Pennsylvania Game Commission Wildlife Disease Reference Library

Mange

<u>OTHER NAMES:</u> Scabies, Red mange

Cause

Mange is a highly contagious skin disease of mammals caused by mites. There are three major categories of mange that affect wild mammals and are caused by different species of mites. Sarcoptic mange is caused by *Sacroptes scabiei*, notoedric mange in wildlife is caused by *Notoedres centrifera*, and demodectic mange is caused by 2 species of mites from the genus *Demodex*. Sarcoptic mange is the most common and most studied in wildlife and will be the focus of this disease description; demodectic and notoedric will be addressed occasionally when information is available. Another form of mange is caused by a mite from the genus *Ursicoptes* and, while it has been detected in bears in Pennsylvania, it is not considered an important source of disease.

Significance

Sarcoptic mange mites are adapted to infect specific hosts, though they have been known to infect other species at least temporarily. There is a specific human adapted variety of *S. scabiei* that causes scabies in people. Occasionally, humans can become infected with animal varieties of *S. scabiei* and may develop a short-lived (10-14 days), self-limiting infection. People at a greater risk of contracting this disease from animals include animal herders, slaughterhouse workers, wildlife biologists, veterinarians, wildlife rehabilitators, researchers, trappers, and pet owners. Sarcoptic mange has lead to declines in fox populations in some areas of the United States and Europe.

Notoedric mange does not infect humans. Demodex mites are a normal inhabitant of the skin of all mammals, and they are also species specific. Occasionally there can be moderate to severe hair follicle damage and hair loss associated with disease caused by *Demodex* mites.

Species Affected

Sarcoptic mange has been reported in over 100 species of wild and domestic mammals. In North America sarcoptic mange is often reported in wild canids such as red foxes, coyotes, gray wolves, and red wolves. Sarcoptic mange has also been reported in black bears, porcupines, rabbits, squirrels, and raccoons.

Notoedric mange is known to occur in the western gray squirrel, eastern gray squirrel, and fox squirrel. *Notoedres centrifera* is host specific to squirrels, and is not known to infect other animal species.

There are many different species of *Demodex* mites that are host specific, though some *Demodex* species can rarely infect other species of closely related mammals. Demodectic mange has been reported in many mammalian species including white-tailed deer, mule deer, and elk.

Distribution

Sarcoptic, notoedric, and demodectic mange are all distributed worldwide, and all have been diagnosed in Pennsylvania.

Transmission

Sarcoptic mange mites burrow and form tunnels in the outer layer of skin. The females lay their eggs within the tunnels and the eggs hatch into larvae within 3 days. The larvae either move to the surface of the skin or remain in the tunnels. In 3-4 days the larvae develop into nymphs, which remain in the tunnels, wander on the surface of the skin, or create new tunnels. The nymphs develop into adults within 5-7 days. Mites can be transferred to a new host when it comes into direct physical contact with an infected host. Larvae and nymphs wandering on the surface of the skin can also fall off

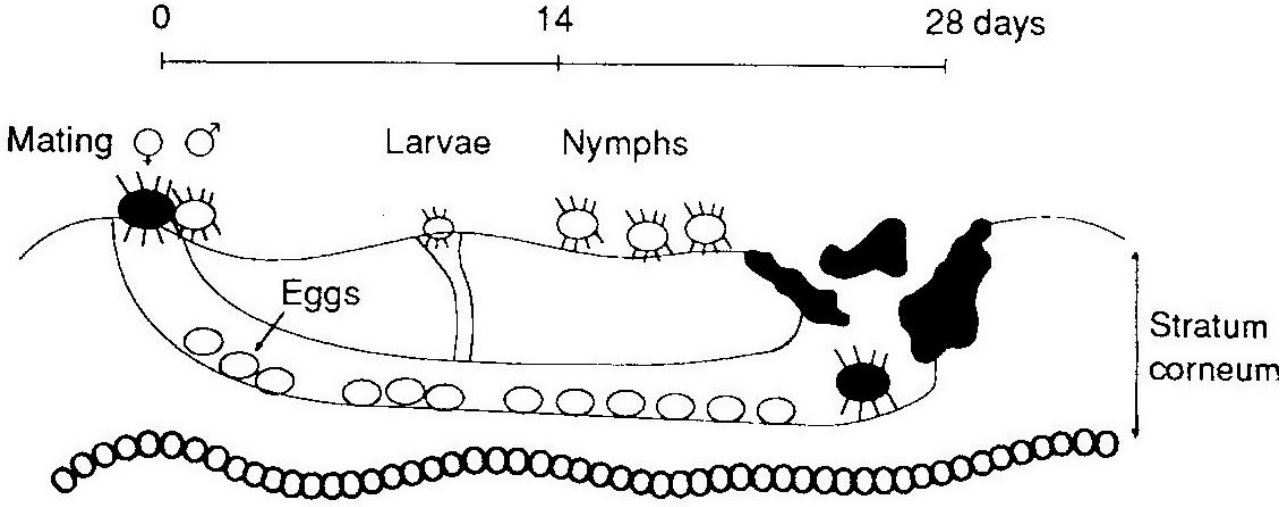

FIG. 5.2—Life cycle of *Sarcoptes scabiei*. (Illustration by R. Isaksson.)

Image from Bornstein et al. 2001

and survive in the environment for several weeks when conditions are ideal (high humidity and low temperature prolongs survival outside of the host). A new host can become infected by coming into contact with an environment contaminated with these free-living mites. This often happens when animals share nests and burrows. The life cycle and transmission of notoedric mites are similar to those of sarcoptic mites.

Demodex mites are different in that they inhabit hair follicles and associated glands. Females lay eggs within the hair follicle that develop into larvae, nymphs, and then adults. A single follicle may contain many mites at various different stages in their life

cycle. *Demodex* mites are probably transmitted from the dam to her young during times of close physical contact such as nursing and grooming.

Clinical Signs

Animals with sarcoptic mange will often exhibit hair thinning and loss. The skin becomes thickened, wrinkled, and covered in scabs and foul-smelling crusts due to overgrowths of normally occurring bacteria and yeasts. Skin lesions can involve the entire body however the ears and face are most commonly affected. Severely affected animals may become emaciated, depressed, and lethargic, and may lose their fear of man. When the skin around the eyes, mouth, and ears is involved, animals may experience blindness, difficulty eating, and hearing loss. Red foxes are typically the most severely affected wild species and often die of this disease. Severely affected bears will often not den.

Squirrels with notoedric mange experience hair loss which may affect nearly the entire body, but crusts do not form.

Demodex mites do not usually cause clinical illness in otherwise healthy animals. Clinical signs of demodectic mange occur in animals that are suffering from poor nutrition, concurrent disease, or a weakened immune system. Similar to the other forms of mange, animals with demodectic mange can experience mild to moderate hair loss with dry, flakey, thickened skin. The larger species of Demodex may cause similar but more severe disease. Animals may also be in poor body condition.

Diagnosis

A diagnosis is reached by microscopic identification of the mites in skin scrapings, though clinical signs may be diagnostic in some cases. Deeper skin scrapings may to necessary to diagnose demodectic mange. Sarcoptic and notoedric mites are round with short, stubby legs, while demodectic mites are cigar shaped.

Treatment

Medications are available that can be used to successfully treat mange, but they are not commonly used in free-ranging wildlife. The Game Commission treats bears they capture that are affected on less than 50% of their bodies. Many affected animals will resolve their mange without intervention if their immune systems begin to function normally.

Management/Prevention

Management of mange in wild populations by reducing the number of infected animals through hunting may not be effective because the mites are probably widespread before animals are recognized with clinical illness. However, it is thought that mange is more likely to become established in high density populations. Mange is a naturally occurring, common disease of wildlife, which makes control difficult. People handling mangy animals should wear gloves, and should wash thoroughly immediately after handling. Infected carcasses should be frozen prior to examination, because sufficient freezing will kill the mites.

Suggested Reading

Desche, C. E., J. J. Andrews, L. A. Baeten, Z. Holder, J. G. Powers, D. Weber, and L. R. Ballweber. 2010. New Records of Hair Follicle Mites (Demodecidae) from North American Cervidae. Journal of Wildlife Diseases 46: 585-590.

Gentes, M., H. Proctor, and G. Wobeser. 2007. Demodicosis in Mule Deer (*Odocoileus hemionus hemionus*) from Saskatchewan, Canada. Journal of Wildlife Diseases 43: 758-761.

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