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FACULTY OF BIOTECHNOLOGY

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ENGLISH FOR BIOTECHNOLOGY

(Preliminary Course)



2008

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HOW TO USE THIS BOOK

The subject “English for biotechnology” contains 2 books, preliminary and advanced course. The book “English for biotechnology – preliminary course” is used to teach student in the field of biotechnology in the second year. It contains skills in English used to understand and communicate in biotechnology area. The topics in this book are general in biotechnology, so the book is useful for introductory course before the student learn professional knowledge in English in the course “English for biotechnology – advanced course”

This book contains 7 lessons which cover many aspects in general biotechnology. In each lesson except the last one, there are 5 parts which supply students many skills in the topic. These parts are

1. *Reading the paragraphs*: in each lesson, one or some paragraphs will help students learn how to skim, read, and understand the main ideas given in the paragraph. After each paragraph, there will be some questions to overview what students understand through the paragraphs. The most important thing in this part is to give vocabulary in biotechnology.
2. *Learning points* is often graphs, charts which is related to biotechnological aspects which students may learn or expand from the paragraphs
3. *Key structure* is grammatical points that help student feel easy to understand English in scientific papers and also help them in writing.
4. *Special difficulties* is a part of explaining something important in English which is common in scientific papers and student should know
5. *Listening* some talks which is concerned with biotechnological issues. The CD for this book is available

LESSON 1: BIOLOGY OF ANIMAL

1. Reading the paragraphs

Your task is to read these paragraphs and understand them to answer the questions below



As we have already discovered, Biology is the study of living things. Exactly what is a living thing? That can sometimes be a hard question to answer. Rather than try to define exactly what a living thing is, we are going to talk about the characteristics of different living things or organisms

Do you remember your first encounter with a living thing other than a person? Like bugs crawling around or spiders spinning their webs. Or may be it was a flower you saw blooming or a tree that you climbed, or perhaps it was the first fish you caught. All of these different forms of life, like us, require similar things to survive. One of the main things that all living organisms have in common is a compound known as DNA. These "blue – prints of life" help to direct the most basic needs living organisms have: metabolism, growth, and reproduction. Let's talk about each one of these characteristics individually in order to see their importance and how they are held in common by living things.

We talk of metabolism being the process that involves changing matter from an outer environment and transforming that matter within the cells of a living organism, so that organism can benefit from the energy being produced by metabolism and then uses it for the other necessities of life. Look at it in this way. We need to have the energy and strength to do what ever it is we do in life, play, study, work, or simply to maintain a health body. We need to eat. Let's say we eat an apple. Eating the apple is the process by which we take matter from the outer environment insides our bodies so that the cells in our bodies can transform the apple into substances that our body can use to help us live. One thing that happens as a result of talking in matter (like the apple) from the outer environment and putting it to work of forming it into usable substances is growth. You know that as you eat more you are able to grow. This is the same for any living organism. The more energy it can transform the more it can build itself and grow.

Along with being able to transform matter into usable energy, living organisms have the ability to makes copies of themselves in order to insure that life will continue. As we have seen, this is called reproduction. This is often considered as an extension to growth process. There are two types of reproduction that characterize living things. The first is known as asexual reproduction. A good example of this type of reproduction is the bacteria. Bacteria grow and soon reach maturity. Once they're reached maturity they split into two separate organisms, each being (almost) identical. Thus, asexual reproduction has occurred where there is one parent and the cell(s) produced is/ are essentially identical. The other type of reproduction that is used by more complex living organisms is where two different parents join to produce a new organism and is known as sexual reproduction.

Another characteristic of living thing is that they are organized in what we'll call an increasing order. For example, when you look at a car or a house, you see the entire object or structure. Likewise, when you look at pine tree or an elephant you see the whole object. What we don't see are the individual parts like every nail in the house, or every hose in the car. The bottom line is that the entire object is made up of the bunch of smaller objects that perform a specific task. . We will study these different levels of organization as they deal with subatomic particles (protons, neutrons, and electrons) that form atoms, and combination of atoms that form molecules (like water). We will also see that cells contain smaller units called organelles that work together in sustaining life within the cell. Getting increasingly larger we see how cells that perform similar function form tissues which in turn form organs. The organs join to form organ systems which ultimately form multicellular organisms. Organisms then form population of similar organisms, populations of different organisms form a community and this, when combined with the physical environment is called an ecosystem. Different ecosystems join together to form the biosphere - or this world in which we live.

To give a brief example of this, let's look at our own human experience. When you think about it, our bodies are made up of billions and billions of atoms (which are made of the subatomic particles). These atoms form molecules (like sugar) which help us to live. Each one of the cells in our body has tiny organelles that help the cell to survive. Cells with like functions are joined together to form tissues, like muscle tissue. There tissues join to form an organ like the heart (a muscle) and the heart and all the other organs in the body (liver, eyes, stomach) make us a living organism. All human are alike and thus form a population, which, when joined with the other types of organisms around us (like trees birds, and other animal) form a community. One community in a specific area (for instance the community of living organisms in a desert) forms an ecosystem. And, the different ecosystems (like mountains, oceans, rivers, arctic regions, etc) come together to form the biosphere.

Seeing how all these things rely on the others in order to live make it easier to understand the cycle of life or the food chain (as it is sometimes called). Put in simple terms, all organisms rely on other organisms for survival. Lions eat other animals like the antelopes or gazelles for their energy, while the antelopes and gazelles eat grass for their energy. The grass receives its energy and nutrients from the sun and the decomposed bodies of animals that have died. So the grass goes into the antelope

which goes into the lion which, after time, goes back into the grass being decomposed and it is one continuous cycle. In biology we have special terms for these different organisms within the food chain. The grass (and mainly all plants) is called producers, since they produce energy from the sun by means of the process known as photosynthesis. The antelopes that eat the grass (herbivores) and the lions that eat them (carnivores) are known as consumers. And once the consumers have gone, the decomposer (bacteria, fungi, etc) break up the organic material to be used by the producers. Incidentally, when the producers have also died, they are taken care of by the decomposers as well. And everything has its place in this cycle and biology helps us understand each place and function within cycle of life.

Vocabulary

Bio- life, living things

Eco- environment

Photo- light

Synthesis process of putting simpler building blocks together to form more complex blocks

-logy study of

Biology the study of life or living things

Environment the surroundings of any organisms

Ecology the study of environment

Photosynthesis the process by which plants transform the energy of the sun into usable energy as sugars

Metabolism the exchange of chemical matter with the outer environment and the transformation of organic material within the cells of an organism generally involves the release or use of chemical energy

Energy the ability of capacity to make things happen or do work

Growth the process in which an organism increases in size by taking in material from the environment and organizing it in its own structures.

Reproduction the ability of living things to produce copies of themselves

Asexual repro. Reproduction that involves only one parent and results in cells that are generally identical to the parent. Commonly seen in plants, simple animals, and bacteria

Sexual repro. Reproduction that involves two different parents joining to form a new individual. Generally seen in more complex organism

Atom the smallest particle of matter containing the properties of an element

Subatomic particle particles that make up an atom – proton, neuron, and electron

Molecule a unit of two or more of the same or different elements joined together

Organelle small sacs or compartments inside a cell that perform specific functions

Cell the smallest living unit which could live independently or form a part of an organism

Tissue a group of cells that have a similar structure that perform a specific activity

Organ a unit of tissues that perform a specific function in a body

Organ system two or more organs that act together to perform an activity

Organism a unit composed of specialized cells, tissue, organs, and usually organ systems, generally any living plant or animal

Population the total number of individuals of species or forms of plant or animal that live in the same area

Community the population of all species living in the same area

Ecosystem the community and its environment

Biosphere the part of the earth's surface and its immediate atmosphere where organisms live

Producer organisms capable of making organism material using the light from the sun, mainly plants

Consumer any organism that consume other organisms like carnivore and herbivore

Decomposer organism that feed on the remains of other organisms, like bacteria and fungi

Food chain (cycle of life) a cycle in which organism are arranged in such a way that one group feeds on the group that comes before it

Herbivore plant eater

Carnivore meat eater

Exercise

1. The exchange of chemical matter with the outer environment and the transformation of organic material within the cell generally involves the release or use of chemical energy

A. metabolism B. DNA
C. growth D. molecule

2. The "blue-prints of life", a molecule found in most organisms that controls the structure of protein

A. cell B. Organelle
C. DNA D. organ

3. The process in which an organism increases in size by taking in material from environment and organizing it in its own structure

A. metabolism B. population
C. growth D. decomposition

4. A unit of two or more of the same different elements joined together

A. biosphere B. ecosystem
C. community D. molecule

5. Small sacs or compartments inside the cell that perform specific function

A. asexual reproduction B. organelle
C. population D. organism

6. The smallest living unit which could live independently or form part of organism

A. cell B. tissue
C. biosphere D. producer

7. A unit of tissues that performs specific function like a heart, liver

A. asexual reproduction B. population
C. community D. organ

8. Reproduction that involves only one parent and results in cells that are generally identical to the parent

A. asexual reproduction B. sexual reproduction
C. organ system D. food chain

9. A cycle in which organisms are arranged in such a way that one group feed on others

A. food chain B. metabolism
C. consumer D. producer

10. Reproduction that involves two different parents joining to form a new individual

A. ecosystem B. sexual reproduction
C. producer D. organ system

11. Organisms that feed on the remains of other organisms, like bacteria and fungi

A. energy B. consumer
C. decomposer D. photosynthesis

12. Two or more organs that act together to perform an activity

A. cycle of life B. organ system
C. metabolism D. organism

13. Organisms capable of making organic material using the light from the sun, mainly plants

A. consumers B. reproducer
C. producer D. decomposer

14. A group of cells that have similar structure that perform a specific activity

A. organisms B. organ
C. tissue D. DNA

15. The total number of individuals of a species or form of plant and animal that live in the same area

A. evolution B. ecology
C. population D. synthesis

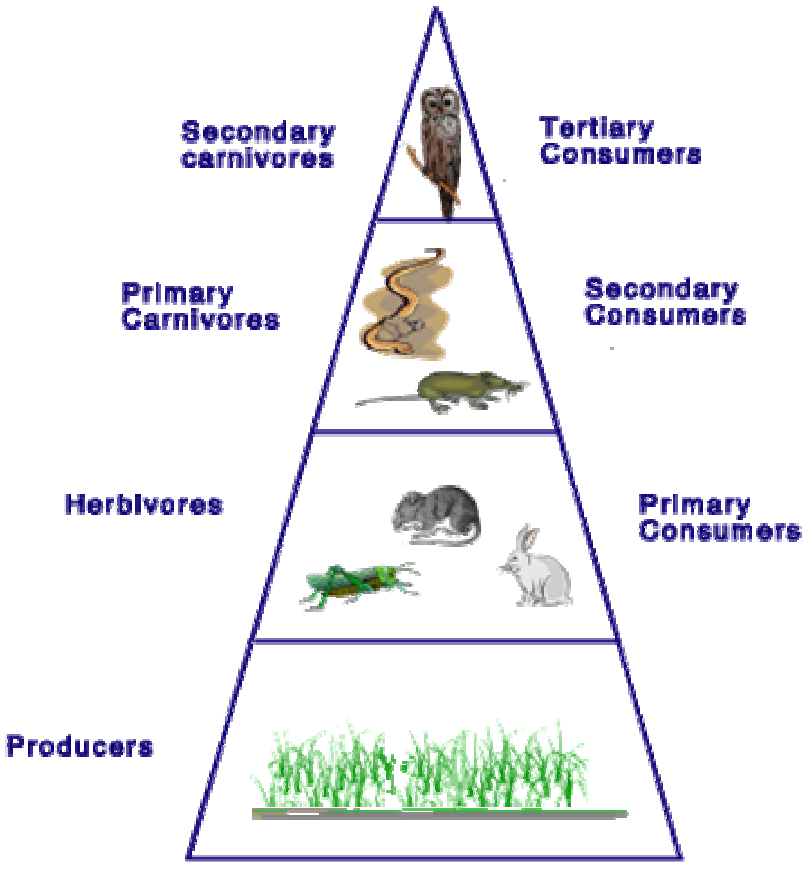
16. Any organism that consume other organisms, like carnivores and herbivores

A. consumer B. community
C. biosphere D. ecosystem

17. The population of all species living t=in the same area
    A. metabolism B. subatomic particles
    C. community D. population
18. The community and its environment
    A. species B. atom
    C. ecology D. ecosystem
19. The part of the earth's surface and its immediate atmosphere where organism live
    A. species B. atom
    C. biosphere D. ecosystem
20. Another name for herbivores and carnivores in cycle of life is
    A. food chain B. metabolism
    C. consumer D. community

2. Learning points

- *Look at the chart Ecological pyramid and explain it in English*



3. Key structures

NORMAL SENTENCE PATTERN IN ENGLISH

Most simple sentence has a structure explained as below

Subject	*verb*	*complement*	*modifier*
Doctor	can remove	a lung cancer	nowadays
Scientists	used	this method	last year



***COMPLEMENT*:** a complement completes the verb. It is similar to the subject because it is usually a noun or noun phrases; however, it generally follows the verb when the sentence is in the active voice. *Every sentence does not require a complement.* The complement **CANNOT** begin with **a preposition**. A complement answers the question what? Or whom?

Examples of complements:

Prokaryotic cells lack *a nucleus*. (What do prokaryotic cells lack?)
Gram-negative bacteria contain *an outer wall layer*. (What do Gram-negative bacteria contain?)
Mr. Brown was raising *a lot of cows*. (What was Mr. Brown raising?)
Dana took care of *her husband* for nine years. (Whom did Dana take care for 9 years?)



***MODIFIER*:** a modifier tells the time, place, or manner of the action. Very often it is a prepositional phrase. A prepositional phase is a group of words that begins with a preposition and ends with a noun. *A modifier of time usually comes last if more than one modifier is present.*

Example of prepositional phrases:

In the morning, at the university, on the table

A modifier can also be an adverb or an adverbial phrase.

Last night, hurriedly, next year, outdoors, yesterday

NOTE: *every sentence does not require a modifier. A modifier answers the question when? Where? Or how?*

Example of modifier:

Most energy conservation occurs **in cyclic photophosphorylation**.
Modifier of place
(Where does most energy conservation occurs?)

Non-small cell lung cancers spread **slowly** **to other parts of the body.**
Modifier of manner *Modifier of place*
(How do non-small cell lung cancers spread to other parts of the body?)

Scientists used this method **last year**.
Modifier of time
(When did scientists use this method?)

♣ **NOTE:** the modifier normally follows the complement, but not always. However, the modifier, especially when it is a prepositional phrase, usually cannot separate the verb and the complement.

Exercise: Underline each components (S, V, Modifier, Complements) of these sentences

1. Most people have heard the sound of bees among flowers
2. Each colony lives in a hive
3. Pollen is the reproductive material of plants
4. Bees make honey through a special process

4. Special difficulties

Prefixes and suffixes mean "NOT"

- **UN** + ADJ => ADJ

Eg: unavailable, unable, and uncomfortable

- **IN** + ADJ => ADJ

eg: (usually il- before "l" <illogical>, im- before "b, m, or p" <imbalance, immoral, impractical>, ir- before r <irreducible>, and in- before other sound <inappropriate>

- **DIS**+ADJ/Verb => ADJ/V

eg: disadvantage, disappear, dislike

- **NON**+ADJ/N => ADJ/N

eg: a non-stop flight, non-alcoholic drinks, a non-smoker

- **DE**+N/V => N/V

eg: defrost a fridge, dehydration

- NOUN + **LESS** => ADJ

Eg: careless, harmless, and homeless

- **A/an** + ADJ => ADJ

Eg: asexual, atypical, anaerobic

Please try to find out some words like these in the passages and make complete sentences in which have the words you got

5. Listening to the talk



• *Listen and discuss on the idea given in the talk*

- which animal they talked about
- their characteristic
- their product
- how they live

LESSON 2: MICROBIOLOGY

1. Reading the paragraphs



The term "virus" is derived from the Latin word for poison or slime. It was originally applied to the noxious stench emanating from swamps that was thought to cause a variety of diseases in the centuries before microbes were discovered and specifically linked to illness. But it was not until almost the end of the nineteenth century that a true virus was **proven** to be the cause of a disease.

The **nature** of viruses made them impossible to detect for many years even after bacteria had been discovered and studied. Not only are viruses too small to be seen with a light microscope but they also cannot be detected through their biological activity except as it occurs in conjunction with other organisms. In fact, viruses show no traces of biological activity by themselves. Unlike bacteria, they are not living agents in the strictest sense. Viruses are very simple pieces of organic material composed only of nucleic acid either DNA or RNA enclosed in a coat of protein made up of simple structural units (some viruses also contain carbohydrates and lipids.) They are parasites requiring human, animal, or plant cells to live. The virus replicates by attaching to a cell and injecting its nucleic acid. Once inside the cell, the DNA or RNA that contains the virus' genetic information takes over the cell's biological machinery and the cell begins to manufacture viral proteins rather than its own.

1. Which of the following is the best title for the passage?
   (A) New Developments in Viral Research
   (B) Exploring the Causes of Disease
   (C) DNA of virus
   (D) Understanding Viruses

2. Before microbes were discovered it was believed that some diseases were caused by
   (A) germ - carrying insects
   (B) Certain strains of bacteria
   (C) Foul odors released from swamps
   (D) Slimy creatures living near swamps

3. The word "proven" is closest meaning to which of the following.
    (A) Shown
    (B) Feared
    (C) Imagined
    (D) Considered

4. The word “nature" is closest in meaning to which of the following?
    (A) Self - sufficiency
    (B) Shapes
    (C) Characteristics
    (D) Speed
5. The author implies that bacteria were investigated earlier than viruses because
    (A) Bacteria are easier to detect
    (B) Bacteria are harder to eradicate
    (C) Viruses are extremely poisonous
    (D) Viruses are found only in hot climates
6. All of the following may be components of a virus EXCEPT
    (A) RNA
    (B) Plant cells
    (C) Carbohydrates
    (D) A coat of protein

Bacteria are extremely small living things. While we measure our own sizes in inches or centimeters, bacterial size is measured in microns. One micron is a thousandth of a millimeter (a pinhead is about a millimeter across). Rod shaped bacteria are usually from two to four microns long, while rounded ones are generally one micron in diameter. Thus if you enlarged a rounded bacterium a thousand times, it would be just about the size of a pinhead. An adult human magnified by the same amount would be over a mile (1.6 kilometers) tall. Even with an ordinary microscope, you must look closely to see bacteria. Using a magnification of 100 times, one finds that bacteria are barely visible as tiny rods or dots. One cannot make out anything of their structure. Using special stains, one can see that some bacteria have wavy - looking "hairs" called flagella attached to them . Others have only one flagellum. The flagella rotate, pushing the bacteria though the water. Many bacteria lack flagella and cannot move about by their own power while others can glide along over surfaces by some little understood mechanism.

From the bacterial point of view, the world is a very different place from what it is to humans. To a bacterium, water is as thick as molasses is to us. Bacteria are so small that they are influenced by the movements of the chemical molecules around them. Bacteria under the microscope, even those with no flagella, often bounce about in the water. This is because they collide with the water molecules and are pushed this way and that. Molecules move so rapidly that within a tenth of a second the molecules around a bacterium have all been replaced by new ones even bacteria without flagella are thus constantly exposed to a changing environment.

7. Which of the following is the main topic of the passage?
   (A) The characteristics of bacteria
   (B) How bacteria reproduce
   (C) The various functions of bacteria
   (D) How bacteria contribute to disease
8. Bacteria are measured in
   (A) Inches
   (B) Centimeters
   (C) Microns
   (D) Millimeters
9. Which of the following is the smallest?
   (A) A pinhead
   (B) A rounded bacterium
   (C) A microscope
   (D) A rod - shaped bacterium
10. According to the passage, someone who examines bacteria using only a microscope that magnifies 100 times would see
   (A) Tiny dots
   (B) Small "hairs"
   (C) Large rods
   (D) Detailed structures
11. The relationship between a bacterium and its flagella is most nearly analogous to which of the following?
   (A) A rider jumping on a horse's back
   (B) A ball being hit by a bat
   (C) A boat powered by a motor
   (D) A door closed by a gust of wind
12. In line 14, the author compares water to molasses, in order to introduce which of the following topics?
   (A) The bacterial content of different liquids
   (B) What happens when bacteria are added to molasses
   (C) The molecular structures of different chemicals
   (D) How difficult it is for bacteria to move through water

Fungi, of which there are over 100,000 species, including yeasts and other single-celled organisms as well as the common molds and mushrooms, were formerly classified as members of the plant kingdom. However, in reality, they are very different from plants and today they are placed in a separate group altogether. The **principal** reason for this is that none of them possesses chlorophyll, and since they cannot synthesize their own carbohydrates, they obtain their supplies either from the breakdown of dead organic matter or from other living organisms. Furthermore the walls of fungal cells are not made of cellulose, as those of plants are, but of another complex sugar-like polymer called chitin, the material from which the hard outer skeletons of shrimps, spiders, and insects are made. The difference between the chemical composition of the cell walls of fungi and those of plants is of enormous importance because it enables the tips of the growing hyphae, the threadlike cells of the fungus, to

secrete enzymes that break down the walls of plant cells without having any effect on those of the fungus itself. It is these cellulose- destroying enzymes that enable fungi to attack anything made from wood, wood pulp, cotton, flax, or other plant material. The destructive power of fungi is impressive. They are a major cause of structural damage to building timbers, a cause of disease in animals and humans, and one of the greatest causes of agricultural losses. Entire crops can be wiped out by fungal attacks both before and after harvesting. Some fungi can grow at + 50^{o}C, while others can grow at -5C, so even food in cold storage may not be completely safe from them. On the other hand, fungi bring about the decomposition of dead organic matter, thus enriching the soil and returning carbon dioxide to the atmosphere. They also enter into a number of mutually beneficial relationships with plants and other organisms. In addition, fungi are the source of many of the most potent antibiotics used in clinical medicine, including penicillin.

13. What does paragraph 1 mainly discuss?
    (A) Differences between simply and complex fungi
    (B) Functions of chlorophyll in plants
    (C) Functions of sugar in the walls of fungal cells
    (D) Differences between fungi and plants

14. Which of the following is mentioned as a major change in how scientists approach the study of fungi?
    (A) Fungi are no longer classified as plants
    (B) Some single-cell organisms are no longer classified as fungi.
    (C) New methods of species identification have been introduced
    (D) Theories about the chemical composition of fungi have been revised.

15. The word "principal" is closest in meaning to
    (A) True
    (B) Main
    (C) Logical
    (D) Obvious

16. According to the passage, how do fungi obtain carbohydrates?
    (A) The absorb carbohydrates from their own cell walls.
    (B) They synthesize chlorophyll to produce carbohydrates.
    (C) They produce carbohydrates by breaking down chitin.
    (D) They acquire carbohydrates from other organic matter, both living and dead.

17. The passage mentions shrimps, spiders, and insects in line 9 because their skeletons
    (A) Can be destroyed by fungi
    (B) Have unusual chemical compositions
    (C) Contain a material found in the walls of fungal cells
    (D) Secrete the same enzymes as the walls of fungal cells do

18. Which of the following terms is defined in the passage?
    (A) "Chlorophyll"
    (B) "Polymer"
    (C) "Hyphae"
    (D) "Enzymes"

19. The word "those" in line 12 refers to
    (A) Tips
    (B) Hyphae
    (C) Enzymes
    (D) Walls

20. Fungi have all of the following characteristics EXCEPT
    (A) They grow hyphae.
    (B) They secrete enzymes.
    (C) They synthesize cellulose.
    (D) They destroy crops.

21. The word "Entire" in line 19 is closest in meaning to
    (A) certain
    (B) Whole
    (C) Mature
    (D) Diseased

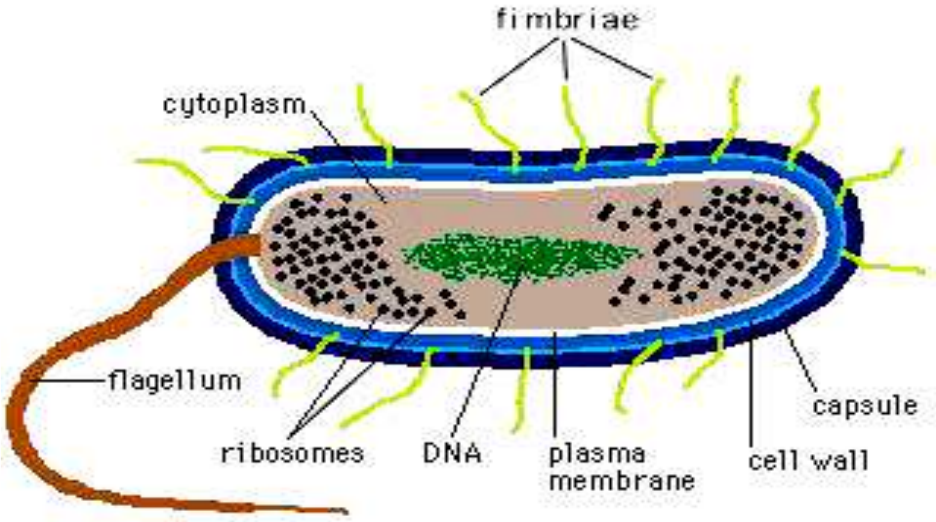
22. The passage describes the negative effects of fungi on all the following EXCEPT
    (A) Buildings
    (B) Animals
    (C) Food
    (D) Soil

23. The phrase "bring about" in line 19 is closest in meaning to
    (A) Cause
    (B) Join
    (C) Take
    (D) Include

24. The passage mentions "penicillin" in line 22 as an example of
    (A) A medicine derived from plants
    (B) A beneficial use of fungi
    (C) A product of the relationship between plants and fungi
    (D) A type of fungi that grows at extreme temperatures.

2. Learning points

The picture below is a general idea about bacterial structure



3. Key structures

PASSIVE VOICE

ACTIVE	**PASSIVE**
Infections **cause** most fevers (**Object**)	Most fevers **are caused** by infections (**Subject**)
People **called** it a unit of life (**Object**)	It **was called** a unit of life (**Subject**)
People also know that veterinary medicine is concerned with the diagnosis, treatment and prevention of diseases in animals	It is also known that veterinary medicine is concerned with the diagnosis, treatment and prevention of diseases in animals Veterinary medicine is also known to be concerned with the diagnosis, treatment and prevention of diseases in animals

The passive statements

Subject	*be (not)*	*Past participle*	*(by+object)*	
Most fevers	are (not)	caused	by infection	
It	was (not)	called		a unit of life

Exercise: Change these sentences into passive and join into one sentence

1. Periodic outbreaks of disease in the community can often naturally boost memory of immunity

.....

2. The protozoa, fungi, plants, and animals represent the eukaryotes

.....

3. Spores are very resistant to heat, harmful agents such as drying, radiation, acids, and chemical disinfectants and even harsh chemicals cannot destroyed these spores easily

.....

4. The nuclear envelope surrounds the nucleus in eukaryotic cell

.....

5. People also say that disease means a change in the normal condition of an animal caused by a living organism

.....

6. They call diseases caused by living organisms infectious

.....

7. Small flying insects can transmit viruses from one animal to others

.....

4. Special difficulties

Look at the sentence:

"An adult human magnified by the same amount would be over a mile (1.6 kilometers) tall"

How to say "1.6" in English?

or "One micron is a thousandth of a millimeter (a pinhead is about a millimeter across)"
*What does "*a thousandth of a millimeter" mean ?

In this part, we will learn how to say this number and a variety of kind of number which are usually seen in scientific papers.

Cardinal and ordinal number:

1, 2, 3	One, two, three
Over 20: 35; 67	thirty-five; sixty-seven
Over 100	
329	three hundred and twenty nine
Over 1000	
1100	one thousand one hundred (eleven hundred)
2500	two thousand two hundred (twenty-five hundred)
33,423	thirty three thousand four hundred and twenty three
2,768,941	two million seven hundred and sixty eight thousand nine hundred and forty one

1^{st}; 2^{nd}; 3^{rd}; 4^{th}; 5^{th}; 9^{th}; 12^{th}; 21^{st}

First; second; third; fourth; fifth; ninth; twelfth; twenty-first

Fractions, decimals, and percentage

1/2	a/one half
1/3	a/one third
1/4	a/one quarter
3/4	three quarters
9/10	nine tenths
19/56	nineteen over fifty-six
5 ½	five and a half
0.67	nought/zero/oh point six seven
3.142	three point one four two
65%	sixty-five percent

Other mathematical expression

(+)	plus
(–)	minus
(x)	times / multiplied by
(÷)	divided by
(=)	is / equals
3^2	three squared
5^3	five cubed
6^8	six to the power of eight
$\sqrt{\ }$	square root of

5. Listening to the talk



Bacteria in Food



- ***Listen and try to answer these question***

1. How many kilograms of ground beef are used to make hamburgers?
2. How many people are sick in five states?
3. How are *E.coli* passed to beef?
4. Where are *Listeria* found naturally?
5. What are other bacteria mentioned and which food related to them?

LESSON 3: FOOD AND HEALTH

1. Reading the paragraphs

Your task is to read these paragraphs and understand them to answer the questions below



The food we eat seems to have profound effects on our heath. Although science has made enormous steps in making food more **fit** to eat, it has, at the same time, made many foods unfit to eat. Some research has shown that perhaps eighty percent of all human illnesses are related to diet and forty percent of cancer is related to diet as well, especially cancer of colon. People of different cultures are more **prone** to contract certain illnesses because of the characteristic foods they consume.

That food is related to illness is not a new discovery. In 1945, government researchers realized that nitrates and nitrites (commonly used to preserve color in meats) as well as other food **additives** caused cancer. Yet, **these carcinogenic**

additives remain in our food, and it becomes more difficult all the time to know which ingredients on the packaging labels of processed food are helpful or harmful.

The additives that we eat are not all so direct. Farmers often give penicillin to cattle and poultry, and because of this, penicillin has been found in the milk of treated cows sometimes similar drugs are administered to animals not for medicinal purposes, but for financial reasons. The farmers are simply trying to fatten the animals in other to obtain a higher price on the market. Although the Food and Drug Administration has tried repeatedly to control these procedures, the practices continue.

A healthy diet is directly related to good health. Often we are unaware of detrimental substances we ingest. Sometimes well-meaning farmers or other who do not realize the consequences add these substances to food without our knowledge.

1. How has science done a disservice to people?
    A. Because of science, disease caused by contaminated food has been virtually eradicated.
    B. It has caused a lack of information concerning the value of food
    C. As a result of scientific intervention, some potentially harmful substances have been added to our food.
    D. The scientists have preserved the color of meats, but not of vegetables.
2. The word “prone” is nearest in the meaning to
    A. Supine
    B. Unlikely
    C. Healthy
    D. predisposed
3. What are nitrates used for?
    A. They preserve flavor in packaged foods
    B. They preserve the color of meats
    C. They are the objects of research
    D. They cause the animals to become fatter.
4. FDA means
    A. Food Direct Additives
    B. Final Difficult Analysis
    C. Food and Drug Administration
    D. Federal Dairy Additives
5. The word “these” refers to
    A. Meats
    B. Colors
    C. Researchers
    D. Nitrates and nitrites

6. The word “carcinogenic” is closest in meaning to
    A. Trouble-making
    B. Color-retaining
    C. Money-making
    D. Cancer-causing

7. All of the following statements are true EXCEPT
    A. Drugs are always given to animals for medical reasons
    B. Somes of the additives in our food are added to the food itself and some are given to the living animals
    C. Researchers have known about the potential hazards of food additives for more than forty-five years
    D. Food may cause forty percent of the cancer in the world

8. The word “additives” is closest meaning to
    A. Added substances
    B. Dangerous substances
    C. Natural substances
    D. Benign substances

9. What is the best title for this passage?
    A. Harmful and Harmless Substances in Food
    B. Improving Health Through a Natural Diet
    C. The Food You Eat Can Affect Your Health
    D. Avoiding Injurious Substances in Food

10. The word “fit” is closest in meaning to
    A. Athletic
    B. Suitable
    C. Tasty
    D. Adaptable

A **nutrient** is either a chemical element or compound used in an organism's metabolism or physiology. Six nutrient groups exist and are broadly classified into those providing energy, and those used as components in the body or cellular structures. A nutrient is essential to an organism if it cannot be synthesized in the organism and must be obtained from a food source.

- *Carbohydrates* are compounds made up of sugars. Carbohydrates are classified by their number of sugar units: monosaccharide (such as glucose and fructose), disaccharides (such as sucrose and lactose), oligosaccharides, and polysaccharides (such as starch, glycogen, and cellulose). These substances provide energy for the cell.

- *Proteins* are organic compounds that consist of the amino acids joined by peptide bonds. The body cannot manufacture some of the amino acids (termed essential amino acids); the diet must supply these. In nutrition, proteins are broken down through digestion back into free amino acids. These substances provide material for the cell building and other cell components

- *Fats* consist of a glycerin molecule with three fatty acids attached. Fatty acids are unbranched hydrocarbon chains, connected by single bonds alone (saturated fatty acids) or by both double and single bonds (unsaturated fatty acids). Fats are needed to keep cell membranes functioning properly, to insulate body organs against shock, to keep body temperature stable, and to maintain healthy skin and hair. The body does not manufacture certain fatty acids (termed essential fatty acids) and the diet must supply these. These substances can be used to provide energy for the cell and also cell building.

- *Minerals* are generally trace elements, salts, or ions such as copper and iron. These minerals are essential to human metabolism.

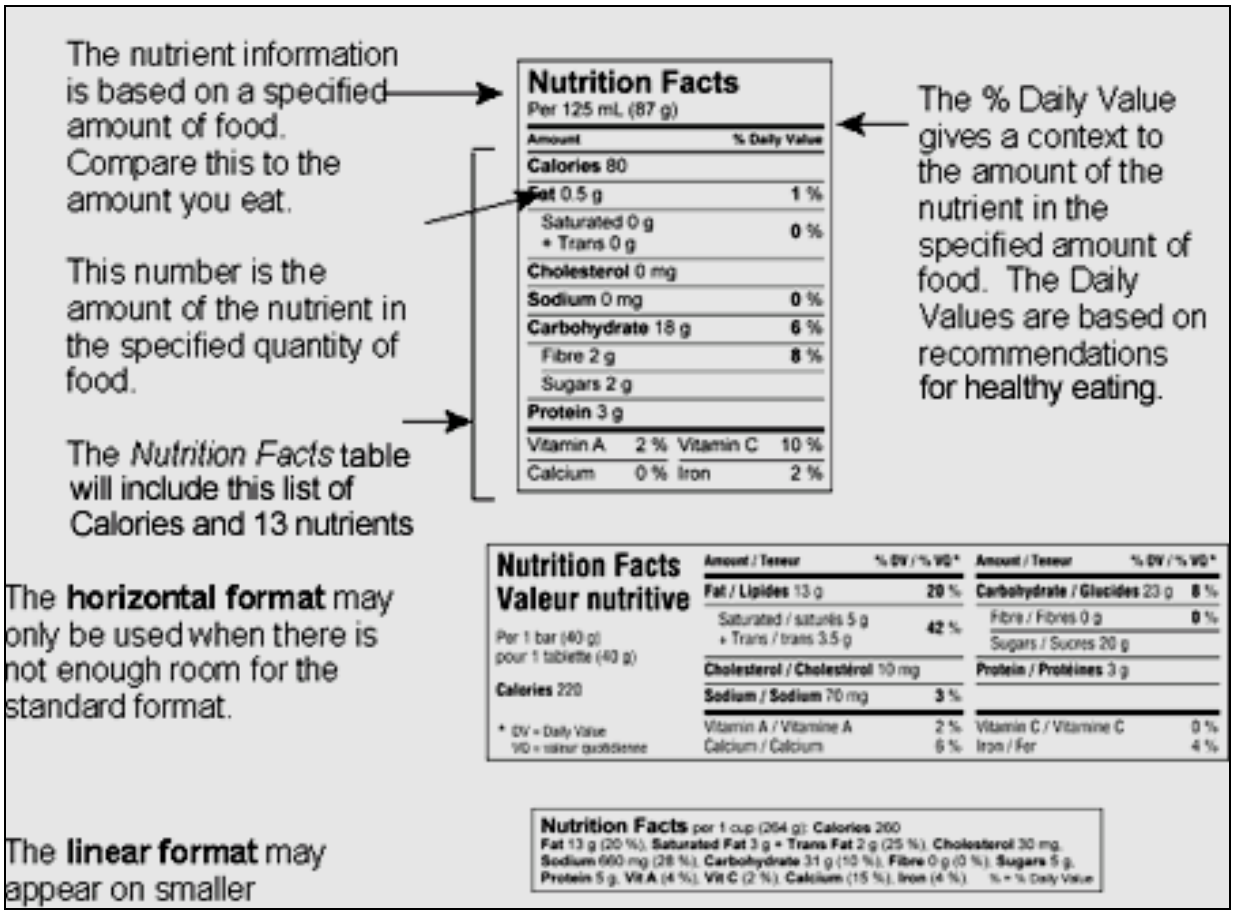
- *Vitamins* are organic compounds essential to the body. They usually act as coenzymes or cofactors for various proteins in the body.

- *Water* is an essential nutrient and is the solvent in which all the chemical reactions of life take place. The last types are considered as substances that support metabolism

11. What is the best title of the paragraph?
    A. Nutrient and its use
    B. Nutrient and its application
    C. Nutrient definition
    D. Nutrient value
12. Which one is not classified as energy provider?
    A. iron
    B. protein
    C. fat
    D. starch
13. Carbohydrate is broken down through digestion back into
    A. amino acid
    B. fatty acid
    C. mineral
    D. sugar
14. In the paragraph, how many kinds of nutrients are classified as substances that support metabolism?
    A. 1
    B. 2
    C. 3
    D. 6
15. What is called a nutrient which cannot be produced in the body?
    A. Important nutrient
    B. Essential nutrient
    C. essential fatty acids
    D. Vitamin

2. Learning points

Look at the graph and say what you can learn



3. Key structures

COMPARISONS

UNEQUAL COMPARISONS

Short + **ADJ/ADV** + ER (+than…)
More + *long* **ADJ/ADV** (+than…)
Less + *long* **ADJ/ADV** (+than…)

Short adj: 1 syllable
Long adj: ›2 syllable

{More / Fewer / Less} + NOUN + than + {noun / pronoun}

As + {Many / Much / Little / Few} + NOUN + as + {noun / pronoun}

EX:

1. Fimbriae are considerably **shorter** *than* flagella and are **more numerous.**
2. Goats with horns seem to survive **better** in the heat *than* goats without horns.
3. It was demonstrated that cloned mice were both **larger** in size and **heavier** *than* a control group of non-cloned mice.
4. The scientists say their method can produce a **quicker** and **more** complete *recovery* **than** current treatments.
(Noun) *(Adj)*
5. He works **less** carefully than { I (formal) / me (informal) }
(Adv)

6. Trees that make it possible to produce paper with **less** environmental damage
(Noun)
7. UNOS says transplant operations in the United States last year used almost **as many organs** from living donors **as** from people who had died.
(Noun)

EQUAL COMPARION

* AS + Adj / Adv + AS + noun / pronoun

* The same + (noun) + as + noun / pronoun

EX:

1. The results showed that the birds that received extra vitamin E did not get infected **as often as** the others.
2. Penguine can dive **as deep as** four hundred and sixty meters and hold their breath for up to twenty minutes.
3. The centers of their bodies keep warm, while the outer parts of their bodies stay almost **as cold as** the outside temperatures.
Ronald had **the same** genes **as** Richard, but was in excellent health.

Double comparatives

One clause

Short Adj / Adv + _ER + And + Short Adj / Adv+ER

More and more + long Adj / Adv

Less and less + Adj / Adv

Two clause

The + comparative + S + VF, the + comparative + S + VF

* BE can be omitted in the double comparative with **two clauses** when the subjects are **noun**

EX:

1. She becomes fatter and fatter.
   ⇨ The fatter she becomes, the less she eats.
   the more attractive she looks.

2. Our research becomes more and more difficult.
   ⇨ The more difficult the research becomes, the harder we try.

3. He works less and less efficiently.
   ⇨ The less efficiently he works, the less progress he makes
   the less chance of getting promotion he has.

4. My sister is mature
   She gets wise
   ⇨ The more mature my sister (is), the wiser she gets.

5. The smaller molecules can weave in and out of the matrix of the gel with more ease, compared with larger molecules

4. Special difficulties

Look at the word "carcinogenic" and learn this

… genous (a.), … genesis (n.), … genecity (n.), … genic (a.), … gen (n.) = producing
endogenous: originating within the organism
exogenous: of external origin

pathogen: any producing-disease agent or microorganism
pathogenic: capable of causing disease
pathogenesis: the origin and development of disease; pathogenetic (=pathogeny)
pathogenecity:the quality of producing or the ability to produce pathological changes or disease
thermogenesis: the production of heat
antigen: any substance that is capable, under appropriate conditions, of inducing a specific immune response and of reacting with the products of that response; antigenic (a.)
antigenecity: the capacity to stimulate the production of antibodies or cell-mediated immune response
pyrogen: a substance which is capable of producing a pyrexia (a fever); pyrogenic (a)

… *osis* = **… *asis*** = disease

salmonellosis, pasteurellosis, mycosis, fasciolliasis, ascariosis (ascariasis)

Try to look up the meaning of the words

carcinogen – carcinogenic
toxin – toxigen- toxigenic
antigen - antigenic
immunogen – immunogenic

5. Listening to the talk



Before listening, please look at these vocabulary

Tissue an aggregate of cells usually of a particular kind together with their intercellular substance that form one of the structural materials of a plant or an animal and that in animals include connective tissue, epithelium, muscle tissue, and nerve tissue

Digestive system relating to or functioning in digestion (the digestive system)

Fetus an unborn or unhatched vertebrate especially after attaining the basic structural plan of its kind ; specifically : a developing human from usually three months after conception to birth — compare EMBRYO

Homocysteine an amino acid $C_4H_9NO_2S$ that is produced in animal metabolism by the demethylation of methionine and forms a complex with serine that breaks up to produce cysteine and homoserine

Heart attacks a serious medical condition in which your heart suddenly stops working normally: ex: He had a heart attack and was rushed to hospital.
stroke an illness in which your brain becomes damaged and you are unable to move part of your body

Diabete [uncountable] a disease in which your body cannot control the amount of sugar in your blood diabetic

Alzheimer's disease [uncountable] a disease that affects someone's brain, and makes it difficult for them to remember things

Omega three fatty acids being or composed of polyunsaturated fatty acids that have the final double bond in the hydrocarbon chain between the third and fourth carbon atoms from the end of the molecule opposite that of the carboxylic acid group and that are found especially in fish, fish oils, vegetable oils, and green leafy vegetables

Colon the part of the large intestine that extends from the cecum to the rectum

Stomach the part of your body where food goes when you have eaten it

Artery one of the tubes that takes blood from your heart to the rest of your body

Blood Pressure the force with which your blood moves around your body: ex: Older people often have high blood pressure.

Cholesterol a steroid alcohol $C_{27}H_{45}OH$ present in animal cells and body fluids that regulates membrane fluidity, functions as a precursor molecule in various metabolic pathways. Bad cholesterol (low-density lipoprotein, LDL) is a lipoprotein of blood plasma that is composed of a moderate proportion of protein with little triglyceride and a high proportion of cholesterol and that is associated with increased probability of developing atherosclerosis. Good cholesterol (high-density lipoprotein,HDL) is a lipoprotein of blood plasma that is composed of a high proportion of protein with little triglyceride and cholesterol and that is associated with decreased probability of developing atherosclerosis

Liver the organ inside your body that cleans your blood

Bladder the part of your body where urine is stored before it leaves your body

Listen and match the food on the left column and its function on the right column

1	Blueberries	A	increase the good kind of cholesterol in the blood
2	chocolate	B	lower blood pressure and protect against heart disease, improve the levels of sugar in the blood
3	Tomatoes	C	Prevent blockages in the arteries, lowers bad cholesterol, and protect brain cells from diseases like Alzheimer's
4	the skins of red grapes	D	prevent heart attacks and cancer
5	Garlic	E	preventing the bacteria from attacking the bladder
6	Fish such as salmon, herring, mackerel and bluefish	F	prevents problems in developing fetuses, lowers blood levels of homocysteine
7	Green tea	G	protect against cancers of the breast, colon and stomach.
8	Oats	H	reduce cholesterol and make the blood less sticky
9	The dark green vegetable spinach	I	reduce the risk of developing cancer in the digestive system
10	vegetable, broccoli	J	slows the growth of bacteria in the mouth

LESSON 4: FOOD PROCESSING

1. Reading the paragraphs

Your task is to read these paragraphs and understand them to answer the questions below



Surprise! we are cooking health food

Hot boning is an energy-saving technique for the meat processing industry. It has received significant attention in recent years when increased **pressure** for energy conservation has **accentuated** the need for more efficient methods of processing the **bovine carcass**. Cooling an entire carcass requires a **considerable** amount of refrigerated space, since bone and **trimmable** fat are cooled along with the muscle. It is also necessary to space the carcasses adequately in the refrigerated room for better air movement and prevention of microbial contamination, thus adding to the volume requirements for **carcass chillers.**

Conventional handling of meat involves holding the beef sides in the cooler for 24 to 36 hours before boning. Chilling in the traditional fashion is also associated with a loss of carcass weight ranging from 2 percent to 4 percent due to evaporation of moisture from the meat tissue.

Early excision, or hot boning, of muscle prerigor followed by vacuum packaging has several potential advantages. By removing only the edible muscle and fat prerigor, refrigeration space and costs are minimized, boning labor is decreased, and storage yields increased. Because hot boning often results in the toughening of meat, a more recent approach, hot boning following electrical stimulation, has been used to reduce the necessary time of rigor mortis.

Some researchers have found **this** method beneficial in maintaining tender meat, while others have found that the meat also becomes tough after electrical stimulation.

1. The word “accentuated” is meaning to
    A. de-emphasized
    B. speeded up
    C. caused
    D. highlighted

2. All of the following are mentioned as drawbacks of the conventional method of boning EXCEPT
    A. Storage space requirements
    B. Energy waste
    C. Loss of carcass weight
    D. Toughness of meat
3. The word “pressure” is nearest in meaning to
    A. Urgency
    B. Weight
    C. Flavor
    D. Cooking texture
4. Hot boning is becoming very popular because
    A. It cause meat to be very tender
    B. It helps conserve energy and is less expensive than conventional methods
    C. Meat tastes better when the bone is adequately seared along with the meat
    D. It reduces the weight of the carcass
5. The word “carcass chiller” is nearest in meaning to
    A. A refrigerator for the animal body
    B. A method of boning meat
    C. Electrical stimulation of beef
    D. Early excision
6. The word “early excision” is closest in meaning to
    A. Vacuum packaging
    B. Hot boning
    C. Carcass chilling
    D. Electrical stimulation
7. The toughening of meat during hot boning has been combated by
    A. following hot boning with electrical stimulation
    B. tenderizing the meat
    C. using electrical stimulation before hot boning
    D. removing only the edible muscle and fat prerigor
8. The word “bovine” is nearest in meaning to
    A. Cold
    B. Electrically stimulated
    C. Beef
    D. Pork
9. the word “this” refers to
    A. hot boning
    B. hot boning following electrical stimulation
    C. rigor mortis
    D. removing edible muscle and fat prerigor

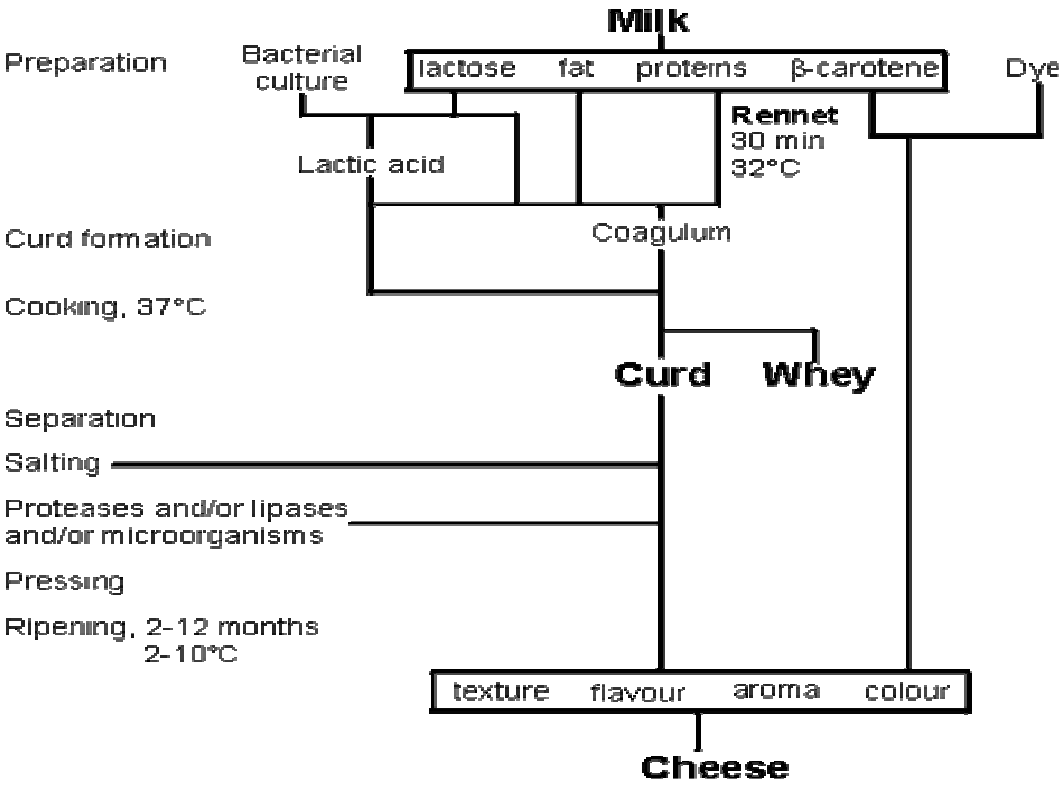
10. the word “carcass” is closest in meaning to
    A. deboned meat
    B. body
    C. refrigerator
    D. fat

11. The word “considerable” is closest in meaning to
    A. Frigid
    B. Kind
    C. Lesser
    D. Substantial

One reason it is recommended to remove bone before refrigerating is that
    E. It make the meat more tender
    F. The bones are able to be used for other purpose
    G. It increases chilling time
    H. It saves cooling space by not refrigerating parts that will be discarded

12. The word “trimmable” is nearest in meaning to
    A. Unsaturated
    B. Removable
    C. Unhealthy
    D. Chillable

2. Learning points



3. Key structures



THE RELATIVE PRONOUNS

Person	**Thing / Animal**
Who (Subject) Whom (Object) Whose + Noun (Possessive Adj)	Which (Subject / Object) = That **OF** which + **THE** + noun (possessive adj) = **THE** + noun + of which

Time	**Place**
When (Adv) = In / On / At } which	Where (Adv) = In / On / At / To } which

Note: only use WHERE and WHEN with these preposition: on, in, at, to.
Ex: The ceiling **under which** (***Not*** *use WHERE*) there are many fans.

These wells mark *the different lanes* **WHERE (in which)** a sample may be loaded.
1997 is *the year* **WHEN** (**at which**) a group of Scottish researchers announced the birth of Dolly.
All goats should have covered *shelters* **WHERE** (**in which**) they can escape the rain and extremely hot or cold weather.
The plants decay into *a mixture* **that** can be spread on *the farmland* **WHERE** (**on which**) the crops are growing.

POSITION OF ADJECTIVE CLAUSE

- After a noun
- After a personal pronoun (*the emphatic form*)
- After pronouns (*all, those, those of you / us / them*)
- After a sentence (*which clause*)

(I.) After a noun

Ex.1: Christopher Reeve is a man.
He was died of lung cancer.
He has active, untreated TB bacteria in his throat or lungs.
His wife is Dana Reeve.
Dana Reeve took care of **him** for nine years until his death last year.

⇨ Christopher Reeve is ***a man*** **WHO** was died of lung cancer.
WHO has active, untreated TB bacteria in his throat or lungs.

WHOSE wife is Dana Reeve.
WHOM Dana Reeve took care of for nine years.

Ex.2: The year
(Adv) **when** the mouflon sheep was successfully cloned.
(object) **which / that** you're mentioned ($\mathbf{V_t}$).
(subject) **which / that** was full of difficulty.

(II.) After a personal pronoun (*the emphatic form*)

Ex: I first saw the embryonic stem cells at Dr. John's laboratory.
⇨ It's was I **who (that)** first saw the embryonic stem cells at Dr. John's laboratory.
(Subject)
⇨ It was the embryonic stem cells **which (that)** I first saw at Dr. John's laboratory.
(object)
⇨ It was Dr. John's laboratory **at which / that / where** I first saw the embryonic stem cells.
(*object of preposition)*
⇨ It was at Dr. John's laboratory **that** I first saw the embryonic stem cells.
(*adv phrase)*

(III.) After pronouns
ALL + THAT
THOSE
THOSE of you / us / them

Ex.1: In the future, scientists can produce **all** **THAT** there are in our bodies.
(*object)*
THAT carry out specific duties, like
(subject) the stomach, the heart, or the lung.
Ex.2: **Those** **WHO** work closely with a TB victim can become infected with the TB bacteria.

(IV). After a sentence (*which clause*)

+ The letters stand for four chemicals called bases**, which** together compose DNA.
+ The cell wall is a rigid structure outside the cytoplasmic membrane**, which** provides support and protection from osmotic lysis.
+ The electron transport system (ETS) is a proton pump that produces the proton motion force**, which** can then be converted to ATP.
+ Aerobic respiration involves oxygen as the terminal electron acceptor**, which** generally produces the most energy.
+ Photosynthetic organisms obtain their energy from light**, which** they can convert to proton motion force, and their carbon source is often CO_2.

Exercise : Now you have to read two or three sentences and then write one sentence with the same meaning. Use a relative clause in your sentence.

1. The fetal cells came from a woman. Her pregnancy was ended at fourteen weeks.

.....

2. The RNA code is then translated to protein code. That is a different “language.”

.....

3. These wells mark the different lanes. A sample may be loaded in these lanes.

.....

4. This photo shows an agarose gel. This gel has not been used.

.....

5. In the United States, the goal of health organizations is to quickly identify infected people. Especially these people have the highest risk of developing the disease.

.....

6. There are several drugs. These drugs can prevent tuberculosis in people. Those people are at risk of becoming infected.

.....

7. Next, they took a cell with an intact genome from a different adult sheep (Dolly's "mother") and fused it to the sheep egg. This egg lacked a genome.

.....

8. The electron transport system (ETS) is a proton pump. It produces the proton motion force. That can then be converted to ATP.

.....

9. Yeast is blended into the mixture of sugar, the yeast use the sugar and release carbon dioxide. That causes the dough to expand and “rise”.

10. This is a process. Beer and wine receive the alcoholic content by this process.

.....

11. This method provided meat for the sailors and animals. These sailors and animals came to the New World with Christopher Columbus.

.....

12. Breeding companies could sell cloned embryos in a manner similar to a way. Semen is currently marketed in this way.

.....

4. Special difficulties

Some common prefixes

re (=again)	rewrite a letter, re-enter a room, remarry
semi (=half)	a semi-conscious state
mono (=one)	monolingual
multi (=many)	multi-layer
super (=big/more)	a supersonic aircraft, super-antigen
sub (=under/less)	sub-devide
mini (=small)	minibus
pre (=before)	pre-clinical, pre-vet, preliminary
post (=after)	postgraduate
ex (=previousy)	ex-wife
inter (=between)	international, interdisciplinary
trans (=across)	transplant
co (=together)	co-worker
over (=too much)	overweight
under (=too little)	undercooked
out (=more/better)	outstanding
anti (=against)	antibiotic
mis (=badly/wrongly)	misuse, misunderstanding

5. Listening to the paragraphs



Curing Meat

Before listening, try to learn these words

Cure: 1 to make an illness or injury better [□ heal]: • This type of cancer can be cured. cure somebody of something • 90% of patients can be cured of the disease. 2 to solve a problem, or improve a bad situation: • an attempt to cure unemployment 3 to preserve food by drying it, hanging it in smoke, or covering it with salt: • cured ham

Interfere [verb-intransitive] to try to become involved in a situation when people do not want you to: interfere in • I wish he'd stop interfering in my life. interfere with something (phrasal verb) to prevent something from continuing or developing successfully: • Don't let sports interfere with your schoolwork.

Salmonella a kind of bacteria in food that makes you ill

Brine salty water, often used for preserving food

inject to put a drug into someone's body by using a special needle: inject something into somebody/something • The vaccine is injected into your arm.

Nitrate a salt or ester of nitric acid

Trichinella a genus (coextensive with the family Trichinellidae of the order Enoplida) of nematode worms comprising the trichinae and being often isolated in a distinct superfamily

Trichinellosis a disease caused by trichinella

Answer these questions

1. What is the purpose of curing meat
A. to interfere with the chane of the color of meat
B. to make meat dry
C. to keep meat for a longer time
D. to improve taste and tender

2. Which subtances is used to cure meat as a traditional method
A. Nitrate
B. Sodium chloride
D. MSG (mono sodium glutamate)
D. All of them

3. How does the meat processing industry speed up the curing process ?
A. keep meat in a salty liquid, called brine, for several days
B. put meat into a lot of rough salt for several days
C. add nitrate into cured meat
D. inject salty liquid directly into the meat

4. Why does the USDA limit the amount of nitrate added to cured meat?
A. Because it makes cured meat become gray
B. Because it destroys all the organisms known to infect uncooked meat
C. Because it makes cured meat more salty
D. Because it can react with proteins to form chemicals that cause cancer

5. What is recomended by scientists at the CDC ?
A. Cooking cured meat can provide extra safety to prevent the possibility of infection
B. Limit the amount of nitrate in cured meat
C. people with high blood pressure and heart disease should limit salt they eat.
D. none of them

LESSON 5: ENVIROMENTAL TOPICS

1. Reading the paragraphs



A useful definition of an air pollutant is a compound added directly or indirectly by humans to the atmosphere in such quantities as to affect humans, animals vegetations, or materials **adversely**. Air pollution requires a very flexible definition that permits continuous change. When the first air pollution laws were established in England in the fourteenth century, air pollutants were limited to compounds that could be seen or smelled-a far cry from the extensive list of harmful substances known today. As technology has developed and knowledge of the health aspects of various chemicals has increased, the list of air pollutants has lengthened. In the future, even water vapor might be considered an air pollutant under certain conditions. Many of the more important air pollutants, such as sulfur oxides, carbon monoxide, and nitrogen oxides, are found in nature. As the Earth developed, the concentrations of these pollutants were **altered** by various chemical reactions; they became components in biogeochemical cycle. These serve as an air purification scheme by allowing the compounds to move from the air to the water or soil on a global basis, nature's output of these compounds dwarfs that resulting form human activities. However, human production usually occurs in a localized area, such as a city. In this localized regions, human output may be dominant and may temporarily overload the natural purification scheme of the cycle. The result is an increased concentration of **noxious** chemicals in the air. The concentrations at which the adverse effects appear will be greater than the concentrations that the pollutants would have in the absence of human activities. The actual concentration need not be large for a substance to be a pollutant; in fact the numerical value tells us little until we know how much of an increase this represents over the concentration that would occur naturally in the area. For example, sulfur dioxide has **detectable** health effects at 0.08 parts per million (ppm), which is about 400 times its natural level. Carbon monoxide, however, ahs a natural level of 0.1 ppm and is not usually a pollutant until its level reaches about 15 ppm.

1. What does the passage mainly discuss?
   (A) The economic impact of air pollution
   (B) What constitutes an air pollutant
   (C) How much harm air pollutants can cause
   (D) The effects of compounds added to the atmosphere

2. The word "adversely" is closest in meaning to
    (A) negatively
    (B) quickly
    (C) admittedly
    (D) considerably
3. It can be inferred from the first paragraph that
    (A) water vapor is an air pollutant in localized areas
    (B) most air pollutants today can be seen or smelled
    (C) the definition of air pollution will continue to change
    (D) a substance becomes an air pollutant only in cities
4. The word "altered" is closest in meaning to
    (A) eliminated
    (B) caused
    (C) slowed
    (D) changed
5. Natural pollutants can play an important role in controlling air pollution for which of the following reasons?
    (A) They function as part of a purification process.
    (B) They occur in greater quantities than other pollutants.
    (C) They are less harmful to living beings than are other pollutants.
    (D) They have existed since the Earth developed.
6. According to the passage, which of the following is true about human-generated air pollution in localized regions?
    (A) It can be dwarfed by nature's output of pollutants in the localized region.
    (B) It can overwhelm the natural system that removes pollutants.
    (C) It will damage areas outside of the localized regions.
    (D) It will react harmfully with naturally occurring pollutants.
7. The word "noxious' is closest in meaning to
    (A) harmful
    (B) noticeable
    (C) extensive
    (D) weak
8. According to the passage, the numerical valued of the concentration level of a substance is only useful if
    (A) the other substances in the area are known
    (B) it is in a localized area
    (C) the naturally occurring level is also known
    (D) it can be calculated quickly
9. The word "detectable" is closest in meaning to
    (A) beneficial
    (B) special
    (C) measurable
    (D) separable

10.Which of the following is best supported by the passage?

(A) To effectively control pollution local government should regularly review their air pollution laws.

(B) One of the most important steps in preserving natural lands is to better enforce air pollution laws.

(C) Scientists should be consulted in order to establish uniform limits for all air pollutants.

(D) Human activities have been effective in reducing air pollution

Scientists have discovered that for the last 160,000 years, at least, there has been a consistent relationship between the amount of carbon dioxide in the air and the average temperature of the planet. The importance of carbon dioxide in regulating the Earth's temperature was confirmed by scientists working in eastern Antarctica.

Drilling down into a glacier, they extracted a mile-long cylinder of ice from the hole. The glacier had formed as layer upon layer of snow **accumulated** year after year. Thus drilling into the ice was **tantamount** to drilling back through time. The deepest sections of the core are composed of water that fell as snow 160,000 years ago. Scientists in Grenoble, France, fractured portions of the core and measured the composition of ancient air released from bubbles in the ice. Instruments were used to measure the ratio of certain isotopes in the frozen water to get an idea of the prevailing atmospheric temperature at the time when that particular bit of water became locked in the glacier. The result is a **remarkable** unbroken record of temperature and of atmospheric levels of carbon dioxide. Almost every time the chill of an ice age descended on the planet, carbon dioxide levels dropped. When the global temperature dropped 9°F (5 °C), carbon dioxide levels dropped to 190 parts per million or so. Generally, as each ice age ended and the Earth basked in a warm interglacial period, carbon dioxide levels were around 280 parts per million. Through the 160,000 years of that ice record, the level of carbon dioxide in the atmosphere fluctuated between 190 and 280 parts per million, but never rose much higher-until the Industrial Revolution beginning in the eighteenth century and continuing today. There is indirect evidence that the **link** between carbon dioxide levels and global temperature change goes back much further than the glacial record. Carbon dioxide levels may have been much greater than the current concentration during the Carboniferous period, 360 to 285 million years ago. The period was named for aprofusion of plant life whose buried remains produced a large fraction of the coal deposits that are being brought to the surface and burned today.

1. Which of the following does the passage mainly discuss?
   (A) Chemical causes of ice ages
   (B) Techniques for studying ancient layers of ice in glaciers
   (C) Evidence of a relationship between levels of carbon dioxide and global temperature
   (D) Effects of plant life on carbon dioxide levels in the atmosphere

2. The word “accumulated” is closest in meaning to_____
   (A) spread out
   (B) changed
   (C) became denser
   (D) built up

3. According to the passage, the drilling of the glacier in eastern Antarctica was important because it
   (A) allowed scientists to experiment with new drilling techniques
   (B) permitted the study of surface temperatures in an ice-covered region of Earth
   (C) provided insight about climate conditions in earlier periods
   (D) confirmed earlier findings about how glaciers are formed

4. The phrase "tantamount to" is closest in meaning to
   (A) complementary to
   (B) practically the same as
   (C) especially well suited to
   (D) unlikely to be confused with

5. According to the passage, Grenoble, France, is the place where
   (A) instruments were developed for measuring certain chemical elements
   (B) scientists first recorded atmospheric levels of carbon dioxide
   (C) scientists studied the contents of an ice core from Antarctica

6. According to the passage, scientists used isotopes from the water of the ice core to determine which of following?
   (A) The amount of air that had bubbled to the surface since the ice had formed
   (B) The temperature of the atmosphere when the ice was formed
   (C) The date at which water had become locked in the glacier
   (D) The rate at which water had been frozen in the glacier

7. The word "remarkable" is closest in meaning to
   (A) genuine
   (B) permanent
   (C) extraordinary
   (D) continuous

8. The word "link" is closest in meaning to
   (A) tension
   (B) connection
   (C) attraction
   (D) distance

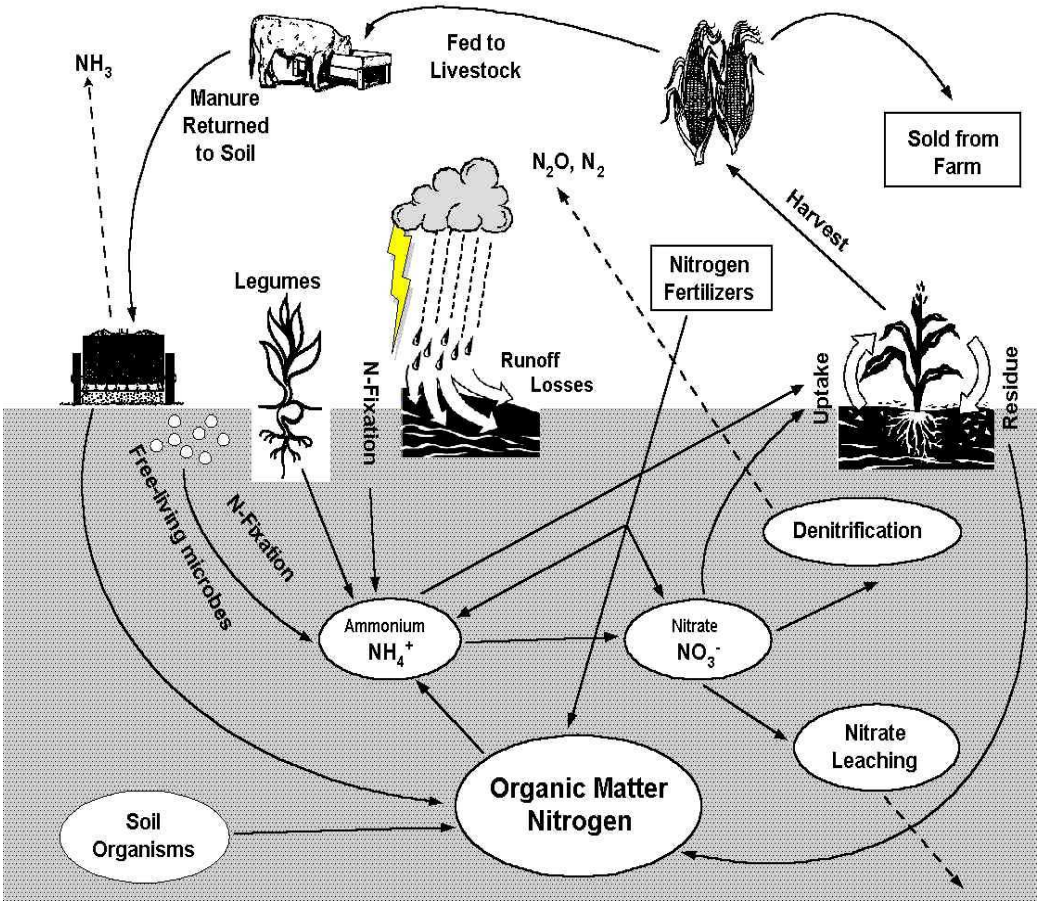
9. The passage implies that the warmest temperatures among the periods mentioned occurred
   (A) in the early eighteenth century
   (B) 160,000 years ago
   (C) at the end of each ice age
   (D) between 360 and 285 million years ago

10. According to the passage, the Carboniferous period was characterized by
   (A) a reduction in the number of coal deposits
   (B) the burning of a large amount of coal
   (C) an abundance of plants
   (D) an accelerated rate of glacier formation

11. The passage explains the origin of which of the following terms?
    (A) Glacier (line5)
    (B) Isotopes (line 11)
    (C) Industrial Revolution (line 21)
    (D) Carboniferous period (lines 26

2. Learning points

Look at the chart showing the nitrogen cycle



3. Key structures

OPTIONAL RELATIVE CLAUSE REDUCTION

❖ **Restrictive clause**: *is one that cannot be omitted from a sentence if the sentence is to keep its original meaning.*

Ex: *People* who (that) drink too much alcohol or use illegal drugs have a higher risk of becoming sick from the tuberculosis bacteria.
(If "who drink too much alcohol or use illegal drugs" were omitted, the sentence would have a different meaning.)

@ It is possible to omit the relative pronoun and the verb "be" (along with any other auxiliaries) in the following cases:

- **Before relative clauses in the passive voice:**

The enzymes which are contained in the lysosome are used by the cell digestion.

⇨ The enzymes contained in the lysosome are used by the cell digestion.

- **Before prepositional phrases:**

The beaker that is on the counter contains a solution.

⇨ The beaker on the counter contains a solution.

- **Before progressive (continuous) verb structures:**

The girl who is running down the street might be in trouble.

⇨ The girl running down the street might be in trouble.

❖**Nonrestrictive clause:** *contains additional information which is not required to give the meaning of the sentence.*

Ex: *The mouflon sheep***,** which is a wild Mediterranean sheep with less than 1000 animals remaining**,** was successfully cloned.

(It is **not** possible to use "**THAT"** in the place of WHICH in this sentence. You also can **not** leave out **WHO** or **WHICH.** And you have to put **commas (,)** at the beginning and at the end of the clause.)

@ It is also possible to omit "the relative pronoun" and the verb "be" in nonrestrictive clauses before noun phrases.

⇨ *The mouflon sheep*, a wild Mediterranean sheep with less than 1000 animals remaining, was successfully cloned.

Exercise 2: Reduce the relative clauses in the following sentences (if possible).

1. Others at risk are people who are infected with tuberculosis bacteria but do not have the active disease.

.....

2. People who eat foods that contain this bacteria can get listeriosis.

.....

3. Biotechnology has yielded new and improved medicines for animals that help lower production costs and improve animal well being by fighting diseases which are caused by bacteria and parasites.

.....

4. Vaccines are now used to prevent diseases including: foot and mouth disease, scours, brucellosis, shipping fever, feline leukemia, rabies, and infections which are affecting cultivated fish.

.....

5. Producing large amounts of therapeutic proteins in animal milk may be an efficient, relatively low cost method to manufacture many proteins that are used to treat human diseases or proteins that have industrial value.

.....

6. The actual risk which is associated with this will depend on the type of animal and the nature of the genetic modification.

.....

7. This example of a blunt cut is from *Eco* RV, another Restriction Enzyme which is isolated from *E. coli.*

.....

4. Special difficulties

LATIN EXPRESSIONS REFERRING TO TEXTUAL MATTERS

Expression	Full form	Literal meaning	Morden use
Ad hoc	*ad hoc*	improvised	For a specific occassion
c.f	*confer*	Compare	Compare
circa (c. or ca.)	*circa*	About	About, approximately
e.g.	*exempli gratia*	Free example	For example
et al.	*et alli*	And others	And other authors
etc.	*et cetera*	And others	And others
i.e.	*id est*	That is	That is to say
infra	*infra*	below	See below
in situ	*in situ*	In position	in the natural or original position
in vitro	*in vitro*	In glass	Outside the body
in vivo	*in vivo*	In the living	Inside the body
P.S.	*post scriptum*	After writing	Something added after signature
Post hoc	*post hoc*	Because of this	formulated after the fact
Supra	*supra*	Above	see above
vice versa	*vice versa*	conversely	the opposite of a situation

5. Listening to the talk

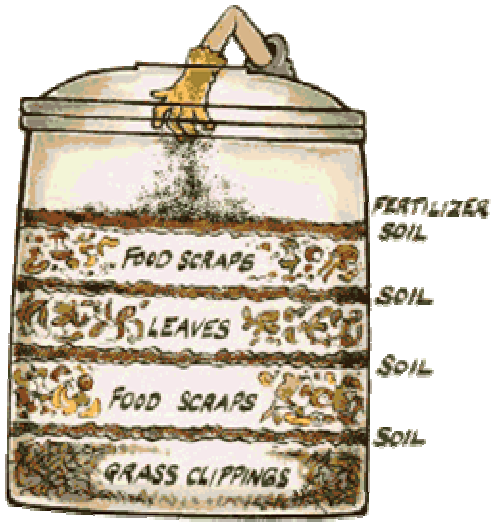


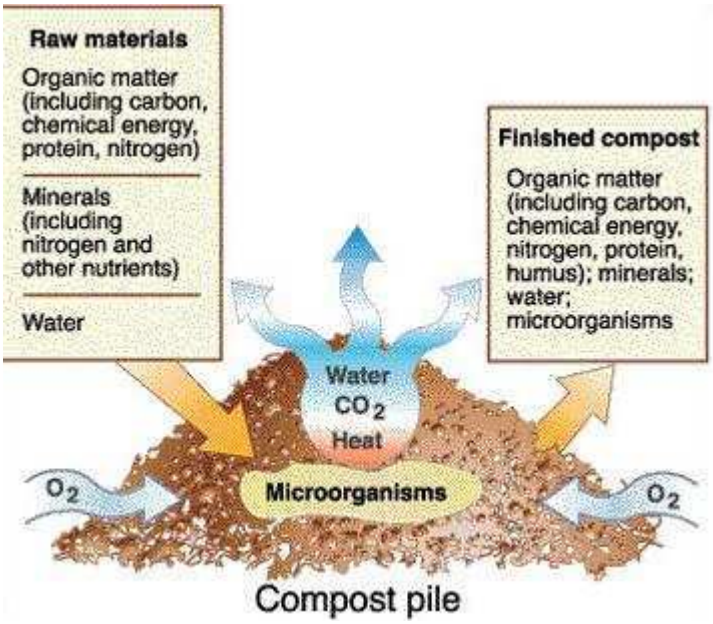
Composting

Listen to the talk and look at these pictures, then explain the whole process of composting



Compost pile

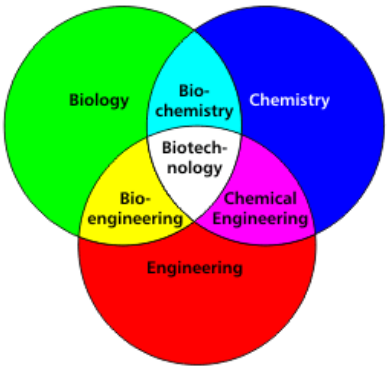




Compost pile

LESSON 6: APPLIED BIOTECHNOLOGY

1. Reading the paragraphs



Disciplines of Biotechnology

Aviculturists, people *who* raise birds for commercial sale, have not yet learned how to simulate the natural incubation of parrot eggs in the wild. **They** continue to look for better ways to increase egg production and *to* improve chick survival rates. When parrots incubate their eggs in the wild, the temperature and humidity of the nest are controlled naturally. Heat is transferred from the bird's skin to the top portion of the eggshell, leaving the sides and bottom of the egg at a cooler temperature. This temperature **gradient** may be vital to successful hatching. Nest construction can contribute to this temperature gradient Nests of loosely arranged sticks, rocks, or dirt are cooler in temperature at the bottom where the egg contacts the nesting material. Such nests also act as humidity regulators by allowing rain to drain into the bottom sections of the nest so that the eggs are not in direct contact with the water. As the water that collects in the bottom of the nest evaporates, the water vapor rises and is heated by the incubating bird, which adds significant humidity to the incubation environment. In artificial **incubation** programs, aviculturists remove eggs from the nests of parrots and incubate them under laboratory conditions.

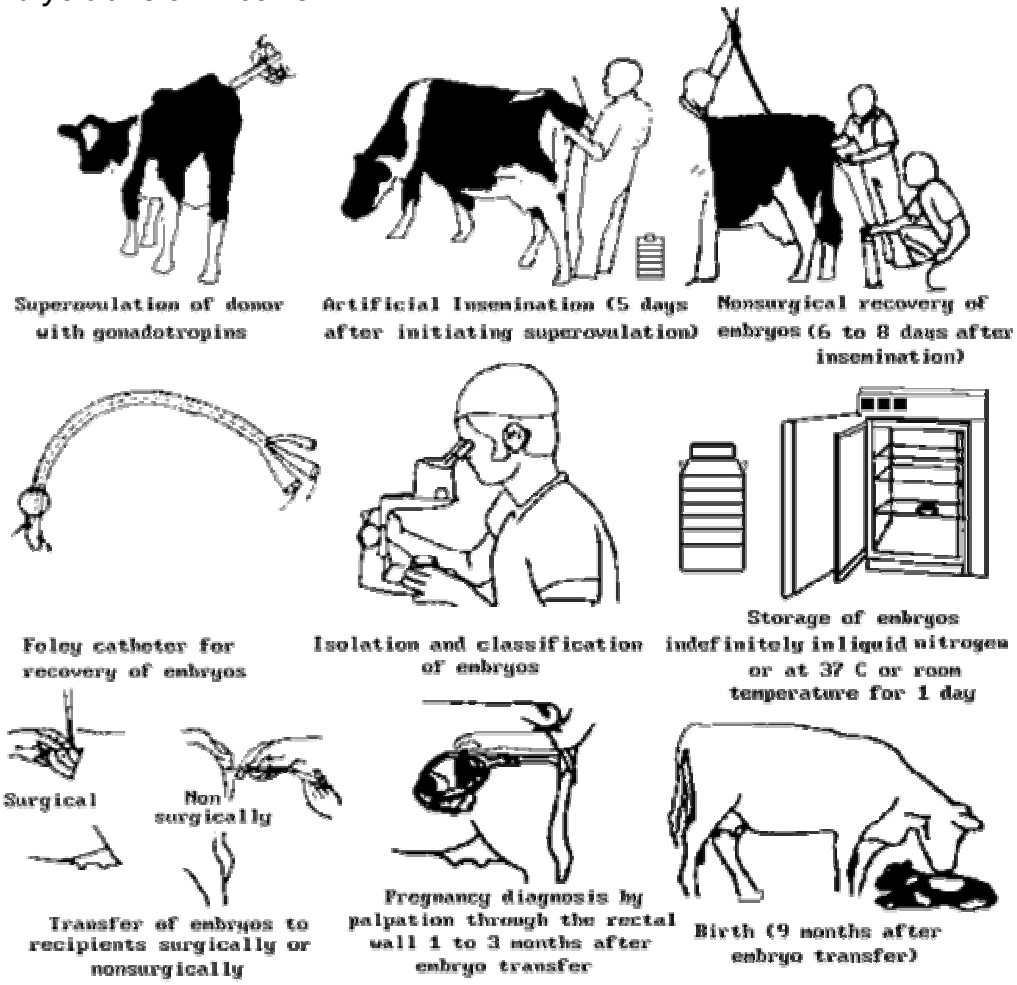
Most commercial incubators heat the eggs fairly evenly from top to bottom, thus ignoring the bird's method of natural incubation, and perhaps reducing the viability and survivability of the hatching chicks. When incubators are not used, aviculturists sometimes **suspend** wooden boxes outdoors to use as nests in which to place eggs. In areas where weather can become cold after eggs are laid, it is very important to maintain a deep foundation of nesting material to act as insulator against the cold bottom of the box. If eggs rest against the wooden bottom in extremely cold weather conditions, they can become chilled to a point where the **embryo** can no longer survive. Similarly, these boxes should be protected from direct sunlight to avoid high temperatures that are also **fatal** to the growing embryo. Nesting material should be added in sufficient amounts to avoid both extreme temperature situations mentioned above and assure that the eggs have a soft, **secure** place to rest.

1. What is the main idea of the passage?
    (A) Nesting material varies according to the parrots' environment.
    (B) Humidity is an important factor in incubating parrots' eggs.
    (C) Aviculturists have constructed the ideal nest box for parrots.
    (D) Wild parrots' nests provide information useful for artificial incubation.
2. The word "They" in line 2 refers to
    (A) aviculturists
    (B) birds
    (C) eggs
    (D) rates
3. According to paragraph 2, when the temperature of the sides and bottom of the egg are cooler than the top, then
    (A) there may be a good chance for successful incubation
    (B) the embryo will not develop normally
    (C) the incubating parent moves the egg to a new position.
    (D) the incubation process is slowed down
4. According to paragraph 2, sticks, rocks, or dirt are used to
    (A) soften the bottom of the nest for the newly hatched chick
    (B) hold the nest together
    (C) help lower the temperature at the bottom of the nest
    (D) make the nest bigger
5. According to paragraph 2, the construction of the nest allows water to
    (A) provide a beneficial source of humidity in the nest
    (B) loosen the materials at the bottom of the nest
    (C) keep the nest in a clean condition
    (D) touch the bottom of the eggs
6. All of the following are part of a parrot's incubation method EXCEPT
    (A) heating the water vapor as it rises from the bottom of the nest
    (B) arranging nesting material at the bottom of the nest
    (C) transferring heat from the parent to the top of the eggshell
    (D) maintaining a constant temperature on the eggshell
7. The word "suspend" is closest in meaning to
    (A) build
    (B) paint
    (C)hang
    (D) move
8. The word "fatal" is closest in meaning to
    (A) close
    (B) deadly
    (C) natural
    (D) hot
9. The word "secure" is closest in meaning to
    (A) fiesh
    (B) diy
    (C) safe
    (D) warm

10. According to paragraph 3, a deep foundation of nesting material provides
    (A) a constant source of humidity
    (B) a strong nest box
    (C) more room for newly hatched chicks
    (D) protection against cold weather
11. Which of the following is a problem with commercial incubators?
    (A) They lack the natural temperature changes of the outdoors.
    (B) They are unable to heat the eggs evenly
    (C) They do not transfer heat to the egg in the same way the parent bird does.
    (D) They are expensive to operate.
12. Which of the following terms is defined in thepassage?
    (A) Aviculturists
    (B) Gradient
    (C) Incubation
    (D) Embryo

2. Learning points

Embryo transfer in cows



3. Key structures

COMPARISONS (cont.)

SUPERLATIVE

The + short Adj/Adv + EST
The + most + long Adj/Adv
The + least + Adj/Adv

EX:

1. The birds that received **the largest** amount had **the lowest** number of infections.
2. Many scientists say pigs are **the best** animals for transplants.
3. Russia is **the biggest** importer of American chicken products.
4. The Calvin-Benson cycle is **the most** common pathway for CO_2 fixation in the biospere.

NOTES

Much
= Far + comparative Adj/Adv
= A lot

1. The scientists say a crocodile's defense system against disease is **much** more powerful than that of the human body's defense system.
2. The particle used was two hundred nanometers -- **much, much / far / a lot** smaller than a human hair.
3. The structure of the spore is **much** more complex than that of the vegetative cell in that it has many layers.

Complete these sentences. Use the comparative of the words in brackets and one of these words: a bit / a little / much / a lot / far.

1. The structure of the spore is …… that of the vegetative cell in that it has many layers. (complex)
2. Fermentation is a process generally used only in anaerobic conditions, since respiration is ……(efficient aerobically)
3. Experts say one thousand birds weighing ……..…….. would need about ten cubic meters of bulking material. (one kilogram each)
4. Oxygen helps the organisms change the plant materials……(rapidly)
5. The Foreign Agriculture Service there estimated that production would be …….....demand. (Great)
6. Fimbriae are considerably …… flagella and are …… (short / numerous)

7. Composting is the mixing of plant or animal wastes so they break down and produce ……. substances. (simple)
8. Development of animals that serve as models for human diseases to help scientists ……understand prevention and treatment strategies. (good)

4. Special difficulties

To break (sth into sth): to be damaged and seperated into parts. Eg: If the egg touches the ice or breaks, the chick will die.

To break away (from sb/sth): to escape suddenly from sb who is holding you; to leave; to move away from a group. Eg: The proteins and lipids of the cell processed and "packaged" in the Golgi apparatus. In order to "send" these proteins and lipids to the correct "addresses", the outside-edge sacs frequently bulge and break away and form drop-like sacs that are called secrectory vesicles

To break down: to destroy sth . Eg: The liquid breaks down the nectar into simple sugars; The enzymes contained in the lysosome are used by the cell digestion. They break down particles of food taken in and make the end products available for use by the cell.

5. Listening to the talk

Listening to the talks and make their summaries



Scientists Clone Pigs to Make Omega-3 Fatty Acids

Question

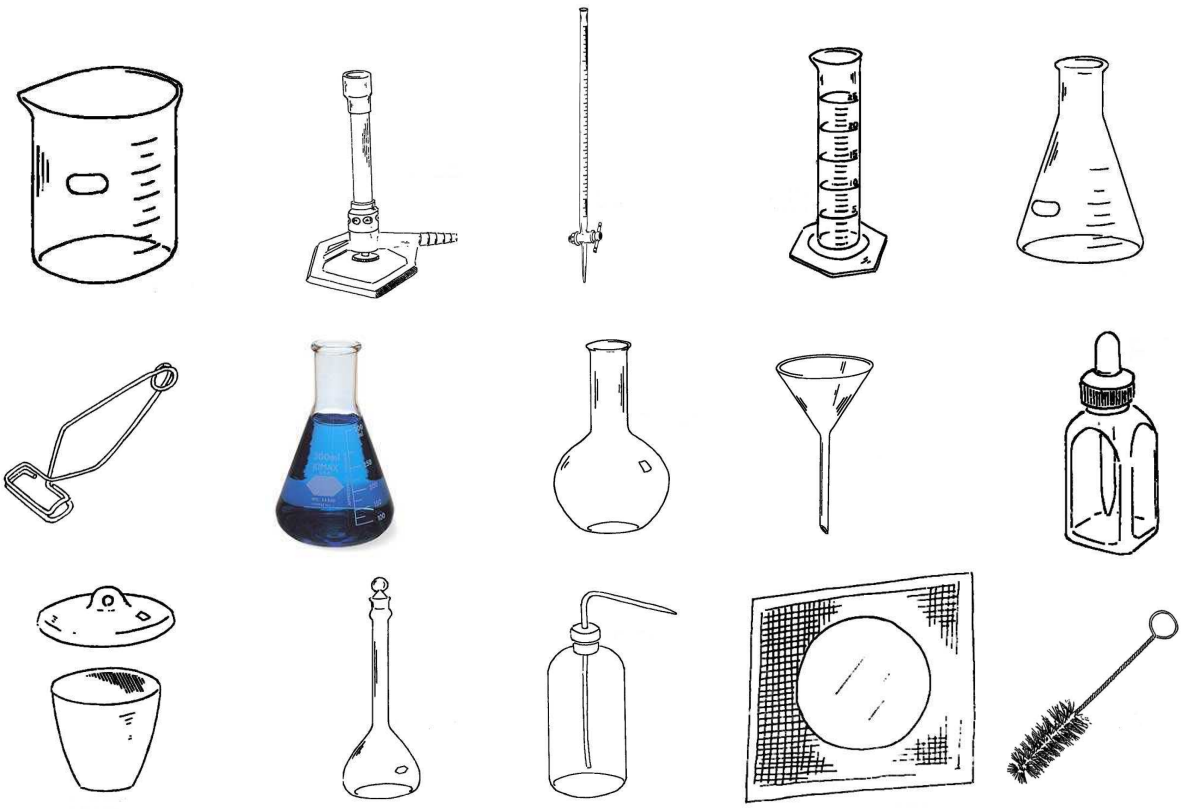
1. What have Scientists developed to produce omega-three fatty acids ?
2. What are omega-three fatty acids believed to help?
3. Has The Food and Drug Administration approved a cloned animal for use as food ?
4. Which animal did Professor Jing Kang use to engineer with a gene from a kind of worm in the first step of the study?
5. Have pigs been cloned before, but not for a purpose of omega-3 fatty acid producer?
6. What is other benefit of omega-3 fatty acid ?

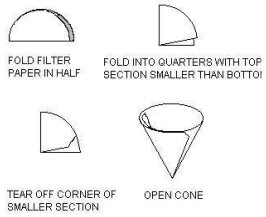
LESSON 7: LABORATORY

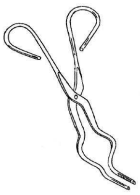
1. LABORATOY EQUIPMENT

there are several things you can see in a laboratory, try to learn their names in English

Beaker,
Bunsen burner,
burette,
graduated cylinder,
Erlenmeyer flask,
test tube clamp,
conical flask,
Florence flask,
funnel,
dropping bottle,
crucible,
volumetric flask,
wash bottle,
wire screen,
test tube brush,
test tube,
crucible tongs,
safety tongs,
pipette,
filter paper,
pipette pump,
pipette filler,
micropipette,
Petri dish,
balance,
centrifuge,
water bath,
incubator,
pH meter,
autoclave,
dispenser,
Pasteur pipette,
bio-shaker,
vortexer,
magnetic stirrer






















2. SAFETY IN LABORATORY

There are some signs related to safety in laboratory, try to explain the meanings of these signs

1. *Toxic Chemical Sign*: This is the symbol for toxic or poisonous materials.
2. *Non-potable Water Sign*: The non-potable water sign lets you know the water is not approved for drinking.

3. *Environmental Hazard Sign*: This is the symbol for a material which represents an environmental hazard
4. *Eyewash Sign*: This sign is located at an eyewash station
5. *Recycling Sign*: This sign is located at an eyewash station
6. *Toxic Materials Sign*:This sign indicates the presence of a toxic or poisonous material.
7. *Explosive Material Sign*: This symbol accompanies explosive materials
8. *Flammable Sign*: This is the symbol for a flammable substance, or one which can catch fire readily
9. *Radioactive Symbol*: This symbol indicates a radiation hazard
10. *Chemistry Hazard Label*: The hazard label is found on chemical containers. It indicates health hazard, flammability, and other cautions associated with the chemical.
11. *Biohazard Symbol*: This is the symbol for a biohazard, or a material which represents a threat to cellular materials or living organisms.
12. *Electrical Hazard Sign*: This sign warns of live electricity.
13. *Open Flame Prohibited Sign*: If you see a No Open Flames sign, this usually implies there is a flammable or combustible material nearby.
14. *Corrosive Materials Sign*: Corrosive materials are usually strong acids or bases. They represent a hazard to your skin, and often to mucous membranes through inhalation of vapors. Pay attention to the proper storage container for corrosive materials. In addition, corrosive materials are reactive.



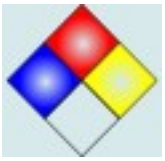













3. ABBREVIATION

In scientific papers, there are some abbreviations that may be used without definition in table headings

Term	abbreviation	Term	abbreviation
Amount	amt	Specific gravity	sp gr
Approximately	approx	Standard deviation	sd
Average	avg	Standard error	se
Concentration	concn	Standard error of the mean	sem
Diameter	diam	Temprature	temp
Experiment	expt	Versus	vs
Experimental	exptl	Volume	vol
Height	ht	Week	wk
Molecular weight	mol wt	Weight	wt
Number	no.	year	yr
peparation	prepn		

4. PROTOCOL

In lab work, sometime you have to work with protocol. Protocol is a step by step direction that you follow to reach a particular purpose, for example, a protocol to extract DNA from bacteria, a protocol to determine nitrite content in meat product. Here is a sample of protocol

GERBER DETERMINATION OF FAT IN MILK

INTRODUCTION

The determination of the fat content of milk and other diary products is an important quality control measure. By law the fat content of milk must not be lower than 3.3%. In addition, one may not increase the fat content of a batch of milk by adding cream skimmed off from another batch, but it has to be done by blending one batch with another. The Gerber test was designed in Switzerland in 1982 and is a cheap, rapid and accurate method for determining fat in milk.

The determination involves the separation of fat from milk by virtue of its lower density. Specific volumes of milk and H_2SO_4 (SG = 1.820 – 1.825) are mixed in a Gerber tube or butyrometer. The proteins in milk are dissolved by the H_2SO_4 and the lighter fat globules are then separated by centrifugation and the fat content read off directly from the graduated tube. Amyl alcohol is also added to give a clear, homogeneous fat column.

The pipettes and butyrometers are accurately calibrated and can also be used to determine various other qualities of milk products such as the solubility index of milk powder and the % fat in cream and cheese.

Method

Sample preparation

This method works more easily with raw milk than with homogenized milk. Whatever sample you use it must be thoroughly mixed before sampling.

Incubate the milk at 38^0C to just liquefy the fat and then cool to 20^0C. Mix by pouring from one container to another e.g. in 250 ml beakers. Prevent inclusion of air. ***Do not shake the sample vigorously!***

PROCEDURE

1. *Pipette 10 ml H_2SO_4 (SG = 1.820 – 1.825) into a Gerber butyrometer with an ordinary graduated 10 ml pipette.*
2. *Pipette 10.77 ml milk carefully down the side of the butyrometer to form a layer on the sulfuric acid. Use the pipette provided.*
3. *Carefully pipette 1 ml of amyl alcohol onto the layer of milk. Use the pipette provided and a pipetting aid.*
4. *Seal the butyrometer carefully (do not shake too much) with a plug and key. The rubber stopper must be twisted firmly into place so it will not be forced out during expansion. Mix the sample and H_2SO_4 by carefully rolling the tube in your hand at an angle of 45^0. Once all the milk is mixed you may invert the tube once or twice to complete mixing in the graduated stem.*
5. *If by this time the butyrometers are still hot you may carry on with the centrifuging step. If not, place the butyrometers in a water bath at 65^0C for 5 minutes.*
6. *Fit the butyrometers in the bushings of the centrifuge with the graduated stems pointing to the center.*
7. *Centrifuge for 5 minutes at 1 100 r.p.m. Time the run from when the centrifuge speed reaches 1 100 r.p.m.*
8. *Remove the butyrometers carefully from their bushings. Take care not to splash the fat up the tube. If cloudiness occurs due to splashing, centrifuge for a further 1 minute.*
9. *Incubate for 5 minutes at 65^0C in a water bath.*
10. *Adjust the position of the fat column such that the lower fat line corresponds with one of the major graduations on the tube. Read the % fat from this mark to the lowest point of the upper meniscus.*
11. *Each scale division represents 0.1 unit. The second decimal point can be judged visually.*

MATERIALS AND EQUIPMENT

- *Gerber centrifuge with copper bushings.*
- *Gerber butyrometers and pipettes washed in chronic acid.*
- *Waterbath at 38^0C.*

- *Waterbath at 65^0C.*
- *2 x 500 ml beakers for heating milk.*
- *Graduated 1 ml pipette.*
- *Conc. H_2SO_4 (SG = 1.820 – 1.825)*
- *Amyl alcohol suitable for milk testing.*
- *Raw and pasteurized milk samples.*

