EXAM 2 Preview Materials 24 October 2005

An Australian tick species secretes a toxin (holocyclotoxin) in its saliva when it feeds on dogs, livestock and humans. This toxin inhibits the release of the neurotransmitter acetylcholine into the synapse.

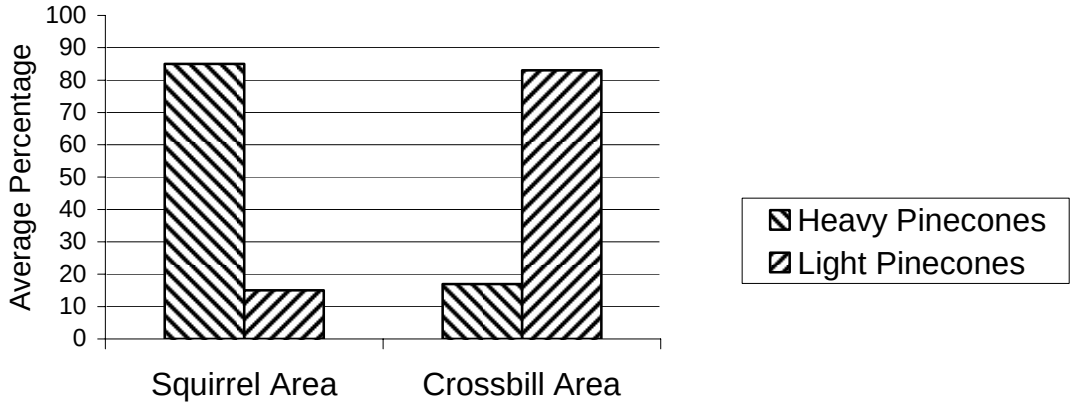
A rancher bought 10 calves in Australia, where these ticks are common and occur in large numbers, and shipped them to an island off the continent where she had a station (ranch). Unfortunately for the cattle and her, 50 Australian ticks rode over on the cattle and established a population on the island.

Some plants develop flowers that are pollinated by flies. Such flowers are simple red flowers, have little odor, and provide easy access to nectar (sugar) that attracts flies. The flies recognize the flowers by their red color and the sugar by sensors in their feet. They draw up the liquid nectar using their special sucking mouthparts. While foraging for the nectar, the flies transfer pollen from one plant to another.

In the Kisatchie National Forest in north-central Louisiana researchers have been trying to determine the characteristics associated with bat day-roosts (resting places) that are located under bridges. One hypothesis concerning day-roost choice by bats concerns thermoregulation. The researchers predicted that in warmer months, bats should choose the coolest possible locations on the undersurface of the bridge and during colder months the bats should choose the warmest possible locations on the undersurface of the bridge.

Lake Victoria in Africa was originally a flowing river that was transformed into a lake about a million years ago. Today there are at least 4 genera and over 200 species of African cichlid fishes. It is thought that the African cichlid fish in Lake Victoria are descendants of a small subpopulation of a single species of cichlid that inhabited the rivers in the Lake Victoria basin. The ancestral cichlids probably fed on insects. Today, there are species of cichlids in Lake Victoria that eat one of the following: algae, plankton, other fish species, mollusks, insects, fish scales or only fish eyes.

In the Rocky Mountains, crossbill birds live and eat lodgepole pine seeds. In many areas, red squirrels are an important predator of the pine seeds. Crossbill birds can live in these same places and also eat pine seeds, but the squirrels get to the seeds first, so those birds don't get as many seeds. However, in a few isolated places, there are no red squirrels, and crossbill birds are the most important seed predator for lodgepoles. Scientists from the University of California at Berkeley are interested in the ecology of the lodgepole pine's habitat and the squirrels and crossbill birds. They examine areas where the predominant predator is the squirrel and other areas where the predominant predator is the crossbill birds. They determine what proportions of heavy and light pinecones are found in each area. They find either heavy pinecones with fewer seeds or lighter pinecones with more seeds. The results of their studies are graphed below.



A man was killed when he was hit across the face by a blunt object in a grocery store. Traces of the murder weapon are stuck to the victim's face. Two witnesses to the crime agree that the murder weapon was a food item, whose wrapper burst open when it struck the man's face. However, one witness says it was a large package of frozen broccoli and the other insists that it was a large piece of frozen pork. When the detective examines the traces of the weapon under the microscope, he sees the following structures in the cells: nucleus, cell wall, ribosomes, mitochondria, cell membrane.