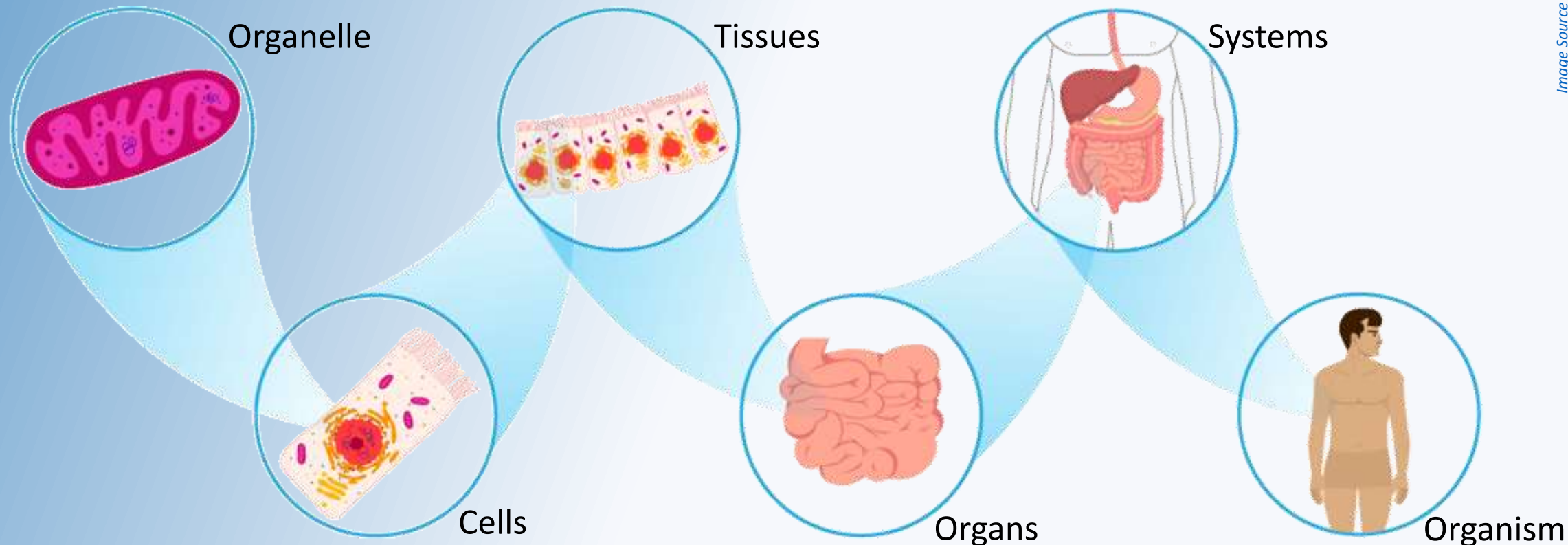
Cells & Organelles

- **Mitochondria** - transforms chemical energy into forms the cell can use.
- **Nucleus** – stores instructions for assembling proteins (DNA).
- **Cell Membrane** – protects the cell's interior.
- **Ribosomes** – assembles the cell's proteins.
- **Cytoplasm** – 'jelly filling' of the cell.



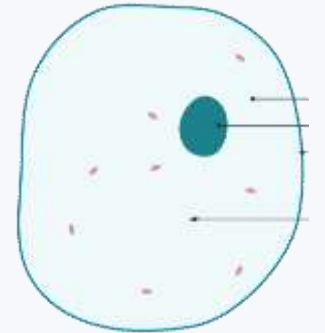
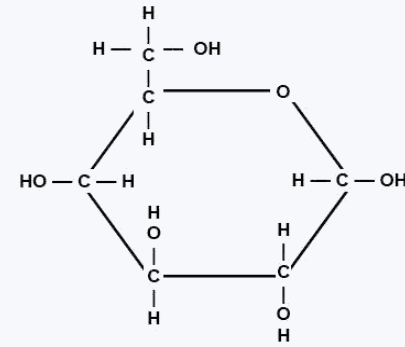
Cells, Tissues, Organs, and Systems

- The cells of *multicellular* organisms are organized at different levels.
 - A group of similar cells form a tissue.
 - Organs are comprised of different tissues (muscle, nerves, connective tissue, etc.)
 - Different organs with a similar function form a system.
 - A collection of systems comprises an individual organism.



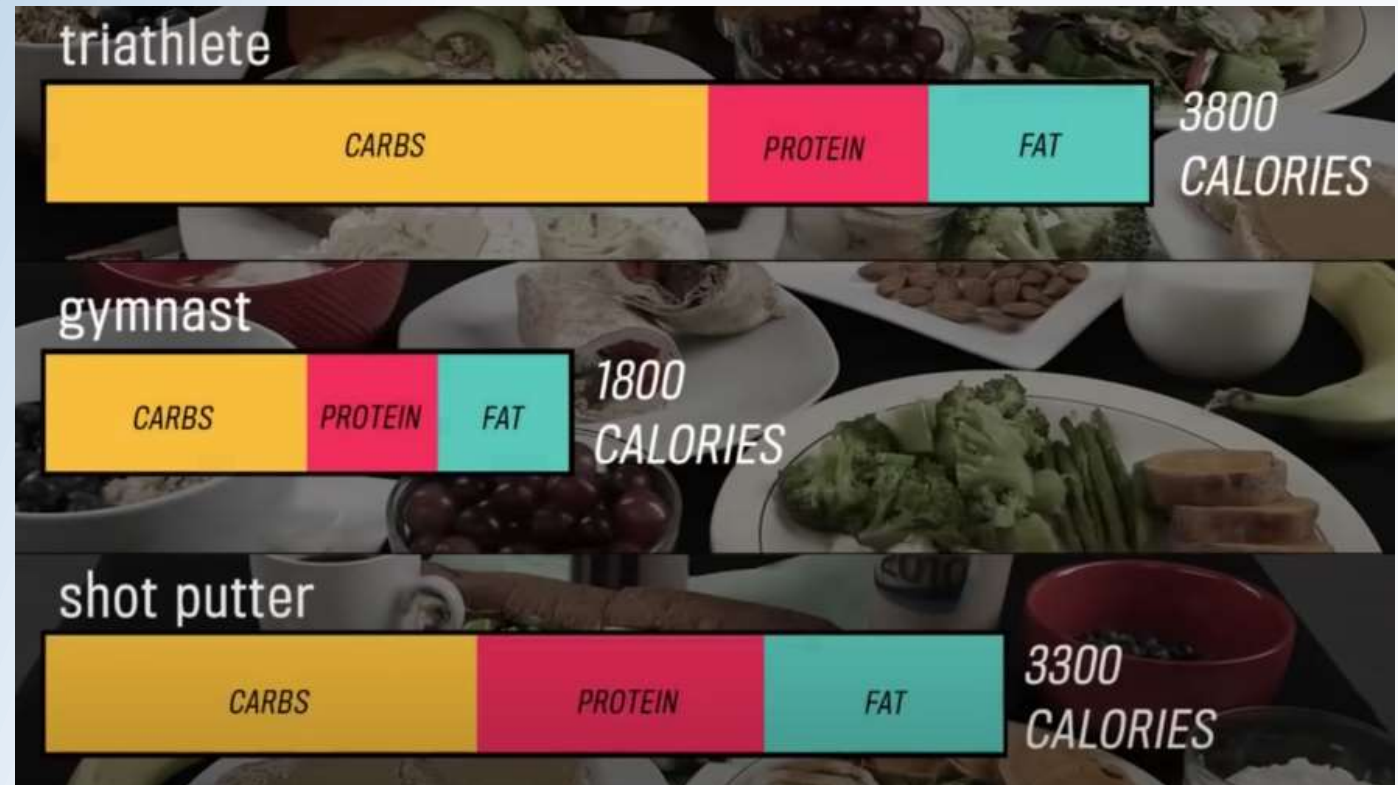
The Four Levels

- **In this class, we will investigate biological phenomena at four different levels.**
 - Atomic-molecular: how atoms are rearranged to form new molecules, and how energy is transformed from one kind to another.
 - Cellular: the processes that occur within cells to move matter and transform energy.
 - Organismal: how individual animals, plants, fungi, and bacteria function, survive, and reproduce.
 - Ecosystem-planetary: how living organisms interact with non-living resources, causing changes across large areas of the planet.
- **Understanding biology requires accurate reasoning across all four levels.**



Animals Unit – W1 Driving Question

- Are we better able to answer these questions with this new info?
- Driving Question: What happens to consumed food?
- What are the cells of animals made from?
- How are cells similar and different from molecules (and macromolecules)?
- How do cells use the matter and energy in our food?



Looking Ahead: Part 3 Investigation

- In Part 3 you will investigate how the food we consume is similar to what our cells are made from.

Nutrition Facts	
Steak	
Serving Size: <input type="text" value="100"/> g (100g)	
<hr/>	
Amount Per Serving	
Calories 280	Calories from Fat 170
<hr/>	
	% Daily Value*
Total Fat 18g	28%
Saturated Fat 7g	35%
Polyunsaturated Fat 1g	
Monounsaturated Fat 8g	
Cholesterol 97mg	32%
Sodium 52mg	2%
Potassium 320mg	9%
Total Carbohydrates 0g	0%
Dietary Fiber 0g	0%
Sugars 0g	
Protein 26g	
<hr/>	
Vitamin A	0%
Vitamin C	0%
Calcium	1%
Iron	10%
<hr/>	
* Percent Daily Values are based on a 2000 calorie diet.	

Nutrition Facts	
Pork Loin Chop	
Serving Size: <input type="text" value="100"/> g (100g)	
<hr/>	
Amount Per Serving	
Calories 209	Calories from Fat 100
<hr/>	
	% Daily Value*
Total Fat 11g	17%
Saturated Fat 3.5g	18%
Trans Fat 0.1g	
Polyunsaturated Fat 1.4g	
Monounsaturated Fat 4.2g	
Cholesterol 84mg	28%
Sodium 55mg	2%
Potassium 344mg	10%
Total Carbohydrates 0g	0%
Dietary Fiber 0g	0%
Sugars 0g	
Protein 26g	
<hr/>	
Vitamin A	0.1%
Vitamin C	0%
Calcium	1.8%
Iron	4.4%
<hr/>	
* Percent Daily Values are based on a 2000 calorie diet.	

Key Points

- **All living organisms (animals, plants, fungi, bacteria, etc.) are comprised of cells.**
 - A cell consists of a fatty membrane surrounding protein structures & fluid.
 - A cell is the smallest thing that can be alive.
- **Animal cells are primarily made from two key ingredients – protein and fat.**
 - The membranes of cells are made from fat. The structures inside of cells are mostly made from proteins.
 - Cells also use carbohydrates as a source of chemical energy.
- **The fats, proteins, and carbohydrates found in cells are all examples of macromolecules.**
 - A macromolecule is a long chain of individual molecules bonded together.

Key Points

- **Fats, proteins, and carbohydrates are made from different molecules.**
 - Fats are made from long chains of fatty acid molecules.
 - Proteins are made from long chains of amino acid molecules.
 - Carbohydrates are made from long chains of glucose molecules.
- **An organelle is a specialized structure within a cell with a specific job.**
 - Most organelles have their own fatty membranes and functional proteins.
 - Examples of organelles include: Mitochondria (cell energy); Nucleus (stores DNA); Membrane (protection); Ribosomes (assembles proteins).
- **Organism are comprised of systems, organs, tissues, and cells.**
 - A group of similar cells form tissues. Different tissues form organs. Organs with similar functions form systems. Systems comprise an organism.

Key Vocab

- A cell consists of a fatty membrane surrounding protein structures & fluid.
- The membranes of cells are the outer coverings that are mostly made from fatty molecules.
- A macromolecule is a long chain of individual molecules bonded together.
- Fats make up the membranes of cells and can store energy; fats are made from long chains of fatty acid molecules.
- Proteins are the functional parts of cells and are made from long chains of amino acid molecules.
- Carbohydrates provide chemical energy and are made from long chains of glucose molecules.
- An organelle is a specialized structure in cells with a specific job needed for cellular function.
- Tissue: group of similar cells.
- Organ: collection of different tissues with a similar function.
- System: different organs that perform similar functions.

