

BIOL 1114, April 11, 2005
EXAM III – Preview Material

Gambian rats from western Africa were shipped to a warehouse in Illinois where other wildlife, such as dormice, squirrels, and prairie dogs were temporarily housed prior to sale at pet swaps throughout the U.S. The rats did not go through proper monitoring and quarantine prior to shipment into the U.S. Several humans that had purchased animals from the Illinois facility developed a pox-like disease after handling or being bitten by the animals. The Center for Disease Control (CDC) became involved because of recent bioterrorist activities and similarities between symptoms in these human cases to those of smallpox. Investigations determined that the infectious agent was monkeypox, a virus related to the smallpox virus. The virus was introduced into the U.S through infected Gambian rats. Although some rats showed signs of illness, the disease was less severe in the rats than in the dormice, squirrels, prairie dogs, and humans exposed to the virus. In their natural habitat, Gambian rats acquire the virus from infected non-human primates.

Mrs. Holland, an avid gardener, waters her strawberry patch 2-3 times a week in August in Oklahoma. Her Blue Heeler dog, Bullet, accompanies her as she waters. On extremely hot days, much to Mrs. Holland's displeasure, Bullet will dig holes in the cool soil and stretch out in the holes to thermoregulate.

In the Oklahoma Panhandle, agriculture dominates the landscape. Prairie dogs occur on isolated patches of remnant native prairie in this region. Prairie dogs live in social family groups in complex systems of burrows. They feed on grasses and forbs (weeds) that grow above ground. Where many families of prairie dogs co-occur, a whole "town" will develop. These towns are conspicuous in that the vegetation in them is very short due to repeated close grazing by the prairie dogs. Prairie dogs were once abundant throughout the Great Plains, but their numbers have dropped dramatically due to efforts by farmers and ranchers to exterminate them. Prairie dogs are persecuted because of perceived threats to cattle from tripping in prairie dog burrows, competition with cattle for vegetation, and the potential for prairie dogs as carriers of bubonic plague to transmit that disease to humans. Some OSU undergraduates spend their summer studying rates of disease transmission at two prairie dog towns. Town "A" has 50 prairie dogs in 5 acres. Town "B" has 60 prairie dogs in 20 acres.

Tay Sachs is a disorder that results in death from degeneration of the central nervous system, typically by the age of 5. People that exhibit the syndrome lack the enzyme hexosaminidase A (or hex A) and cannot destroy a particular fatty substance, which then builds up in nerve cells in the brain, causing them to die. To date, there is no cure. There are nearly 90 mutations in the Hex A gene that will result in Tay-Sachs like symptoms, but the most severe results in a complete lack of the Alpha subunit of the protein. A person with one mutated Hex A allele and one normal Hex A allele will not develop Tay-Sachs. A key DNA sequence in the Hex A gene is TAT TGG ACG ATG GGA TCG.