

BIOL 1114 Exam #2 (Preview) October 10, 2016

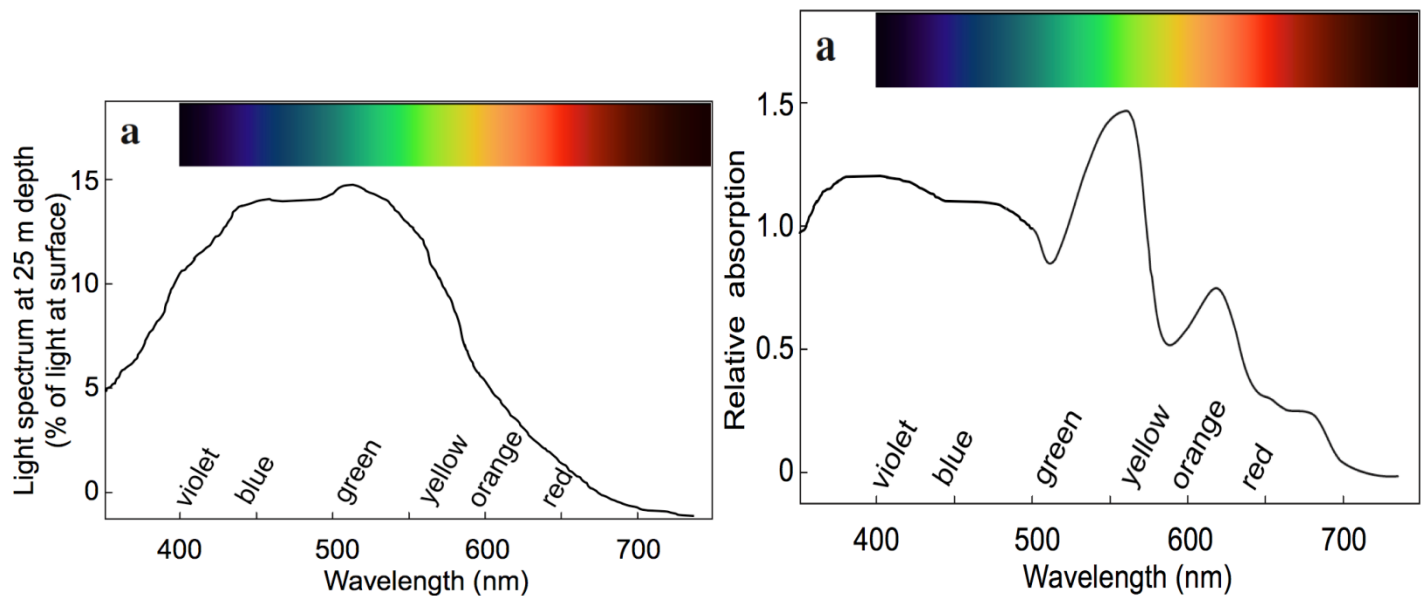
The following material will appear on the upcoming exam. Use this preview to familiarize yourself with the material, and guide you in studying. Be sure to look up the definitions of any words you do not know. You are free to discuss this material or ask questions about it.

Use a #2 pencil to fill in the information on your NCS answer sheet. Put your **O-Key Account Username** in the boxes indicated for **LAST NAME** and darken the appropriate circles. **Write your Name (Last, First)** and **"Star"** or **"NoStar"** in the space above the boxes containing your **O-Key Account Username**. Darken the **(S)** in the **last column of the name circles**. Enter the number **1632** and **darken the corresponding circles** in the **first 4 columns** of the **"Student ID."** Failure to perform this correctly will incur a **-10pt handling fee**. Read all questions and answers **carefully** before choosing the **single BEST response** for each question. Feel free to ask the instructor for clarification.

A gardener conducts an experiment in an attempt to improve the growth rate (determined largely by photosynthesis) of shade-loving plants grown in glass houses. He covers two glass houses with shading fabric that does not change the color of sunlight, and covers another two glass houses with green plastic.



A novice SCUBA diver at 25 meters depth in murky water collects a seaweed that looks gray-brown while she is at depth, i.e. essentially colorless. When she comes to the surface in full sunlight, it looks a distinct color. Curious about this, she grinds it up in a blender with some water and pours the extract into a tube and measures its absorption spectrum (left panel) with a spectrophotometer:



↑ Underwater light spectrum at 25 meters depth (relative to the surface) where the unidentified seaweed was collected. Colors are labeled at the approximate corresponding wavelengths.

↑ Absorption spectrum of a crude aqueous (water) extract of an unidentified seaweed. Colors are labeled at the approximate corresponding wavelengths.

The regulator on the diver's breathing apparatus fails, so he could exhale, but the supply of O₂ is cut off. The diver's vision begins to blur because his nerves begin to fail. After a few minutes, the regulator begins to work again, and the diver breathes a sigh of relief as well as O₂.

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After the diver returns to shore, he decides to tour the fantasy islands (so named because of their fictitious nature) around which he was diving and notices that there are very similar beetles on the 5 islands. Between the islands, the beetles differ in the number of bumps and ridges along their backs, although there appear no differences in their fitness. He also observes the beetles all live in the flowers of a particular species of plant that is unique in having holes that fit the beetles' legs perfectly. The beetles feed on the insects that eat the plant. The diver consults with one of the local entomologists (scientists who study insects). The first concept the diver and the entomologists discuss involves the evolutionary processes that reduce genetic variation. He then learns that the fitness of the plants and the beetles is much lower when either occurs without the other. He also learns that when the beetles are transported to other islands, they survive and reproduce at the same rate as on their own islands and will do so even when mating with beetles from the other islands, which they will do with equal frequency. Finally, the entomologists told him that it appears that the ancestor of these beetles arrived on the islands about 3 million years ago from the nearby continent, where they vary greatly in the number of bumps and ridges on their backs.



Bark scorpions use neurotoxic venom to kill prey and cause intense pain in potential predators. Mice are one potential predator of scorpions. The venom of scorpions normally affects mammals by increasing the frequency of action potentials in their pain-sensing neurons. However, one particular species of mouse, the Southern grasshopper mouse, is not negatively affected by the venom of the bark scorpion. A scientist begins a long-term study of the mice and scorpions.



Permethrin, a new type of insecticide (a chemical that kills insect pests), has become widely popular among homeowners because when used correctly, it is very effective at controlling insect pests without harming cats and dogs. Mr. Jay Bird is among a growing number of homeowners that keep bees at their homes. Unfortunately, Mr. Bird's neighbor did not know that he was keeping bees, and used a large amount of Permethrin to control beetles which are feeding on his prize-winning flower plants. Shortly after the insecticide was applied, Mr. Bird noticed that bees from some of his hives were dying.



Gatito, a prized pet cat of a family in Rio, is bitten by the venomous Brazilian rattlesnake (*Crotalus durissus terrificus*) while the family is attending the Olympic Games. When the family returns, they find poor Gatito nearly comatose with shallow breathing and unable to move its limbs. They rush Gatito to a nearby vet hospital in Rio. The vet, seeing Gatito's symptoms, immediately injects an antidote solution into the paralyzed animal. Several minutes later Gatito's eyes open, and it immediately begins to flick its front paws.