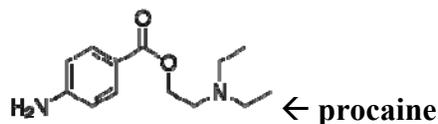


PREVIEW MATERIAL FOR Exam 2 - Spring 2014 (March 10, 2014)

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 or N**) in the last column of the name circles. Enter the number **1412** 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.



During most of the 20th century, dentists applied the anesthetic procaine (Novocain™) to inhibit pain during dental procedures. Procaine acts by inhibiting action potentials from propagating in nerves. Nerves are actually bundles of axons, the extensions of neurons. Procaine is also a potent vasodilator.

Other potent drugs that act at the neuromuscular junction (NMJ = the synapse between the neuron and muscle) have been used in medicine. One such paralytic drug, curare, is derived naturally from the tropical vine plant *Strychnos toxifera*. Although it has been smeared on arrowheads by indigenous hunter-warriors in the Amazon, curare in dilute form has medicinal value. It has been added to the anesthetic “cocktail” prescribed by surgeons as a muscle relaxant used prior to surgery.

As an “extreme” enthusiast, your friend is known to have several deadly venomous animals as “pets” in his house.

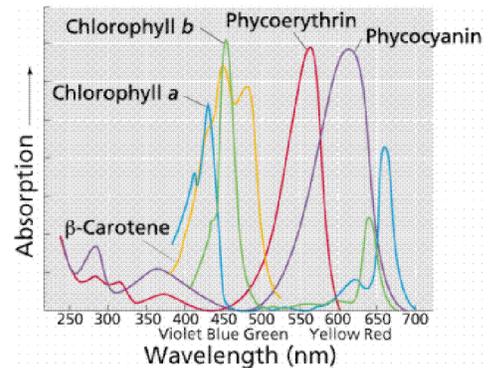
| Animal | Toxin | Effect |
|-------------------------------|--------------|---|
| Funnel Web Spider | Robustotoxin | Keeps Na ⁺ gates open constantly |
| Krait (a snake) | Bungarotoxin | Blocks acetylcholine receptors |
| Rattlesnake | Crotoxin | Reduces acetylcholine release |
| Black Widow Spider | Latrotoxin | Enhances acetylcholine release |
| Puffer Fish | Tetrodotoxin | Keeps Na ⁺ gates closed |
| Australian common brown snake | Textilotoxin | Blocks release of acetylcholine |
| Green Mamba (snake) | Fasciculin-I | Blocks action of acetylcholinesterase |

<http://faculty.washington.edu/chudler/toxin1.html>

The black widow spider found in Oklahoma looks slightly different compared to those found in western Canada. Scientists are debating whether to classify them as different species.

Normally, the concentration of calcium ions (Ca⁺⁺) outside the neuron is much greater than the concentration inside. When an action potential reaches an axon terminus, the “signal” triggering the secretion of acetylcholine into the synapse is a rapid flow of Ca⁺⁺ through channels into the neuron.

Zooxanthellae are small dinoflagellate algae (single-celled plants) that live within most Anthozoan coral polyps (animals). This tight symbiotic relationship allows the corals to benefit from the additional oxygen and glucose produced by photosynthesis within the zooxanthellae, while in return, the algae benefit from the protection offered by the coral polyps. In addition, zooxanthellae also give many corals their color. Due to physical stress, such as dramatic increase in ocean water temperatures, the zooxanthellae within corals can become damaged or expelled and the corals take on a stark white appearance known as “coral bleaching”. In some species of zooxanthellae the rate of photosynthesis is dependent on high concentrations of the photosynthetic pigment **phycoerythrin**. Most zooxanthellae are found in coral reefs of warm, tropical oceans and the Great Barrier Reef located off Australia’s East coast is the world’s biggest single structure made by living organisms.



<http://www2.estrellamountain.edu/faculty/farabee/BIOBK/pigment.gif>

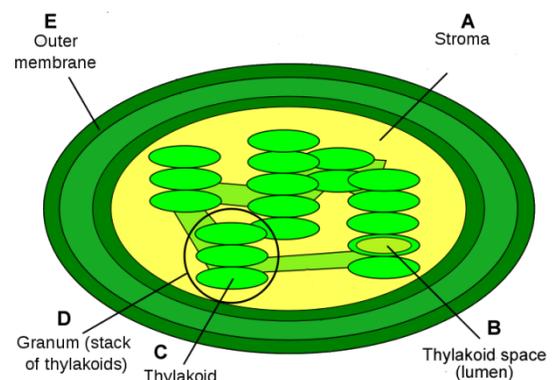
An overworked graduate student wanted to take a vacation but needed to complete a project over the summer so she decided the only solution was to take her study plants with her to a private island where she could work on her project but relax on the beach too! She brought with her a packet of 100 daisy seeds. When she arrived at the hotel, she unpacked and set out with her daisy seeds to find some empty land. She accidentally tripped on the front steps and 10 seeds fell onto the ground. The student was in a hurry and did not pick up the fallen seeds. After a drive, 45 miles away from the hotel, she found a plot of land without any other plants nearby. She planted her remaining 90 seeds and then came back to water them every day for her entire 3 week vacation. After the 3 week period she measured and recorded the height of her 90 daisy plants.

At the end of the 3 week vacation she also noticed the 10 seeds that were dropped by the hotel had germinated into plants and so she measured them. These 10 plants were even taller than the 90 plants at the site away from the hotel. She noticed these 10 plants were right under the lights of the hotel.

In the winter, the hotel groundskeeper decided to change all the outside white light bulbs to red and green lights to celebrate for the holidays.

While on the island, she found a group of butterflies that had bigger blue patches than the butterflies back home. She collected 50 specimens of some of the island butterflies and compared them to 100 museum specimens that represent butterflies with blue spots found back home in North America. After close examination the blue patches were indeed 25% larger on the island butterflies.

The two stages of photosynthesis, the light-dependent and light-independent reactions, occur in different parts of a plant’s chloroplast, represented schematically below.



http://biowiki.ucdavis.edu/@api/deki/files/745/Picture_4.png