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The following document describes common types of zoonotic illnesses encountered when working with the indicated species. **This is not an exhaustive list and the possibility of zoonotic disease should be considered every time work is conducted with animals.** Specific-pathogen-free status in laboratory animals tests only for the presence of particular pathogens and is NOT an assurance that the animal is pathogen-free or that it cannot transmit zoonotic diseases. PPE and experimental practices appropriate to the specific task should be followed when working with any animal species. EHS recommendations are made during review of your IACUC protocol – additional questions about the potential for zoonotic disease exposure should be directed to your EHS representative.

If you have had an exposure and/or are showing symptoms of illness, and need medical attention refer to the information in the University of Michigan's Bite Scratch Protocol

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Bacterial

Disease:	**ANTHRAX**
Description of Disease:	Wild mammals such as antelope and deer can become infected with anthrax, caused by the gram-positive bacterium *Bacillus anthracis*, after breathing in or ingesting spores in contaminated soil, plants, or water. Anthrax manifests as respiratory distress and shock in these animals. In the research setting, infection in humans can cause both cutaneous and systemic disease.
Clinical Signs in Animals:	Clinical signs for the cutaneous form in affected animals include blisters with surrounding swelling that progress to having black, ulcerated centers. Ingestion of anthrax will cause systemic signs such as fever, nausea, swollen lymph nodes, loose stool (possibly with blood), hyperemia, and a bloated abdomen. The inhalational form will cause similar systemic signs, but will also include lethargy and can progress to

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	respiratory distress. Untreated, 85-90% of animals with anthrax affecting their lungs will die.
Transmission and Symptoms in Humans:	Anthrax can be transmitted by inhalation when handling the wool, hides, or hair of infected animals or by cutaneous contact through breaks in the skin when handling these animal products. Symptoms develop in humans anywhere from one day to seven days (cutaneous) to two months (inhalational) after infection. The clinical signs in humans are the same as in affected animals. The sores associated with the cutaneous form will be pruritic and will most likely appear on the face, neck, arms, or hands. In the inhalational form, people can experience fever and chills, chest discomfort, shortness of breath, confusion or dizziness, cough, nausea, vomiting or stomach pain, headache, sweating (often drenching), extremely lethargy, and body aches. The inhalational form of this diseases is usually fatal without aggressive treatment.
Prevention:	Infection with anthrax can be prevented through the recognition of the clinical signs in wild and domestic ruminants and wearing personal protective equipment when handling animals or carcasses in which these signs were present. Domestic animals in areas where anthrax is prevalent can also be vaccinated to prevent infection and potential spread.
Additional Information:	https://www.cdc.gov/anthrax/basics/index.html https://www.cdc.gov/anthrax/pdf/evergreen-pdfs/anthrax-evergreen-content-english.pdf

Disease:	**BRUCELLOSIS**

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Description of Disease:	In animals, this disease is also known as Bang's disease or contagious abortion. In humans, it is referred to as Mediterranean fever, Malta fever, or undulant fever. Brucellosis is caused by infection with gram-negative, non-motile bacteria within the genus *Brucella* including *Brucella abortus, B. canis, B. melitensis,* and *B.suis.* Since these bacteria function as facultative intracellular parasites, they tend to cause chronic disease.
Clinical Signs in Animals:	Animals most frequently infected include domesticated and wild species of bovidae, ovidae, capridae, suidae, and capridae. Symptoms in animals include abortion, infertility, and testicular abnormalities. Infected animals may also not display any signs of illness.
Transmission and Symptoms in Humans:	Transmission to humans in a laboratory setting is by the direct contact of broken skin or the mucous membranes (such as eyes or mouth) with infected animal birth products (aborted fetuses, fetal fluid and membranes, and secretions), blood, or urine. Inadvertent consumption of unpasteurized milk could also be a route of infection. The bacteria can also be transmitted through inhalation of aerosols. Symptoms usually develop in humans within one-two months of infection. Flu-like symptoms such as the namesake undulant fever, headache, chills, sweating, weakness, malaise, muscle aches, and nausea can last two to four weeks or longer. In some cases, infection with *Brucella* has caused bacteremia or painful generalized lymphadenopathy and splenomegaly.
Prevention:	Transmission of *Brucella* can be prevented through utilization of good personal hygiene and strict sanitization methods, and by wearing personal protective equipment especially when working with pregnant host species or their birth products. Birth products should be disposed of promptly and carefully. Contaminated surfaces should be appropriately disinfected.

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Additional Information:	https://www.cdc.gov/brucellosis/index.html

Disease:	**CAMPYLOBACTERIOSIS**
Description of Disease:	*Campylobacter spp.* bacteria can be found in a large variety of species of both wild and domestic mammals including pigs, sheep, dogs, cats, ferrets, hamsters, and nonhuman primates, where the bacteria frequently colonize the gastrointestinal tract. Infected sheep and pigs have been most frequently implicated in zoonotic disease transmissions. *Campylobacter jejuni* and *C. coli* are leading causes of diarrhea in humans.
Clinical Signs in Animals:	Infected animals may display diarrhea, abortion, stillbirths, fever, reduced appetite, and vomiting. However, an infected animal may not show any signs of illness. Animals treated for *Campylobacter* may continue to be carriers and to shed the disease.
Transmission and Symptoms in Humans:	In the laboratory environment, *Campylobacter spp* is transmitted to humans when a person ingests infected fecal material such as when a contaminated glove or piece of equipment contacts a human's mucous membranes. Infected humans may either display no signs of illness or may develop abdominal pain, malaise, fever, nausea, vomiting, or diarrhea. Illness usually occurs within 1-10 days of exposure, most frequently within 2-5 days.
Prevention:	The practice of good personal hygiene, such as handwashing after handling animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel.
Additional Information:	https://www.cdc.gov/campylobacter/index.html

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Disease:	**DERMATOPHILOSIS**
Description of Disease:	The spore-forming bacterium *Dermatophilus congolensis* causes a skin disease in animals variably known as Lumpy wool, Strawberry footrot, Rain rot, contagious dermatitis, and Streptothricosis. Deer are the wildlife most commonly affected, though it has also been found in rabbits, rodents, skunks, camels, buffalo, primate, and several species of carnivores.
Clinical Signs in Animals:	Affected animals will have a “paintbrush” appearance of matted fur, with crusted purulent material present in the mats. Patchy or extensive hair loss can also occur. Some infected animals may show no clinical signs.
Transmission and Symptoms in Humans:	*Dermatophilus* is transmitted through the handling of infected animals when bacteria enter breaks in the skin. Rain, high humidity, and high temperature are associated with outbreaks because they cause a breakdown in the skin’s natural barriers. Symptoms include pus-filled blisters on the hands and arms that can ulcerate and cause scarring.
Prevention:	Transmission can be prevented by wearing appropriate personal protective equipment when working with wildlife, especially those with clinical signs. Spores can remain infective for months on fur, clothing, or in crusts.
Additional Information:	https://www.vet.upenn.edu/research/centers-laboratories/research-initiatives/wildlife-futures-program/resources/fact-sheets/fact-sheet-detail/dermatophilosis

Disease:	**ERYSIPELAS / ERYSIPELOID**

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Description of Disease:	Erysipelas is a disease caused by the bacteria *Erysipelothrix rhusiopathiae.* Its most important reservoir is domestic swine, but it can also infect a variety of wild animals. *Erysipelothrix* causes a local cutaneous lesion called erysipeloid, a generalized cutaneous form, and can also cause septicemia.
Clinical Signs in Animals:	Infected animals may show signs of fever, lethargy, septicemia (sometimes leading to endocarditis), arthritis, and sudden death. Certain symptoms are thought specific to swine such as diamond-shaped skin lesions and necrosis of the ear and tail tips.
Transmission and Symptoms in Humans:	Erysipelas is transmitted to humans by direct contact with infected animals, tissues, or feces. Infected humans most frequently exhibit well-defined skin lesions such as redness or swelling but may also exhibit fever, a generalized bacterial infection, endocarditis (inflammation of the inner lining of the heart), encephalitis (inflammation of the brain), and septic arthritis within one to three days of exposure.
Prevention:	The practice of good personal hygiene, such as hand washing after contacting animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel.
Additional Information:	https://medlineplus.gov/ency/article/0 00632.htm

Disease:	**LEPTOSPIROSIS**
Description of Disease:	Spirochete bacteria of the genus *Leptospira* can infect a wide range of wild mammal species including various rodents, raccoons, skunks, squirrels, opossums, deer, dogs, cats,

	ruminants, and nonhuman primates. In humans, *Leptospira* can cause an acute, severe form of the disease called Weil's disease and can also cause Severe Pulmonary Hemorrhage Syndrome.
Clinical Signs in Animals:	Infection can result in varying symptoms across species. Rodents may be asymptomatic, while canids may exhibit kidney and liver disease and sheep may experience reproductive failure. Nonhuman primates may exhibit blood clotting abnormalities or abortion.
Transmission and Symptoms in Humans:	Transmission to humans may occur if the individual's abraded skin or mucous membranes come in contact with the urine or tissues of infected animals or equipment contaminated with these substances. It is also possible for humans to contract the disease through inhalation of fine particles of contaminated fluids that may be generated during high-power washing of contaminated equipment. Symptoms in humans may include fever, chills, weakness, pain, and headache. The severe form of the disease (Weil's disease) results in impaired kidney and liver function, accompanied by jaundice, as well as mental status changes from meningitis, and possible death. Severe Pulmonary Hemorrhage Syndrome occurs when Leptospirosis causes bleeding from the lungs.
Prevention:	The best methods of control are good sanitation with appropriate animal waste control and appropriate use of personal protective equipment when handling animals.
Additional Information:	https://www.cdc.gov/leptospirosis/index.html

Disease:	**LYME DISEASE**
Description of Disease:	The spirochete bacteria *Borrelia burgdorferi* and (rarely) *Borrelia mayonii* are the causative agents of Lyme borreliosis or Lyme disease in humans. Small mammals and birds are

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	the natural reservoirs of *Borrelia burgdorferi*, with the *Ixodes* genus of ticks serving as the arthropod vector. Since different life stages of the ticks feed on a variety of small and medium-sized host species in addition to the larger deer (which the adults must feed on to reproduce), there is a wide range of hosts for the disease.
Clinical Signs in Animals:	Most wild mammals and birds do not show readily apparent clinical signs of Lyme disease, though white-footed mice may exhibit reddening of the ears and neurological signs that include trembling, head tilt, circling to one side, loss of coordination, and hind limb weakness. Dogs may also have intermittent, recurrent lameness, fever, anorexia, lethargy, lymphadenopathy, and possibly arthritis. In various domestic species, Lyme disease can cause renal, neurologic, and cardiac abnormalities, with renal failure ultimately being fatal.
Transmission and Symptoms in Humans:	Transmission occurs through salivation during the blood feeding of *Ixodes* ticks. Signs of Lyme disease will first appear 3 to 30 days after transmission. These early signs can include fever, chills, headache, fatigue, muscle and joint aches, and swollen lymph nodes. A rash occurs in 70-80% of affected people, on average about 7 days after transmission. This erythema migrans (EM) rash begins with redness and warmth at the site of the tick bite and spreads out over several days, sometimes with central clearing creating a “bull’s eye” appearance. Later symptoms of Lyme disease (days to months after bite) include severe headaches and neck stiffness, additional EM rashes, facial palsy, arthritis with severe pain and swelling of the knees or other large joints, intermittent pain in muscles, joints, and tendons, heart palpitations (Lyme carditis), dizziness or shortness of breath, nerve pains, numbness or tingling in the hands and feet, and meningitis. After treatment, some affected individuals experience a condition called Post-Treatment Lyme Disease Syndrome (PTLSD) that causes pain, fatigue, and difficulty thinking for 6 months or more.
Prevention:	Newly arrived wild-caught mammals should be treated for

	ticks and other ectoparasites with appropriate insecticides. Personnel working with animals that may harbor ticks should check their clothing, equipment, and bodies for ticks after working with the animals or being outdoors in wooded and brushy areas with high grass and leaf litter. Personnel can also decrease the chance of harboring ticks on their clothes and bodies by treating their clothing with 0.5% permethrin and using EPA-registered insect repellents.
Additional Information:	https://www.cdc.gov/lyme/index.html https://www.pgc.pa.gov/Wildlife/Wildlife-RelatedDiseases/Pages/LymeDisease.aspx

Disease:	**METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)**
Description of Disease:	MRSA has been reported in many domestic and wild animal species. In animals and people, MRSA enters and colonizes in open wounds, causing antibiotic-resistant infections local and systemic infections.
Clinical Signs in Animals:	Abscesses, dermatitis, post-operative infections, and catheter implant sites are common sites for MRSA infections. Infected sites can show crusting, scaling, papules, pustules, redness, hair loss, and inflammation.
Transmission and Symptoms in Humans:	Recently MRSA has become more prevalent in both animals and humans in both the clinical and surgical setting, but wildlife species have also been identified as reservoirs. There is growing concern that MRSA can be transmitted from animals to people. There have been reports of people developing MRSA who have worked in close contact with dogs and cats that are harboring the bacteria. The biggest risk factor in contracting MRSA is accidental exposure of an open cut or wound when handling infected animals. MRSA

	colonization does not necessarily lead to infection, but it can predispose people to other opportunistic pathogens. Clinical signs in humans typically present as skin infections. Infected areas appear as pustules or boils that may be mistaken for spider bites. The bumps are red, swollen painful and pus may also be seen draining from the site. Signs of a more severe MRSA infection vary from blood steam infections to pneumonia and can lead to potentially life threatening situations. Historically these severe infections are seen in people that have undergone surgery in the hospital, and they are not as common in cases caused by animal handling.
Prevention:	It is important to practice good hygiene, such as frequent hand washing, when working closely with wild-caught mammals. If water and soap are unavailable for handwashing, an alcohol-based hand sanitizer containing at least 60% alcohol can be used to clean the hands. Gloves should be worn at all times, and any breaks in the skin should be covered whenever handling animals. Appropriate disinfection protocols should be followed if an animal is suspected of having MRSA.
Additional Information:	https://www.cdc.gov/mrsa/

Disease:	**MURINE TYPHUS (ENDEMIC TYPHUS)**
Description of Disease:	Murine or Endemic typhus, caused by the obligate intracellular bacterium *Rickettsia typhi*, is part of the typhus group of the *Rickettsia* genus, along with *R*. *prowazekii* (cause of Epidemic typhus, associated with flying squirrels in the eastern United States). Wild rats and their associated fleas, *Xenopsylla cheopis* and *Nosopsyllus fasciatus,* are the main reservoirs of murine typhus, though cat fleas (*Ctenocephalides felis*) living on opossums and other small mammals have also been found to carry *Rickettsia typhi* and a related organism that may potentially cause similar non-

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	specific signs, *Rickettsia felis*. All Rickettsial diseases within the typhus group cause the disease that is generically called typhus or typhus fever.
Clinical Signs in Animals:	*Rickettsia typhi* causes few or no clinical signs in its host animals.
Transmission and Symptoms in Humans:	Transmission is directly through the bites of infected fleas or, more commonly, through contamination of flea bites with their feces. Symptoms occur after an incubation period of 7-14 days and begin with a mild to severe acute febrile illness that includes malaise, headache, rash (typically occurs around day 5 of illness), and chills. In severe cases, an encephalitis and damage to organs including the kidneys, liver, heart, lungs, and/or brain can occur. *R. typhi* can remain infectious in rat feces for up to 100 days.
Prevention:	Flea control through use of insecticides on wild caught mammals is essential to preventing transmission of flea-borne illnesses such as murine typhus. Use of appropriate PPE such as long pants to provide a physical barrier and use of insect repellent to provide a chemical barrier against biting fleas are also important when working with flea-infested animals.
Additional Information:	https://www.cdc.gov/typhus/murine/index.html

Disease:	**PASTEURELLOSIS**
Description of Disease:	Pasteurellosis is caused by infection with the bacteria in the genus, *Pasteurella.* Pasteurellosis can cause chronic local and systemic infections. *Pasteurella multocida* is the cause of hemorrhagic septicemia in wild ruminants including bison, buffalo, deer, and antelope.

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Clinical Signs in Animals:	*Pasteurella* spp commonly colonize the upper respiratory tracts, tonsils, and oral mucosa of animals without signs of infection, Clinically-apparent infections can occur in the ears, nose/sinuses, eye, joints, meninges, and spinal cord. Signs can include fever, hypersalivation, nasal discharge, and dyspnea. With hemorrhagic septicemia, hemorrhages can be present throughout the body.
Transmission and Symptoms in Humans:	This disease is transmitted to humans through bite wounds, scratches, or rarely through the air (aerosol transmission). When carriers are stressed through factors such as high temperature, humidity, illness, or nutritional deficiency, the bacteria will be shed through the mucous membranes. Symptoms in humans include swelling at the site of inoculation, cellulitis, erythema, local lymphadenopathy, fever, and pain. Wounds can have serosanguineous or purulent discharge. Infection can also progress to septicemia, meningoencephalitis, osteomyelitis, and purulent tenosynovitis. These signs initially appear anywhere from 8-72 hours after infection.
Prevention:	Transmission of the disease is decreased by wearing personal protective equipment including gloves when handling wild caught mammals. In addition, all bite wounds should be evaluated by medical personnel.
Additional Information:	https://cwhl.vet.cornell.edu/disease/pasteurella

Disease:	**PLAGUE**
Description of Disease:	Plague is caused by infection with the bacterium *Yersinia pestis.* Plague has been found in wild rodents (mice, rats, prairie dogs, squirrels) and rabbits in the western United States and can also infect the wild carnivores that consume these animals. Though rare, transmission directly through these animals or through fleas can cause bubonic,

	septicemic, or pneumonic plague in humans.
Clinical Signs in Animals:	Felids appear to be more susceptible to plague than other animals. Signs in animals can include the characteristic buboes (acutely swollen, painful lymph nodes that can become draining, especially at the site of exposure) and non-specific signs such as lethargy, depression, anorexia, vomiting, diarrhea, dehydration, fever, muscle soreness, oral lesions, coughing, hemoptysis, and weight loss. If the animals become septicemic, they can also develop signs of shock, dyspnea, and disseminated coagulopathies. Rodents harboring *Yersinia pestis* can have mild to severe infections or have no symptoms at all.
Transmission and Symptoms in Humans:	Plague is transmitted primarily through bites of fleas infected with the bacterium. People typically show symptoms 2-6 days after receiving a bite from an infected flea. The most common form of disease is called bubonic plague, and usually presents as a fever with chills, headache, nausea, vomiting, weakness, back or abdominal pain, and enlarged, painful lymph nodes (buboes). The plague can also less commonly be transmitted directly from animal to person by handling tissues of infected animals or by breathing in air droplets contaminated with *Yersinia pestis*. Primary septicemic plague, caused by infection through the blood stream without a flea bite, does not cause buboes, but will otherwise have similar signs that can progress to multi-organ failure, coagulopathies, and gangrene. People that contract the respiratory form of the disease, called pneumonic plague, either through inhalation by spread of bubonic or primary septicemic plague to the lungs, develop life threatening symptoms without aggressive treatment. Clinical signs are similar to bubonic plague but also include labored and increased breathing with a cough that becomes progressive with blood stained sputum.
Prevention:	Prevention of the transmission of plague should include avoidance of flea bites when handling animals suspected of

	harboring plague, both by development of flea control programs in captive populations of these animals and by personal protective measures such as the use of insect repellents and appropriate personal protective equipment. PPE should include gloves, face mask or shield to protect from air born droplets, eye protection, and protective gowns.
Additional Information:	https://www.cdc.gov/plague/index.html https://www.avma.org/plague-faq

Disease:	**Q FEVER**
Description of Disease:	Q fever is a disease caused by the bacterium *Coxiella burnetii*. It can be acquired by exposure to placental membranes and fetuses of infected animals or to environments or equipment contaminated with the excretions of infected animals. A broad range of domestic and wild species have been associated with Q fever cases in humans, including pregnant cats and wild rabbits, though pregnant sheep and other ruminants are associated with the majority of outbreaks.
Clinical Signs in Animals:	Infected animals may show no clinical signs, though *Coxiella burnetii* is increasingly being recognized as an important cause of late-term abortion, stillbirth, and weak kids in goats and, to a lesser extent, sheep.
Transmission and Symptoms in Humans:	The bacteria are shed in the milk, feces, urine, and especially placental tissues of infected animals; the number of bacteria shed may be especially high when an infected female is pregnant or has recently given birth. Therefore, increased levels of precautions must be instituted when working with pregnant females, newborn offspring, and tissues and body fluids associated with pregnancy. This includes the placenta, amniotic fluid, blood or soiled bedding. In addition, individuals

	who handle young sheep, goats or calves up to six months of age are at higher risk for exposure, as are individuals who participate in the routine care of the animals. Bacteria can become aerosolized, particularly during births and cleaning of birthing areas. Exposure of humans to only a small number of organisms can result in infection. The organisms are very resistant to heat, drying, and many disinfectants and may survive for prolonged periods in the environment. In most infected humans develop an acute illness that could be mistaken for the flu. A fever of 104-105^{o} F may develop and may be accompanied by general malaise, significant muscle aches and pains, a frontal headache with retro-orbital pain, and very frequently a cough. Unexplained weight loss may also occur. Up to half of the individuals who develop this acute disease will develop pneumonia that can be seen on chest x-rays. A large number of people will also develop hepatitis. In most patients the disease is self-limiting, resolving after 10-14 days. In older or ill individuals, acute illness may take 1-2 months to resolve. Less than 1% of infected individuals develop a chronic (> 6month) infection with the Q fever organism. In these cases, endocarditis, an infection of the inner lining of the heart, may develop and is frequently fatal, especially for individuals who have congenital heart disease, prior heart valve disease, or an impaired immune system.
Prevention:	Women of child-bearing age should be aware that there is a risk of Q fever infection resulting in miscarriage or other problems with the human fetus. It is advisable that pregnant women, or those thinking of becoming pregnant, consult with their own physician prior to working with or near ruminants. Individuals with valvular heart disease should not work with animals suspected of having *Coxiella burnetii* because they are at risk of developing a serious, chronic, relapsing infection. When working with pregnant ruminants or other wildlife that may harbor *Coxiella burnetii,* PPE that includes N95-type respirators and protective face shields is recommended.

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Additional Information:	https://www.cdc.gov/qfever/index.html

Disease:	**RAT BITE FEVER**
Description of Disease:	Rat bite fever can be caused by two Gram-negative species of bacilli bacteria: *Streptobacillus moniliformis* and *Spirillum minus*. *Spirillum minus* is rarely found in the United States and is more frequently isolated in Asia and Africa. These bacteria may be present in the oral and respiratory tracts of many rodents, including rats, mice, and gerbils. When disease caused by these bacteria through consumption of food or water contaminated with the urine and droppings of infected rodents, it is known as Haverhill fever.
Clinical Signs in Animals:	Mice may have an acute fatal disease. If they survive, mice may develop infected, arthritic joints and swelling and loss of the digits or limbs. Rats do not usually develop any clinical signs of infection.
Transmission and Symptoms in Humans:	These bacteria are most frequently transmitted to humans via the bite or scratch of an infected rodent. However, transmission may occur secondary to handling an infected animal or equipment contaminated with rodent urine or feces and may not require a bite injury. Infected humans may experience fever, chills, lymphadenopathy (swollen lymph nodes), vomiting, painful and enlarged joints and a rash on the hands or feet. Symptoms usually occur 2-10 days after exposure. If left untreated, it can lead to pneumonia, inflammation of the liver or intestines, and endocarditis (inflammation of the lining of the heart) with a 10% fatality rate.
Prevention:	Preventative measures include proper handling and restraint of rodents to decrease the likelihood of animal bites, use of appropriate person protective equipment (such as gloves and

	gowns), and the prompt treatment and reporting of rodent bite wounds.
Additional Information:	https://www.cdc.gov/rat-bite-fever/index.html

Disease:	**RICKETTSIAL POX**
Description of Disease:	Rickettsial pox, caused by the obligate intracellular bacterium *Rickettsia akari*, is part of the spotted fever group of the *Rickettsia* genus, along with *R*. *rickettsii* (cause of Rocky Mountain spotted fever). Wild mice (*Mus musculus)* and their associated mite, *Liponyssoides* (*Allodermanyssus*) *sanguineus,* are the natural host and vector, respectively, for *R. akari*, though there is serological evidence of prior exposure in various rodents of the genera *Mus, Rattus* (black rats, brown/Norwegian rats)*, Peromyscus* (deer mice), and *Neotoma* (pack/wood rats). All Rickettsial diseases within the spotted fever group, including Rocky Mountain spotted fever, *Rickettsia parkeri* rickettsiosis, Pacific Coast tick fever, and rickettsial pox, cause febrile illness with similar clinical signs.
Clinical Signs in Animals:	*Rickettsia akari* causes few or no clinical signs in its host animals.
Transmission and Symptoms in Humans:	Transmission is directly through the bites of infected mites, which acquire the bacteria from infected rodents that they have previously fed on. Symptoms occur after an incubation period of 10-24 days and begin with a mild to severe acute febrile illness that includes malaise, enlarged lymph nodes, muscle aches, headache, rash, and chills. The rash begins with a discrete maculopapular appearance and progresses to being vesicular and covering the entire body, excluding the palms and soles of the feet. 90% of affected people develop an eschar at the site of the bite. Progression to more severe pulmonary or gastrointestinal signs almost never occurs and

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	people typically recover three weeks after the onset of symptoms.
Prevention:	Mite control through use of insecticides on wild caught mammals is essential to preventing transmission of insect-borne illnesses such as rickettsial pox. Use of appropriate PPE such as long pants to provide a physical barrier and use of insect repellent to provide a chemical barrier against biting mites are also important when working with mite-infested animals.
Additional Information:	https://www.cdc.gov/otherspottedfever/index.html

Disease:	**SALMONELLOSIS**
Description of Disease:	Many species are susceptible to infection with bacteria within the genus *Salmonella* including wild or domesticated mammals such as guinea pigs, mice, rats, hedgehogs, pigs, sheep, cats, dogs, rabbits, and nonhuman primates. These bacteria are normal inhabitants of the intestinal tracts of these animals, but can cause a gastrointestinal disease in both animals and humans.
Clinical Signs in Animals:	Infected animals may display no signs of infection or be severely affected with diarrhea, dehydration, or systemic bacterial infection.
Transmission and Symptoms in Humans:	When handling wild caught mammals, *Salmonella spp* may be transmitted to humans when a person inadvertently ingests infected fecal material or has contact with fomites. Shedding of bacteria in feces increases during periods of stress such as during transportation or handling. Infected humans may have diarrhea (with or without blood), vomiting, fever, and stomach cramps. More severe signs and symptoms may develop especially in individuals with compromised immune systems. Onset of signs will usually

	occur 6 hours to 6 days after infection and last for 4-7 days.
Prevention:	The practice of good personal hygiene, such as hand washing after handling animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel.
Additional Information:	https://www.cdc.gov/healthypets/diseases/salmonella.html https://www.cdc.gov/salmonella/

Disease:	**TETANUS**
Description of Disease:	Tetanus (lockjaw) is an acute, often fatal disease caused by the toxin of the tetanus bacillus, *Clostridium tetani*. The bacterium usually enters the body in the spore form, often through a puncture wound contaminated with soil, dust, or animal feces, or through lacerations, burns, and minor unnoticed wounds. There is variability in susceptibility to tetanus, with humans, horses, guinea pigs, nonhuman primates, mouse, goat, and sheep highly susceptible, while cattle, felids, and canids are more resistant.
Clinical Signs in Animals:	The organism is commonly found in the intestines of animals where it causes no negative effects. In animals that do show clinical signs, these consist of spastic paralysis of the muscles that typically originates with spasticity of the muscles of mastication. Increasing spasticity and rigidity of the muscles of mastication leads to inability to open the mouth (“lockjaw”). In species that are more resistant to the toxin, the signs of muscle spasticity are more likely to be localized to a smaller infected region.
Transmission and Symptoms in	Humans infected through a wound or lesion frequently develop muscle rigidity and painful muscular contractions.

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Humans:	Infection may be fatal.
Prevention:	All employees working with animals should be immunized against tetanus at least every ten years. The use of personal protective equipment such as bite gloves is critical in preventing the transmission of tetanus to unvaccinated personnel working with wild caught mammals. All animal bite or scratch wounds should be thoroughly cleansed and evaluated by a physician.
Additional Information:	https://www.cdc.gov/tetanus/index.html

Disease:	**TUBERCULOSIS**
Description of Disease:	*Mycobacterium spp*., the causative agent of tuberculosis (TB), can infect a wide range of species, with humans, cattle, and birds being the major reservoir hosts. Although rare, outbreaks of tuberculosis still occur in the research setting when wild-caught animals, particularly Old World species of nonhuman primates, are utilized. In nonhuman primates, tuberculosis is not a natural disease; the disease is often contracted in the wild through human contact and then transmitted from monkey to monkey.
Clinical Signs in Animals:	Infected animals may display a wide range of signs from none to sudden, unexpected death. Additional signs that may be seen in nonhuman primates include lung disease (cough, labored breathing, hemoptysis), a loss of appetite, chronic weight loss, enlarged lymph nodes, and abscesses of the skin and other organs. Signs can be dependent on the organ systems affected.
Transmission and Symptoms in Humans:	TB is usually transmitted by airborne infectious particles, but can also be contracted by direct ingestion of bacteria. Laboratory workers have a high risk of contracting the disease when caring for or performing autopsies on infected

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	animals. The organism can also be found in dusty bedding or the cough of infected animals and can become aerosolized during high-pressure water sanitization. Humans infected with TB may be asymptomatic or may exhibit chronic cough, fatigue, fever, weight loss, hemoptysis (coughing of bloody liquid), and lung disease that may become fatal.
Prevention:	Regular health surveillance for personnel working with wild-caught mammals, especially nonhuman primates, and for the nonhuman primates themselves, is the cornerstone of the prevention of tuberculosis. Nonhuman primates must be routinely tested and any infected animals should be promptly removed. Disease transmission to personnel is minimized through use of respiratory tract protection and good personal hygiene.
Additional Information:	https://www.cdc.gov/tb/

Disease:	**TULAREMIA**
Description of Disease:	Tularemia is caused by the bacterium *Franceisella tularensis* and induces disease in many different species, including wild rabbits and rodents, domestic sheep and pigs, and non-human primates. Rabbits and hares are the primary carriers of tularemia in North America.
Clinical Signs in Animals:	When infected, rabbits and rodents are listless, depressed, anorexic, and ataxic, with a roughened hair coat and a tendency to huddle. They may also exhibit weakness, fever, ulcers, regional lymphadenopathy, and abscesses. Some animals are asymptomatic and display no clinical signs, while others may be found dead without a history of illness.
Transmission and Symptoms in Humans:	There are many different presentations of tularemia that manifest depending upon the route of the infection. Ulcerative tularemia is the most common form of the disease and

	usually occurs when handling dead infected animals. People that handle infected animals will develop a skin ulcer at the site where the bacteria enters an open wound. Enlarged lymph nodes will also be present at the region of infection. The pneumonic form of tularemia, while rare, is the most serious form of the disease and results from breathing in aerosols containing the organism, such as during post-mortem examination of an infected animal. Symptoms include cough, chest pain, and difficulty breathing. These symptoms can be fatal if not treated promptly. Fever, chills, headaches, diarrhea, muscle aches, joint pain, and progressive weakness can develop in all forms of the disease. While there have been relatively few cases of tularemia in North America, it is a very infectious disease and only a small number of the organisms are required to cause serious infection. *Tularemia* can survive for long periods of time in the environment.
Prevention:	Due to these characteristics, if an animal is suspected of having tularemia, good infection control procedures should be practiced. Precautions against bites or scratches should be taken. Gloves should be worn, and any breaks in the skin should be covered when handling animal carcasses. Regular hand washing with soap and water, and cleaning of equipment is also an important preventive measure against tularemia.
Additional Information:	http://www.cdc.gov/tularemia/index.html https://www.avma.org/tularemia-facts

Viral

Disease:	**HANTAVIRAL DISEASES**
Description of Disease:	Hantaviral diseases are found in wild rodents in the United States. The species that are known to carry these viruses are cotton rats (*Sigmodon hispidus*), rice rats (*Oryzomys palustris*),

	deer mice (*Peromyscus maniculatus*), and white-footed mice (*Peromyscus leucopus*). The diseases can be induced by numerous viruses within the viral family, Bunyaviridae. These viruses cause both Hantavirus Pulmonary Syndrome (HPS, predominantly in the Americas) and Hemorrhagic Fever with Renal Syndrome (HFRS, predominantly in Europe and Asia) in humans.
Clinical Signs in Animals:	Infected animals most frequently do not develop any signs of illness.
Transmission and Symptoms in Humans:	Transmission to humans is by inhalation, wound contamination, conjunctival exposure, or ingestion of the virus shed in rodent urine, feces, and saliva. Brief exposure times as short as 5 minutes have resulted in human infection. In the US, infected humans may develop acute fever, headaches, muscle aches, gastrointestinal signs (nausea, vomiting, diarrhea), dizziness, chills, and back pain. Four to ten days after the initial symptoms, the late symptoms of Hantavirus Pulmonary Syndrome may appear. These include coughing and shortness of breath. The disease may be fatal in humans.
Prevention:	Hantavirus infections can be prevented through screening of rodents and rodent tissues prior to introduction into resident laboratory animal populations and facilities. Good hygiene, disinfection of contaminated areas, and prevention of wild rodent entry into animal facilities are important in preventing spread of the virus.
Additional Information:	https://www.cdc.gov/hantavirus/

Disease:	**LYMPHOCYTIC CHORIOMENINGITIS (LCM)**
Description of Disease:	Lymphocytic choriomeningitis virus (LCMV) is an arenavirus that can infect many wild and domestic species used in research including mice, rats, hamsters, guinea pigs, non-

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	human primates, swine, and dogs. Rodents, especially hamsters and mice, are the animal species most frequently implicated in disease transmission to humans, but infection must be considered for all wild-caught rodents.
Clinical Signs in Animals:	LCM virus is well adapted to the mouse and infection is typically asymptomatic with lifelong virus shedding. Hamsters infected early in life may fail to thrive and show growth retardation, weakness, conjunctivitis, dehydration, and/or tremors. The LCM virus may be carried and excreted in the blood, cerebrospinal fluid, urine, saliva, secretions, urine, and feces of infected animals.
Transmission and Symptoms in Humans:	Humans can be infected by contamination of skin wounds or mucous membranes with fluids from infected animals, equipment contaminated with infectious fluids, bite wounds, or inhalation of contaminated particles from bedding material or other fomites. Airborne transmission is well documented. Humans may develop a flu-like illness up to 3 weeks following exposure and often recover without any complications or severe illness. However, meningitis (inflammation of the lining of the brain and spinal cord evidenced by severe headaches, neck stiffness, mental confusion and nausea), hydrocephalus, paralysis, and coma have been reported in severe cases. Severe disease may be fatal.
Prevention:	Transmission of the virus can be prevented through use of appropriate personal protective equipment including gloves and protective clothing and through appropriate environmental sanitation. All rodents captured from the wild or obtained from non-research-related sources must be screened for evidence of this disease. Elimination of ectoparasites and insect vectors should be part of an overall plan to prevent LCM virus infections in laboratory animal facilities.
Additional	https://www.cdc.gov/vhf/lcm/

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Information:	

Disease:	**ORF (CONTAGIOUS ECTHYMA, SORE MOUTH, SCABBY MOUTH)**
Description of Disease:	Orf disease is a parapoxvirus infection that is common in many sheep flocks and goat herds throughout the United States. This disease also affects many species of wild ungulates.
Clinical Signs in Animals:	The disease affects all age groups, although young animals are most often and most severely affected. Orf produces crusty, pus-filled blisters on the lips, nostrils, mucous membranes of the oral cavity, lower legs, teats, and urogenital orifices of infected animals. Mortality in animals is due to anorexia from severe oral lesions or secondary infections.
Transmission and Symptoms in Humans:	Orf virus is transmitted to humans by direct contact with virus-filled matter originating from a lesion. External lesions are not always apparent, so recognition may be difficult. The virus is very hardy and can contaminate equipment, supplies, or even the skin and fur/wool of uninfected animals. Humans can become infected from these sources as well as directly from infected animals. The disease in humans is usually characterized by the development of a single proliferative lesion on the hand, arm, or face. The lesion is sometimes mistaken for an abscess. Occasionally, several bumpy lesions are present, each measuring up to 3 cm. in diameter, persisting for 3-6 weeks, and regressing spontaneously. Progression to generalized disease affecting other organs is considered rare. The characteristic appearance of the lesion and a history of recent contact with sheep or wild ungulates are diagnostic of this condition in humans.
Prevention:	Personnel who handle wild ungulates are urged to wear protective clothing and gloves and to practice good personal hygiene.

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Additional Information:	https://www.cdc.gov/poxvirus/orf-virus/index.html

Disease:	**RABIES**
Description of Disease:	Rabies, a rhabdovirus in the *Lyssavirus* genus, causes an acute and almost always fatal disease in a wide variety of mammalian species. Bats and terrestrial carnivores (raccoons, skunks, foxes, and coyotes) are the natural hosts and the mammals most often infected with rabies.
Clinical Signs in Animals:	Most infected animals develop the “furious” or “dumb” forms of the disease. The furious form of rabies causes progressive neurological signs that include hyperexcitability, paresthesia, occasionally self-mutilation, and death secondary to respiratory arrest and organ failure. In contrast, the dumb form of rabies typically causes lethargy, incoordination, and ascending paralysis.
Transmission and Symptoms in Humans:	Most human cases result from contact with infected wildlife. Rabies is transmitted only when the virus is introduced into bite wounds or open cuts in skin or onto mucous membranes. The incubation period in humans can vary from 9 days to 8 months (1 to 3 months is typical). The normal course of disease in humans after incubation begins with a 2- to 4-day prodromal period that causes headache, malaise, fever, and feelings of apprehension. This is followed by the first specific symptom, an abnormal sensation at the exposure site. During this time, there may also be intermittent periods of anxiety, nervousness, or excitation interspersed with periods of a normal mental state. Progression of the disease leads to an acute neurologic period characterized by paresis or paralysis, inability to swallow, hydrophobia, delirium, and convulsions. This progresses to coma and an acute encephalomyelitis followed by respiratory paralysis almost invariably causes death.

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Prevention:	Immediate and thorough washing of all bite wounds and scratches with soap and water and a virucidal agent such as povidone-iodone solution irrigation are important measures for preventing rabies. Rabies postexposure prophylaxis is recommended for all persons with bite, scratch, or mucous membrane exposures to such wildlife. Postexposure prophylaxis should be initiated as soon as possible after personnel are exposed. Postexposure prophylaxis might be appropriate even if a bite, scratch, or mucous membrane exposure is not apparent when there is reasonable probability that such exposure might have occurred. Preexposure vaccination should be considered for persons whose activities bring them into frequent contact with potentially rabid bats, raccoons, skunks, or other species at risk for having rabies. These animals should never be handled by untrained and unvaccinated personnel.
Additional Information:	https://www.cdc.gov/rabies/index.html

Fungal, Parasitic, Protozoal

Disease:	**BAYLISASCARIASIS**
Description of Disease:	*Baylisascaris procyonis*, a roundworm found in raccoons, can cause disease in humans and other mammals. Disease can be severe when the parasites migrate through the eye (ocular larva migrans), visceral organs (visceral larva migrans), or the brain (neural larva migrans).
Clinical Signs in Animals:	Raccoons, the definitive host, do not show clinical signs of infection. Other animals that become infected by the larvae of *Baylisascaris*, such as rabbits and small rodents or carnivores that consume these animals, can show clinical signs that include muscle spasms, tremors, and progressive weakness that can lead to death.

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Transmission and Symptoms in Humans:	After leaving the host raccoon in the feces, eggs take 2 to 4 weeks to become infectious. Transmission occurs when people inadvertently ingest infectious eggs. The incubation period is 1 to 4 weeks. When symptoms occur due to migration of the larvae through various parts of the body, they can include nausea, tiredness, liver enlargement, loss of coordination, lack of attention to people and surroundings, loss of muscle control, blindness, and coma.
Prevention:	Disease caused by *Baylisascaris* can be prevented by proper use of personal protective equipment and by the cleaning of equipment and surfaces that may have been contaminated with raccoon feces.
Additional Information:	https://www.cdc.gov/parasites/baylisascaris/

Disease:	**ECHINOCOCCOSIS (HYDATID CYST DISEASE)**
Description of Disease:	Infection with tapeworms of the genus *Echinococcus* can cause cystic or alveolar echinococcosis in humans. Cystic echinococcosis (hydatid disease) is caused by infection with the larval stage of *E. granulosus*, which has the dog as its definitive host, but is also found in sheep, cattle, goats, and pigs. Alveolar echinococcosis is instead caused by *E. multilocularis* which has foxes, coyotes, and dogs as its definitive hosts, with small rodents such as voles being the intermediate hosts.
Clinical Signs in Animals:	The infected carnivores that serve as definitive hosts usually show no signs of infection. Intermediate hosts can have non-specific signs such as nausea, vomiting, intermittent diarrhea, and weight loss. Affected animals can also have enlarged livers and abdomens, fluid in the abdomen, and difficulty breathing.

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Transmission and Symptoms in Humans:	Transmission most commonly occurs through the accidental ingestion of infective eggs. With cystic echinococcosis, infection can be asymptomatic until hydatid cysts containing the larval parasites grow large enough to cause problems. The rate at which symptoms occur will depend on the location of the cyst, but this process can take years. The cysts are mainly found in the liver and lungs, but can also be in the central nervous system (brain, eyes), bones, heart, kidneys, and spleen. Common symptoms are discomfort, pain, nausea, and vomiting. If a cyst ruptures, the release of fluid can cause anaphylactic shock or even death. In alveolar echinococcosis, the larval forms do not encyst, but cause vesicles destroy surrounding tissues and cause discomfort or pain, weight loss, or malaise. Alveolar echinococcosis caused by *E. multilocularis* can cause liver failure and death either as a result of this or from spread to the lungs or brain.
Prevention:	Proper use of PPE and hygiene practices when working with wild mammals such as foxes, coyotes, and stray dogs is the best way to prevent *Echinococcus* infection.
Additional Information:	https://www.cdc.gov/parasites/echinococcosis/ https://www.cfsph.iastate.edu/FastFacts/pdfs/echinococcosis_F.pdf

Disease:	**GIARDIASIS**
Description of Disease:	Numerous wild caught and domestic mammals including dogs, cats, rodent, beavers, nonhuman primates, pigs, sheep, and goats can all be natural hosts for *Giardia duodenalis* (*lamblia*), a protozoal parasite. In humans, this generally causes a mild intestinal illness. *Giardia* were historically speciated based on host origin, but it is now known that cysts are morphologically indistinguishable and

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	that cross-species transmission can occur.
Clinical Signs in Animals:	Infected animals may not show any signs of illness or may exhibit diarrhea, weight loss, vomiting, or anorexia.
Transmission and Symptoms in Humans:	Giardia infection is transmitted to humans when a person ingests infected fecal material such as when a contaminated glove or piece of equipment contacts a human's mucous membranes. Infected humans may have no symptoms or may develop diarrhea, bloating, a loss of appetite, abdominal cramps, fatigue, weight loss, vomiting, fever, and chills. The stool can be mucus-laden, light colored, and soft. These signs appear approximately 7-10 days after infection and can persist for several weeks.
Prevention:	The practice of good personal hygiene, such as hand washing after handling animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel.
Additional Information:	https://www.cdc.gov/parasites/giardia/

Disease:	**HISTOPLASMOSIS**
Description of Disease:	*Histoplasma capsulatum* is a fungus that is found in bat feces and causes an illness with non-specific symptoms in humans. Histoplasmosis is predominantly a problem in the Mississippi and Ohio River Valleys.
Clinical Signs in Animals:	Bats infected with histoplasmosis typically have no clinical signs, but may have diarrhea.
Transmission and Symptoms in	Transmission occurs by breathing in fungal spores in areas where the soil contains large amounts of bird or bat

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Humans:	droppings. Most people will not show clinical signs, but those that do may have signs that include fever, cough, chills, headache, fatigue, chest pains, and body aches. In people with weakened immune systems, the infection can become systemic and spread to other organs from the lungs, causing severe illness. Clinical signs can occur 3 to 17 days after breathing in fungal spores and last for several weeks to a month.
Prevention:	The practice of good personal hygiene, such as hand washing after handling animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel. Specifically, those working with wild bats or capturing bats in the wild should be careful not to disturb the soil and should wearing appropriate respiratory protection.
Additional Information:	https://www.cdc.gov/fungal/diseases/histoplasmosis/

Disease:	**HOOKWORM INFECTION**
Description of Disease:	Hookworms are zoonotic parasites that infect dogs and cats. There are many different species of hookworms (*Ancylostoma brazilense*, *A. caninum*, *A. ceylanicum*, and *Uncinaria stenocephala*), with most thriving in hot and humid tropical climates.
Clinical Signs in Animals:	In dogs and cats, hookworm infection can create dermatitis and redness where the larva enters the skin. Unlike people, animals can also present with anemia, weakness, anorexia, dark reddish-brown diarrhea, and wasting. Younger animals are typically at higher risk for severe infections.
Transmission and Symptoms in	The eggs of these parasites are shed in the feces of infected animals and contaminate the soil where the animal has

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Humans:	defecated. After 1-2 days the eggs will hatch in the environment and the larvae will molt into their infectious state in 4-7 days. Humans typically become infected when unprotected skin is exposed to soil contaminated with the infectious larvae. In humans, hookworm infection is localized to the skin. The hookworm enters the skin of a human and causes a reaction that is red, itchy and painful. With cutaneous larva migrans, slender red tracts appear in the skin where the larvae have been and these tracks move day to day as the parasite moves through the epidermis.
Prevention:	Proper use of personal protective equipment including shoe covers and avoiding skin contact with infected soil or feces is the best way to prevent infection with hookworm. With potentially infected wild caught mammals, prompt removal of feces from the housing prevents the development of eggs into infectious larvae. Having a routine deworming protocol in place for all wild-caught dogs and cats will also prevent hookworm infections in both animals and people. Routine surveillance including fecal examinations can also prevent the introduction of parasites into the vivarium if wild caught mammals are being utilized.
Additional Information:	https://www.cdc.gov/parasites/zoonotichookworm/

Disease:	**RINGWORM (DERMATOPHYTOSIS)**
Description of Disease:	Ringworm is a superficial mycosis caused by fungi of the genera *Microsporum* (*M. canis and M. gypseum*), *Epidermophyton*, and *Trichophyton* (*T. verrucosum, equinum,* and *mentagrophytes*). Dermatophytes can be found in a variety of laboratory animal species, including dogs, cats, guinea pigs, nonhuman primates, sheep, and goats. They are most likely to be found in random source or wild-caught animals.

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Clinical Signs in Animals:	Infected animals may not exhibit any signs of infection or may develop areas of alopecia (hair loss) and erythema (redness/inflammation). Lesions may or may not be itchy.
Transmission and Symptoms in Humans:	Ringworm can be transmitted to humans by direct contact with infected areas of skin or through contact with a contaminated object. Lesions in humans may appear as flat, spreading, ring-shaped lesions in the skin and often appear within 10-14 days of the exposure. As the lesions increase in diameter, the center often returns to a normal appearance. However, skin lesions may develop different appearances and can only be definitively diagnosed through culture or laboratory examination of the skin. Advancing infection is halted by contact with live tissue and inflammation. The organism can persist in the environment for extended periods of time.
Prevention:	Transmission of an infection can be prevented through use of appropriate personal protective equipment including gloves and protective clothing and through appropriate environmental sanitation.
Additional Information:	https://www.cdc.gov/healthypets/diseases/ringworm.html

Disease:	**TAPEWORM INFECTION**
Description of Disease:	Tapeworm infection is caused by the accidental ingestion of cestode eggs, either directly in the case of *Hymenolepis (Rodentolepis) nana*, or by ingesting a flea infected with *Dipylidium caninum* cysticercoids. *H. nana* is the dwarf tapeworm of humans, but is also a frequent parasite of wild mice and an occasional parasite of laboratory-bred mice, while *D. caninum* is a common tapeworm of dogs and cats. Though rare, those working with wild caught dogs, cats, and mice are at risk of infection with tapeworms.

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Clinical Signs in Animals:	Animals with tapeworm infections may not have any clinical signs or may exhibit signs of anal pruritus, such as scraping the anal region across surfaces in their environment. Animals can also experience mild gastrointestinal disturbances, vomiting, and weight loss. The most easily identified sign of tapeworm infection is the passage of the proglottid form of the worms, which are motile when freshly passed in the feces and may be mistaken for maggots.
Transmission and Symptoms in Humans:	Transmission of *Dipylidium caninum* to adults is very rare since it requires the ingestion of a flea, the intermediate host. In contrast, *Hymenolepis nana* does not need an intermediate host and instead develops into the adult form in humans following ingestion of the egg. Symptoms in humans are the same as those in animals, with anal pruritus and passage of proglottids in the feces being the most distinctive signs.
Prevention:	Flea control through use of insecticides on wild-caught cats and dogs will reduce the chance of transmission of *D. caninum*. Use of appropriate PPE and hygiene practices such as handwashing are the most effective forms of prevention against tapeworm infection.
Additional Information:	https://www.cdc.gov/parasites/dipylidium/index.html

Disease:	**TOXOCARIASIS (ROUND WORM INFECTION)**
Description of Disease:	Toxocariasis is a zoonotic parasitic infection caused by the roundworms that inhabit the GI tracts of domestic and wild canids (*Toxocara canis*) and felids (*Toxocara cati*). *Toxascaris leonina* is a third species found in both canids and felids. Roundworms are found worldwide in the soil. Dogs and cats become infected with round worms by ingestion the parasitic eggs from the soil or contaminated feces or by ingestion of paratenic hosts such as rodents

	and rabbits. In humans, roundworm infection causes visceral larva migrans.
Clinical Signs in Animals:	Young dogs and cats usually present with the more severe symptoms of roundworm infection. In puppies, symptoms include poor growth, and an enlarged abdomen. Sometimes diarrhea, constipation, vomiting, coughing, and nasal discharge may be present. If severe, puppies can die suddenly from parasite obstruction. Kittens are less severely affected by roundworms and can even be asymptomatic. If the infection is more severe, abdominal distension, a roughened hair coat, diarrhea, and dehydration may be seen. It is common practice to place puppies and kittens on a deworming medication in the first few months of life to prevent roundworm infection.
Transmission and Symptoms in Humans:	Humans typically get round worms from accidental ingestion of feces containing infectious round worm eggs. Toxocara infection in many species, including humans, is common, but manifestation of the clinical disease is rare. It is estimated that 14% of the U.S. population has been exposed to toxocara. There are two major forms of toxocara infection in humans; the visceral form and the ocular form. The visceral form of toxocariasis occurs when the round worm larvae migrate through the organs of the individual causing tissue destruction. A high parasite load or a recurrent infection will likely cause this form of toxocariasis. This form of the disease can be asymptomatic in humans or it can cause a series of symptoms consisting of fever, weakness, and enteric signs. Visceral toxocariasis can persist for months, and if left untreated can become severe, resulting in heart complications, neurological signs, and pneumonia. The ocular form is more common and occurs when the larvae of the round worm migrate through the eye causing inflammation and other eye problems. This form can cause sudden and permanent blindness. Typically, only one eye is affected at a time.
Prevention:	If animals are suspect for roundworms, feces should be

	removed before the eggs develop into their infectious state. Roundworm eggs usually have to develop for 1-2 weeks in the environment before they become infectious to animals and humans. Therefore, if feces are removed in a timely manner infection can be more easily prevented. Hand washing and good hygiene should be practiced. Implementing good deworming protocols, especially in puppies and kittens, will also aid in the prevention of round worm infection.
Additional Information:	https://www.cdc.gov/parasites/toxocariasis/index.html

Disease:	**TOXOPLASMOSIS**
Description of Disease:	*Toxoplasma gondii* is an intracellular coccidian protozoal organism that can cause either non-specific or neurological disease in humans. Nearly all warm- blooded animals may become infected with the agent although domestic and wild felids are the only animals that can shed infective materials.
Clinical Signs in Animals:	Adult felids are generally asymptomatic, but young or immunocompromised animals may have vomiting, diarrhea, difficulty breathing, a loss of appetite, eye lesions, and abdominal pain.
Transmission and Symptoms in Humans:	A large percentage of the human population has been exposed to this agent. Transmission to humans in an animal research setting is by ingestion of infective materials from sources contaminated with felid feces. In most healthy humans, the infection results either in no signs of illness or in a mild flu-like illness. More severe signs may include fever, swollen lymph nodes, pneumonia, and rash. Immunosuppressed persons may develop a more severe, life-threatening form of the disease requiring aggressive treatment. Infections of pregnant women may lead to abortion, still births, or birth defects including blindness or severe neurologic disease, with the damage to the unborn

	child often more severe when the transmission occurs earlier in the pregnancy.
Prevention:	Pregnant women or immunocompromised individuals should avoid contact with or wear gloves when handling cat feces or soil. Cat litter and feces should be disposed of promptly and gloves should be worn when handling potentially infective material.
Additional Information:	https://www.cdc.gov/parasites/toxoplasmosis/

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