Hey everyone, it’s the LAST WEEK OF CLASSES!! As we wrap up the semester, here is a brief overview of what has been covered in Bio II. This list is certainly not all-inclusive and may not reflect what will be included in your final exam but is a useful study tool.

**Keywords: Final Review**

Our Group Tutoring sessions will be every **Wednesday from 6:45-7:45 PM in Sid Rich 075.** You can reserve a spot at [https://baylor.edu/tutoring](https://baylor.edu/tutoring). I hope to see you there!

For all of the previous Bio II resources, please visit: [https://www.baylor.edu/case/index.php?id=978656](https://www.baylor.edu/case/index.php?id=978656) and scroll to Biology II. This week will be last group tutoring session, I hope to see y’all there!

**Key Concepts:**

**Ecosystems (Week 10):** consist of all of the biotic and abiotic factors in an area. Within an ecosystem, there is a **flow of energy** from the sun, to the heat that is eventually lost to the environment. Throughout this process, detailed below, energy is conserved. Similarly, the chemical elements that enter and leave an ecosystem are conserved according to the law of conservation of mass.

**Ecological Succession (Week 11):** a sequence of changes in community composition following a disturbance. Succession can be PRIMARY or SECONDARY.

**Circulatory Systems (Week 7):** Every cell in an organism must be able to exchange gases with the environment. For this to be possible, organisms must either have a **simple body plan** which places many or all of the cells in direct contact with the environment or must have a **circulatory system** which moves fluid between each cell’s surrounding tissues.

**Osmoregulation (Week 8):** is achieved by actively pumping solute in and out of cells to move water passively. There are two ways to maintain water balance: **Osmoconformance** and **Osmoregulation.**

- **Animals face different challenges related to osmolarity and therefore regulate differently:**
  - **Marine animals’** main issue is water loss due to higher solute concentration in their environment, so they excrete **urine with a high concentration of salt** and very little water.
  - **Land Animals** face the same issue, instead worrying dehydration. They **convert NH3 to urea** prior to excretion as a way to conserve water. **Freshwater Animals** face the opposite problem. Due to the higher concentration of salts in their bodies, as compared to their outside environments, they are worried about water gain. Thus, they take in salt through their gills and excrete **large amounts of very dilute urine.**

**THE MAIN PURPOSE OF EXCRETION IS TO ELIMINATE NITROGEN WASTE**

**The form of nitrogen waste excreted will always match its function!!**

**Nephrons are the functional unit of the Kidney.**
Bodies of water and mountain ranges can affect regional climate conditions (Week 11). Ocean currents heat or cool overlying air masses that pass across land. The high specific heat of water helps moderate the climate. Similarly, mountains can influence the air flow over land. Warm air goes up the mountain, cools and rains. The leeward side doesn’t get much moisture, so a desert is made on the other side of the mountain.

Survivorship Curves (Week 6): describe the death patterns in types of communities.

- **Type 1** - low death rates at the beginning and middle, then steep at the end ex. humans
- **Type 2** - constant death rate over the lifespan
- **Type 3** - high death rate in young, but flattens out for those who survive

Population sizes can also be “selected” in different ways. Those that undergo *density dependent selection*, or selection for traits that maximize reproductive success in crowded environments are R-selected Populations. Those that undergo *density independent selection* are K-selected Populations.

**Remember, there is always a tradeoff between reproduction and survival. There is competition. Among individuals in the population and the resources available that limit that population.**

Vascular Plant Structure (Week 7):

**Xylem** (water and mineral) and **Phloem** (sugar and solute) are the types of vascular tissue that conduct water throughout vascular plants

**Turgor Pressure:** the amount of force pushing out on the cell wall from water in the cell

- **Turgid:** high tonicity due to water gain with high turgor pressure
- **Flaccid:** tonicity when the cell loses water and has low turgor pressure
- **Plasmolysis:** when the cell membrane separates from the cell wall
- **Stomata:** pores on leaves that regulate water transpiration and gas exchange

- **Guard Cell:** cells which regulate the opening of stomata

When guard cells are **flaccid**, the stomata close. When guard cells are **turgid**, the stomata open. Guard cells pump K$^+$ ions *out* to close stomata and pump K$^+$ *into* open stomata.

**Apical Meristem:** primary growth occurs in the roots and shoots.

- **Zone of cell division:** houses stem cells which constantly divide
- **Zone of elongation:** is where the actual lengthening happens
- **Zone of differentiation:** cells differentiate into the 3 tissue types (*ground, dermal, vascular*).

**Shoot apical meristem** - where most primary shoot growth occurs

**Apical Dominance:** when an axillary bud is inhibited the nearer it is to an apical meristem; prevents the formation of lateral branches

**Vascular Tissue:** xylem and phloem
**Dermal Tissue:** tissues which protect the plant from external environment and prevent desiccation

**Epidermis** (non-woody plants) a single layer of tissue that provides a boundary with the environment

**Ground Tissue:** tissue *not* categorized as dermal or vascular; may be internal to the vasculature (pith) or external to the vasculature (cortex).

**Cuticle:** a thin, waxy layer over which covers the upper epidermis of leaves

**Periderm** (woody plants): tissues that replace the epidermis in woody plants

**Animal Form and Function (Week 5):** In order of increasing complexity, they are *cells, tissues, organs, organ systems and bodies.* By increasing complexity, organisms are able to maximize their *Surface Area to Volume* ratios. This is important because it enables organisms to exchange nutrients, water and other materials with their environment.

**Exotherm:** organism which gains their heat from external sources

**Endotherm:** organism which is warmed by heat generated through metabolism

All endotherms are homeothermic, but some exotherms can be as well, depending on their external environments.

**Animal Diversity (Week 6):** Animals are multicellular, heterotrophic eukaryotes with tissues that develop from *embryonic layers.* The stages of embryonic development are shared among all animals and proceeds through many cleavages, or successions of mitotic cell division without cell growth, meaning that cells divide into two cells over and over.

PLEASE KNOW THE ABOVE FIGURES 😊
Origin of Species (Week 9): According to the Biological Species Concept, members of a Species can interbreed and form viable, fertile offspring. When species become Reproductively Isolated and can no longer interbreed, Speciation, or two new species arising from one, can occur. Reproductive Isolation can be either Prezygotic, or before the creation of a zygote, or Postzygotic, after the creation of a zygote.

**Prezygotic Isolating Mechanisms** include: Behavioral Isolation, Mechanical Isolation, Habitat Isolation, Temporal Isolation, and Genetic Isolation

**Postzygotic Isolating Mechanisms** include: Hybrid breakdown, Reduced hybrid fertility, and Reduced hybrid viability

• **Allopatric Speciation** occurs when members of a population are kept APART by a geographic barrier; **Sympatric Speciation** occurs when the members of a population are not geographically isolated and are in the SAME area

Plant Life Cycles (Week 7): Please be familiar with, and able to draw these figures.

Seed Plants (Week 11): larger, more complex plants displaying sporophyte dominant cycles and using **Sporophyte:** the **diploid** (2n) stage of the seed plant’s life cycle which is enlarged and is the ‘structure’ we associate with a plant
Gametophyte: the haploid (n) stage of the seed plant’s life. The male gametophyte is the sperm-containing pollen grain and the female is the egg-containing archegonia/ovules. Gymnosperm: naked seed of conifers. The mature sporophyte (2n), bear pollen cones (♂) and ovulate cones (♀), where gametophytes (n) are formed. Check out this video to learn more about gymnosperm life cycles: https://www.youtube.com/watch?v=2gWEgrMwMe0

Angiosperms: flowering plants, which utilize male and female components of the sporophyte (stamen and carpels, respectively) to form the male and female gametophytes. A pollen grain (2 components: the tube cell (n) and the generative cell (n)) from an anther may be transferred to a stigma. The tube cell forms a tube down the style to an ovule while the generative cell divides mitotically to form 2 sperm nuclei. At the female gametophyte, one sperm nucleus will fertilize the egg, and the discharged nucleus will fertilize the polar nuclei to form the endosperm (3n).

Double Fertilization: the two sperm nuclei fertilize the egg and polar nuclei of the female gametophyte.

Cotyledon: one or two embryonic seed leaves.

Evolution (Week 15): Evolution describes Descent with Modification, or the change in a species over time.

While changes can occur in individual organisms, only populations can evolve.

Evolution occurs through the action of Natural Selection in which individual organisms which are more suited to their environments are more likely to survive long enough to reproduce than other individuals of the same species who are less suited to the same environment. Over time, these individuals who survive to reproduce shape the characteristics of the population. Evolution is a very slow process but can produce large changes in a population over time.

For natural selection to occur:
- members of the same population must vary in their inherited traits
- individuals with favorable inherited traits must have a higher probability of survival and reproduction, therefore producing more offspring than other individuals
- the species must produce more offspring than the environment can support, meaning many “less fit” offspring die before reproducing.
**Outcome of Natural Selection:** Traits which are reproductively favorable accumulate in a population.

**Hardy Weinberg Equilibrium** assesses whether evolution is occurring in a population.

- For a population to be in Hardy Weinberg Equilibrium there must be:
  1. No mutations
  2. No natural selection
  3. Random mating
  4. No gene flow between populations
  5. A large population size.

- If these criteria are met, the population is **Not evolving**, and the following equation can be used: \( p + q = 1 \)

**Neurons (Week 4):** A potential is a charge difference caused by the unequal distribution of ions on either side of a membrane. **Membrane potential** is the charge difference across a membrane. In a cell at resting potential, the membrane potential is around **-70mV** and is maintained by the **sodium potassium pump** which actively pumps **2Na+ out of the cell and 3K+ into the cell** using ATP. **Equilibrium potential** is the magnitude of membrane potential when an ion reaches equilibrium.

**ACTION POTENTIAL FAST FACTS:**
- All action potentials for a neuron have the same magnitude
- Action potentials can only move in one direction due to the refractory period
- Action Potentials are all or nothing: either they occur or do not occur

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**Links to Conceptual Videos:**
- Male Reproductive Anatomy: [https://www.youtube.com/watch?v=RhBS9ANCVL8](https://www.youtube.com/watch?v=RhBS9ANCVL8)
- Female Reproductive Anatomy: [https://www.youtube.com/watch?v=LPvqphgIYXE](https://www.youtube.com/watch?v=LPvqphgIYXE)
- Spermatogenesis and Oogenesis: [https://www.youtube.com/watch?v=vonVty4Ktuc](https://www.youtube.com/watch?v=vonVty4Ktuc)
- Cardiac Cycle: [https://www.youtube.com/watch?v=7XafE_h60](https://www.youtube.com/watch?v=7XafE_h60)
- Clot Formation: [https://www.youtube.com/watch?v=RQpBj8ebbNY](https://www.youtube.com/watch?v=RQpBj8ebbNY)
- Positive and Negative Feedback: [https://www.youtube.com/watch?v=IzO9nTZCw4](https://www.youtube.com/watch?v=IzO9nTZCw4)
- Countercurrent Exchange (shown in fish): [https://www.youtube.com/watch?v=cVFqME-NW9s](https://www.youtube.com/watch?v=cVFqME-NW9s)
- Amphibian Breathing: [https://www.youtube.com/watch?v=uYoElFVvL5U](https://www.youtube.com/watch?v=uYoElFVvL5U)
- Bird Breathing: [https://www.youtube.com/watch?v=yDvWIDmCKcU](https://www.youtube.com/watch?v=yDvWIDmCKcU)
- Transportation of CO2: [https://www.youtube.com/watch?v=BShB8_1oCGk](https://www.youtube.com/watch?v=BShB8_1oCGk)
- Competitive Exclusion: [https://www.youtube.com/watch?v=Ddq5tXVZ2HA](https://www.youtube.com/watch?v=Ddq5tXVZ2HA)
- Major Aquatic Biomes: [https://www.youtube.com/watch?v=4fMemcd-VXw](https://www.youtube.com/watch?v=4fMemcd-VXw)
- Terrestrial Biomes: [https://www.youtube.com/watch?v=4kQSIWXsUtg](https://www.youtube.com/watch?v=4kQSIWXsUtg)
- Bulk transport, (7:08): [https://www.youtube.com/watch?v=bsYj8f54I0](https://www.youtube.com/watch?v=bsYj8f54I0)
- Vascular Plants: [https://www.youtube.com/watch?v=h9oDTM7M8](https://www.youtube.com/watch?v=h9oDTM7M8)
- Geologic Record: [https://www.youtube.com/watch?v=rWp5Zp1AIaE](https://www.youtube.com/watch?v=rWp5Zp1AIaE)
- Alternation of Generations: [https://www.youtube.com/watch?v=iRKu2MN4T04](https://www.youtube.com/watch?v=iRKu2MN4T04)
- Life Cycle of a Moss: [https://youtu.be/o1z0Vfo62Lg](https://youtu.be/o1z0Vfo62Lg)
Leah McAleer

**Life Cycle of a Fern** and the differences between the **Moss Life Cycle**, check out this video: https://youtu.be/Fhk-Y0duNj

**Monocots vs Eudicots** or more about **double fertilization**: https://www.youtube.com/watch?v=xe99TGccbxo; *(double fertilization) {4:38-6:38}* ) https://www.youtube.com/watch?v=HLYPm2idSTE

**Seed Germination**: https://www.youtube.com/watch?v=_be5P30G36U&pbjreload=101

**Fruit Structure and function**: https://www.youtube.com/watch?v=nax2mH1bFa4

**Basics of sustainability**: https://www.youtube.com/watch?v=5r4IoXPyx8

**Plant Hormones**: https://www.youtube.com/watch?v=HdwIkIkJoBY

**Nitrogen Cycle**: https://youtu.be/UrP1E-yM7Cs

**Protist Characteristics**, check out this video: https://youtu.be/kQdRVq0b9Bk

**Natural Selection**: https://www.youtube.com/watch?v=0SCjhI86grU

**Study Tips:**

*** Review the main concepts in each chapter, and be especially familiar with the main ones that your professor has stressed***

That’s all folks. Thank you for a great semester.

Good luck on finals!

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