CHAPTER 1

Introduction: Biology Today

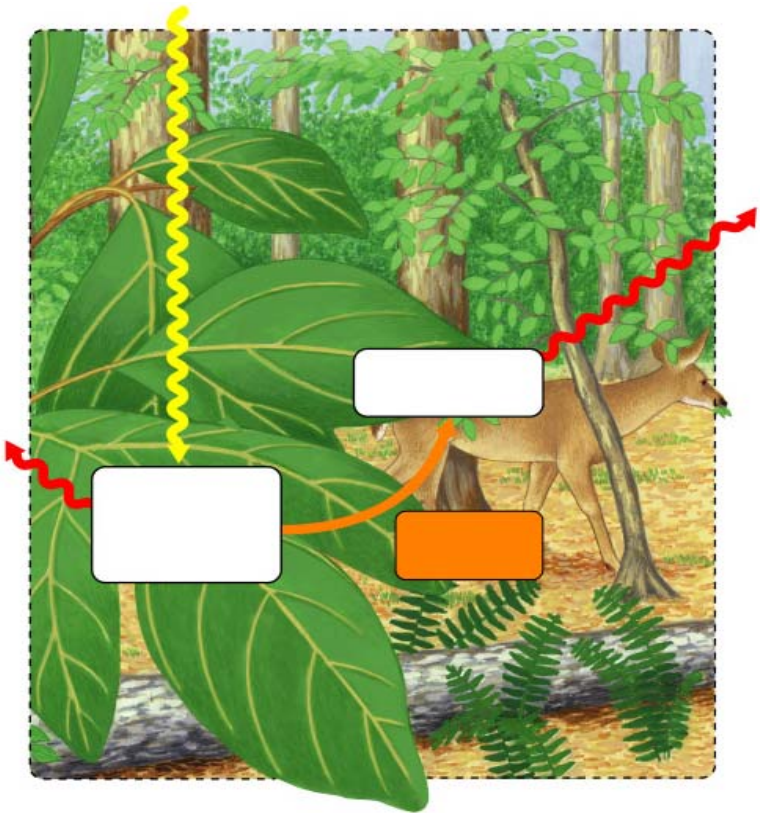
Nutrient and Energy Cycling

- The dynamics of any ecosystem depend on two processes
  - Cycling of _____;

    Organic and inorganic molecules like _____
  - Flow of _____;

– Into ecosystem as _____, out as _____energy

Be able to fill in and explain this figure;



What is this figure showing?

_____

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Cells and Their DNA

- The _____is the lowest level of structure that can perform all activities required for _____
  - All _____are composed of cells
  - They are very _____; require a _____to see
  - Cells make up tissues and _____
- We can distinguish two major types of cells
  - _____
  - _____

Prokaryotes vs. Eukaryotes

- The _____cell is simple and contains no _____

- Most common example; _____

- The eukaryotic cell is more _____and contains _____
  - Example; _____and Animals
  - The _____is the largest organelle in most eukaryotic _____

DNA and Genes

- All cells use _____as the chemical material of genes
  - _____are the units of inheritance that transmit information from parents to offspring
- The language of DNA contains just _____letters
  - A, _____G, _____C, _____T_____

Genetic Engineering

- Genetic _____and biotechnology have allowed us to manipulate the DNA and genes of _____
- This has lead to _____about the safety of genetically engineered plants and animals
- Examples:_____

Life in Its Diverse Forms

- Diversity is the hallmark of a successful _____
  - The diversity of known life includes _____ species
  - Estimates of the total diversity range from _____ species

Grouping Species: The Basic Concept

- _____means the amount of variation in different species that exists in a particular area
- _____is the branch of biology that names and classifies species
  - It formalizes the _____ordering of organisms
  - That means;_____

- What do these butterflies have to do with taxonomy? _____

The Three Domains of Life

- The three domains of life are;

  _____
- Bacteria and _____are both prokaryotic domains
- _____includes at least four kingdoms

_____

- **Unity in the Diversity of Life**
  - Underlying the diversity of life is a striking unity, especially at the lower levels of _____

– Example: _____

- _____accounts for this combination of _____ and _____ (discussed in later chapters)
- Alternative views include _____

Intelligent Design

•The concept that certain _____ of the universe and of living things are best explained by an _____ cause

- not an _____ process such as _____ selection.

•Proponents say that _____ is a scientific theory that stands on equal footing with, or is _____ to, current scientific theories regarding the _____

•An overwhelming _____ of the _____ community views intelligent design as _____ or junk science.

•Fundamental argument; **_____ complexity;**

–Controversial _____ that certain biological systems are too _____ to have evolved _____ from simpler, or "less complete", _____,

–based on the idea that a structure's _____ parts would be useless prior to their _____ state.

–The _____ is a famous example of a supposedly "_____ complex" structure, due to its many elaborate and _____ parts, seemingly all _____ upon one another.

–It is frequently cited by intelligent design and creationism _____ as an example of _____ complexity.

Evolution: Biology's Unifying Theme

•Evolution means _____

•_____ found in the _____ support _____ assertions

•Similar species share a _____ that ties all members of that group _____

- Example; All bears have many _____ to each other, but also share similarities with other _____ (a common ancestor)

•Darwin published _____ in 1859

- Book contained _____ main points;

1. Descent with _____; change in form from an _____ (in the past) to _____ species (today)
2. _____ Selection; the _____ dictates which characteristics are _____ and which are detrimental and molds organisms _____

Darwin's Conclusions

•Darwin's concept of _____ is based on two _____ facts;

•_____ and struggle for existence; more _____- will be produced than can survive; a struggle for existence will result (_____-)

•Individual _____; individuals in the same _____ are different from each other.

•It is the unequal reproductive success that Darwin called _____

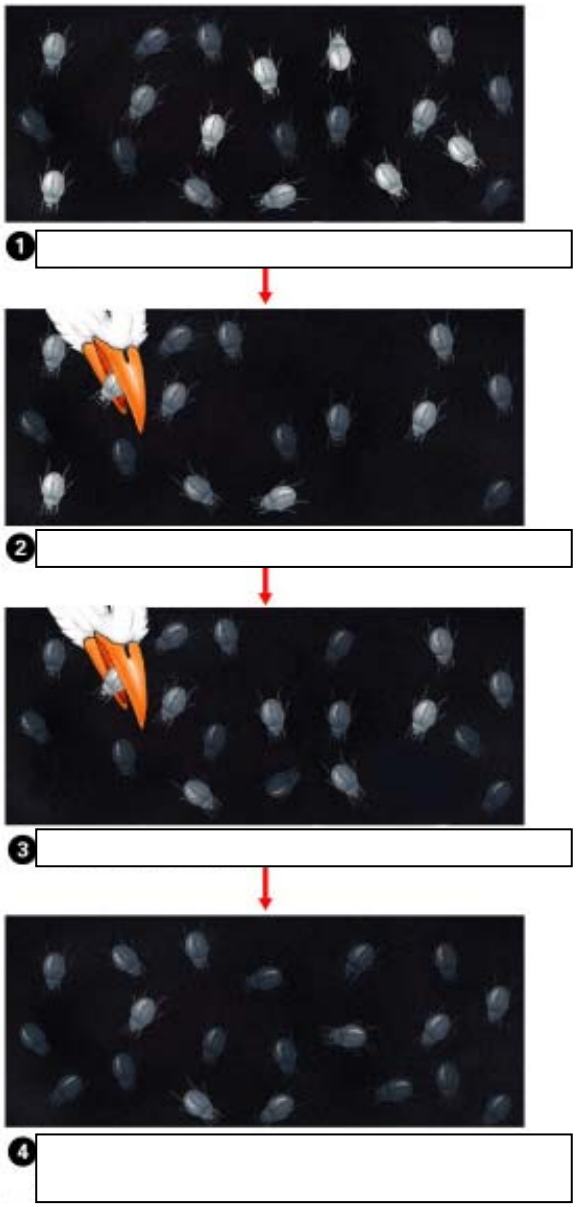
Natural Selection in Action

•In any _____, there is variation between members, in this case, _____

•Certain traits will be less _____ at survival and _____; birds eat those that do not blend into _____

•The survivors that posses the "best" traits for that environment _____

•Offspring of successful _____ carry those same successful traits (_____)



Artificial vs. Natural selection

•_____- selection favors those traits that are appealing to _____ and not necessarily those that would suite the organism best in the _____.

•How have these miniature horses become so small?_____

•What is the nearest common relative of all of these dogs?_____

•For more information about the history of dogs go to; **http://www.pbs.org/wgbh/evolution/library/01/5/l_015_02.html**

The Process of Science

- Two forms of science; _____and _____Driven Science

Discovery Science

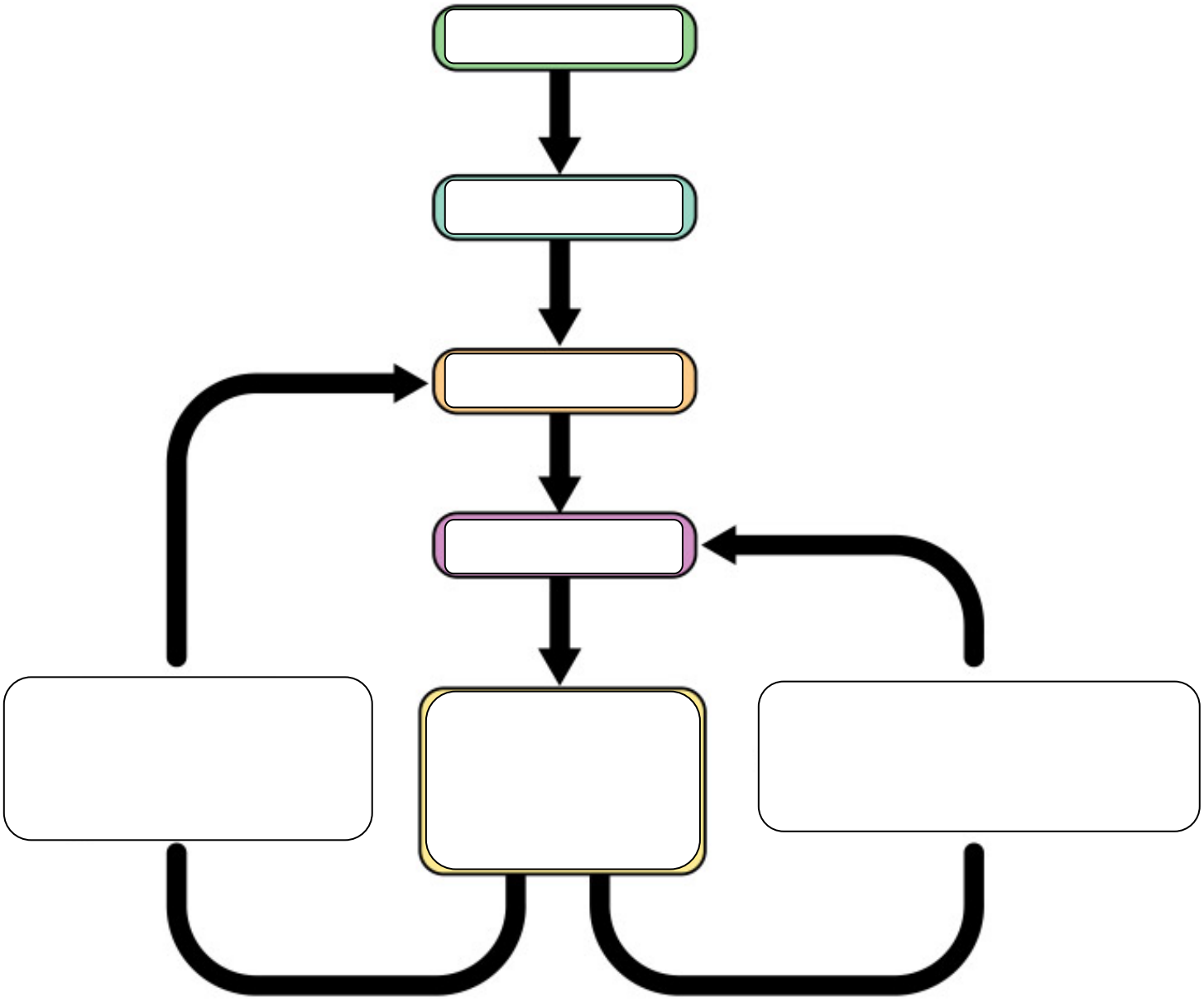
- Science seeks _____causes for natural events
- Requires that _____be made
- Examples; _____

- _____collection of plant and animal species in South America
- Sequencing of the human _____ (DNA)

- Leads to important conclusions based on _____reasoning
  - A generalization based on a large number of observations; “All living things are made of _____”
  - Produces fundamental _____in science

Hypothesis-Driven Science

- Observations often lead to _____ - “Why does that happen?”
- Must follow the _____method;
  - A series of logical steps and investigations/experiments that leads to an _____conclusion



The Scientific Method; Another Example

- Begins with observations;

- "_____"

- Observations lead to questions;

  - "_____"

- A hypothesis, based on the observations, is formed;

  - "_____"

- Hypotheses lead to predictions;

  - "_____"

- Predictions lead to the development of tests;

  - "_____
  _____"

- If test supports hypothesis, then theory can be formed;

  - "_____"

- If test does not support hypothesis, form a new hypothesis and test_____

Theories in Science

- Science is not about accumulating _____; - ex; a telephone book is full of facts but not _____
- Facts are necessary, but it is new _____and the tests of those theories that drives scientific _____
- Scientific greats like _____
  - They did not discover many new _____, but
  - Proposed _____that explain a broad range of _____
  - These theories have stood the test of _____
- Theories only become widely accepted if they are supported by _____evidence

Multiple Choices (Answer these and we will go over them in class)

1. The dynamics of any ecosystem depend on what two processes?
   A. The cycling of energy and the flow of nutrients
   B. The cycling of nutrients and the flow of energy
   C. The shining of the sun and the size of the clouds
   D. The biotic and abiotic processes
   E. None of the above are correct

2. What nutrients cycle in an ecosystem; True (A) or F (B)

3. How is the movement of energy in an ecosystem different from that of nutrients?
   A. Energy cycles, while nutrients flow
   B. Energy flows, while nutrients cycle
   C. They both flow, but energy flows faster
   D. They both cycle, but nutrients cycle faster
   E. None of the above are correct

4. What is the lowest level of structure that can perform all activities required for life?
   A. Atom
   B. Cell
   C. Animal
   D. Organ
   E. None of the above are correct

5. All organisms are composed of cells; True (A) or F (B)

6. Why do you need a microscope to see cells?
   A. Because they are not very well colored
   B. Because they are very small
   C. Because they are very large

D. Because they are prokaryotic
E. None of the above are correct

7. What are the two major types of cells?
   A. Hair and organs
   B. Prokaryotic and Eukaryotic
   C. Plant and animal
   D. His and hers
   E. None of the above are correct

8. Which type of cell is simple, with no organelles?
   A. Eukaryotic
   B. Animal
   C. Plant
   D. Human
   E. None of the above are correct

9. Prokaryotic cells have no DNA since they have no nucleus; True (A) or False (B)

10. An example of a prokaryotic cell is a;
    A. Bacterium
    B. Animal
    C. Plant
    D. Fungus
    E. None of the above are correct

11. How are eukaryotic cells different from prokaryotic ones?
    A. Eukaryotic cells have DNA, while prokaryotic ones do not
    B. Eukaryotic cells have no organelles or nucleus, while prokaryotic ones do
    C. Prokaryotic cells have no organelles or nucleus, while eukaryotic ones do
    D. All of the above are correct
    E. None of the above are correct

12. Plant and animal cells are similar to each other because they both;
    A. Are eukaryotic
    B. Are photosynthetic
    C. Are prokaryotic
    D. Have cell walls
    E. None of the above are correct

13. What is the largest organelle in prokaryotic cells?
    A. Mitochondria
    B. Golgi bodies
    C. Ribosomes
    D. Nucleus
    E. None of the above are correct

14. All cells use what chemical to form their genes?
    A. Cotton
    B. RNA
    C. DNA
    D. Protein
    E. None of the above are correct

15. What are the units of inheritance that transmit information from parent to offspring?
    A. DNA
    B. Genes
    C. Jeans
    D. Polyribosomes
    E. None of the above are correct

16. What are the four letters (bases) of DNA?
    A. A
    B. G
    C. C
    D. T
    E. All of the above are correct

17. What have genetic engineering and biotechnology allowed us to do?
    A. To convert one organism into another
    B. To produce genetically superior humans
    C. To play God
    D. to manipulate the DNA and genes of organisms
    E. None of the above are correct

18. What are some controversies about genetically engineered organisms?
    A. That they may not be safe to let into the environment
    B. That the foods made from them may not be safe to eat
    C. That genetically engineering organisms is not natural
    D. All of the above are correct
    E. None of the above are correct

19. What is the hallmark of a successful ecosystem?
    A. Diversity
    B. Lots of the same animal
    C. It makes a lot of money for people
    D. It has a star on the Walk of Fame
    E. None of the above are correct

20. About how many known species are there in the world?
    A. over 100
    B. over 1,000
    C. over 1,000,000
    D. over 1,000,000,000
    E. None of the above are correct

21. The species that we know about so far represent most of the total diversity on earth; True (A) or False (B)

22. What term would be used to describe how many different kinds of things live in an ecosystem?
    A. Diversity
    B. Biodiversity
    C. Species richness
    D. Population
    E. None of the above are correct

23. What is the branch of biology that would help us categorize and classify living things into groups?
    A. Diversity
    B. Biodiversity
    C. Species richness
    D. Population
    E. None of the above are correct

24. What are the three domains of life?
    A. Plant, Animal, and Bacteria
    B. Prokaryotes, Eukaryotes and Bacteria
    C. Prokaryotes, Eukaryotes and Archaea
    D. Living, Dead, Undead
    E. None of the above are correct

25. Which of the domains of life are prokaryotic?
    A. Eukaryotes
    B. Archaea only
    C. Prokaryotes and Eukaryotes
    D. Bacteria and Archaea
    E. None of the above are correct

26. Bacteria and humans are very different when you look at their most basic levels of structure; True (A) or False (B)

27. What are two of the theories that compete to explain the combination of unity and diversity among species?
    A. Evolution and Natural Selection
    B. Evolution and Relativity
    C. Evolution and Intelligent Design/Creationism
    D. Right and wrong
    E. None of the above are correct

28. What are the main argument(s) of the proponents of intelligent design?
    A. Certain features of the universe and of living things are best explained by an intelligent cause
    B. It is a scientific theory that stands on equal footing with, or is superior to, current scientific theories regarding the evolution and origin of life
    C. Certain biological systems are too complex to have evolved naturally from simpler, or "less complete", predecessors
    D. All of the above are correct
    E. None of the above are correct

29. What is irreducible complexity?
    A. Certain features of the universe and of living things are best explained by an intelligent cause
    B. It is a scientific theory that stands on equal footing with, or is superior to, current scientific theories regarding the evolution and origin of life
    C. Certain biological systems are too complex to have evolved naturally from simpler, or "less complete", predecessors
    D. All of the above are correct
    E. None of the above are correct

30. Evolution means;
    A. Humans used to be monkeys
    B. People came from the ocean
    C. Change over time
    D. Darwin was correct
    E. None of the above are correct

31. What archeological remains support Darwin's assertions?
    A. Fossils
    B. Ancient writings
    C. The pyramids
    D. The Rosetta Stone
    E. None of the above are correct

32. What do similar species share?
    A. The same name
    B. A common ancestor
    C. All of their genes
    D. Nothing
    E. None of the above are correct

33. Darwin published what book in 1859?
    A. Evolution Rocks
    B. On the Origin of Species
    C. Your Uncle was a Monkey
    D. Special Theory of Relativity
    E. None of the above are correct

34. Darwin's book contained what two main points?
    A. Descent with Modification and Natural Selection
    B. People used to be monkeys and we changed due to evolution
    C. Life began in the primordial soup and we are basically monkeys
    D. All of the above are correct
    E. None of the above are correct

35. What is described as; more offspring will be produced than can survive; a struggle for existence will result?
    A. Overproduction
    B. Population explosion
    C. Baby boom
    D. All of the above are correct
    E. None of the above are correct

36. What term means that individuals in the same species are different from each other.
    A. Individual similarities
    B. Identical twins
    C. Natural selection
    D. Evolution
    E. None of the above are correct

37. Certain heritable traits within an individual will be less successful at survival and reproduction; True (A) or False (B)

38. The survivors that posses the "best" traits for that environment will do more of what than those possessing less than desirable traits?
    A. Have the most offspring
    B. Have the fewest offspring
    C. Become really strong
    D. Will survive to a ripe old age
    E. None of the above are correct

39. Offspring of successful parents carry those same successful what?
    A. Clothes
    B. Jeans
    C. Traits/Genes
    D. Faces
    E. None of the above are correct

40. What is the main difference between the concepts of artificial and natural selection?
    A. One is out in the wild, while the other is in a lab
    B. Artificial uses nature to decide and natural uses humans
    C. Artificial selection involves choosing traits appealing to humans, while natural selection uses traits that help an animal better survive and reproduce
    D. All of the above are correct
    E. None of the above are correct

41. Artificial selection favors those traits that are appealing to;
    A. Chemists
    B. Nature
    C. Humans
    D. Genes
    E. None of the above are correct

42. How have miniature horses become so small?
    A. Due to natural selection
    B. Due to artificial selection
    C. Due to genetic engineering
    D. Due to massive mutations
    E. None of the above are correct

43. What is the nearest common relative of all of dogs?
    A. Coyotes
    B. Wolves
    C. Seals
    D. There is no common relative to all dogs; they were created
    E. None of the above are correct

44. What are the two fundamental forms of science?
    A. Chemistry and Biology
    B. Discovery and Inquiry
    C. Discovery and Hypothesis-driven
    D. Biology and Creationism
    E. None of the above are correct

45. What does discovery science do for science?
    A. Finds new facts
    B. Generates new theories to explain observations
    C. Discovers new planets, only
    D. Helps it out
    E. None of the above are correct

46. What is a series of logical steps and investigations/tests that lead to an objective conclusion?
    A. Inductive reasoning
    B. Deductive reasoning
    C. Scientific method
    D. Random testing
    E. None of the above are correct

47. Why are scientists like Newton, Darwin, and Einstein considered (by the scientific community) to be great scientists?
    A. Because they looked really cool
    B. Because they were able to discover so many new facts
    C. Because they were able to propose such amazing new theories to explain natural phenomena
    D. Because they are in science books
    E. None of the above are correct

Essays;
Be able to fill in and describe the figures in the notes as well as the one below;