


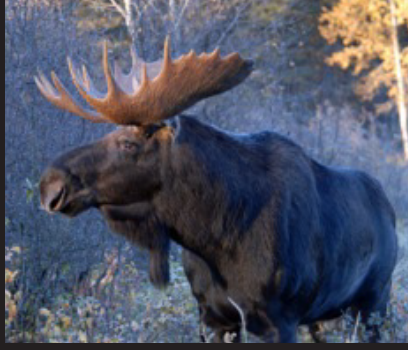

THE NORTHEAST WILDLIFE DISEASE COOPERATIVE
http://sites.tufts.edu/nwdc

Mange and Mites

Other Names: Scabies, Red mange, Knemidocoptiasis, Scaly face and leg, Tassel foot

Cause

Mange is a highly contagious skin disease of mammals caused by mites. There are several categories of mange affecting wild mammals caused by different species of mites that are very similar in appearance. The three major categories of mange are sarcoptic mange, which is caused by *Sacroptes scabiei*, notoedric mange, which is caused by *Notoedres centrifera*, and demodectic mange, which is caused by two species of mites from the genus *Demodex*. Sarcoptic mange is the most common and most studied in wildlife and will thus be the focus of this disease description. A fourth form of mange, psoroptic mange, is caused by *Psoroptes cuniculi*. Mites from the genus *Knemidocoptes* (most commonly *K. pilae*, *K. mutans*, and *K. jamaicensis*) infect only birds and cause symptoms similar to mange.

Significance

Mites that cause sarcoptic mange are adapted to infect specific hosts, though they can also temporarily infect other species. 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. Animal herders, slaughterhouse workers, wildlife biologists, veterinarians, wildlife rehabilitators, researchers, trappers, and pet owners are at greater risk of contracting scabies from an infected animal. Sarcoptic mange has lead to declines in fox populations in some areas of the United States and Europe.

Notoedric mange does not infect humans but is an important disease of domestic and wild cats. It has also been reported in squirrels. *Demodex* mites are species specific and a normal inhabitant of the skin of all mammals. Occasionally there can be moderate to severe hair follicle damage and hair loss associated with disease caused by *Demodex* mites. *Knemidocoptes* mites can cause severe damage to birds if not properly treated and are common in exotic captive bird species.

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. Though *Notoedres centrifera* is generally host specific to squirrels, it has recently been found to be the cause of a population decline in bobcats in several counties in California.

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

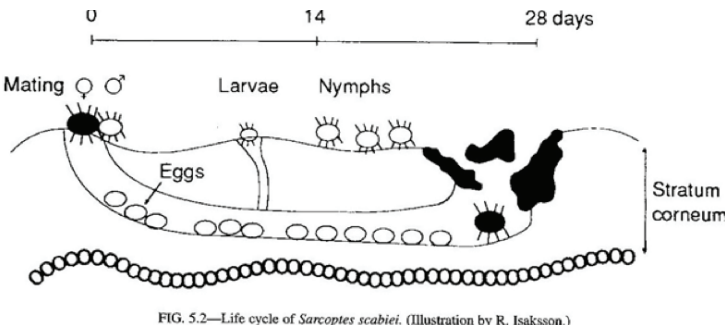

FIG. 5.2—Life cycle of *Sarcoptes scabiei*. (Illustration by R. Isaksson.)

Image from Bornstein et al. 2001

mites affecting white-tailed deer was described in 2007.

Psoroptic mange is most commonly found in livestock, including sheep, goats, cattle, and horses. It also affects both domestic and wild rabbits.

Knemidocoptes mites affect many species of wild and domestic birds, including golden eagles, snowy owls, great horned owls, and other raptors, woodpeckers, ducks, geese, swans, sparrows, robins, wrens, finches, canaries, chickens, turkeys and many exotic captive bird species.

Distribution

Sarcoptic, notoedric, and demodectic mange and *Knemidocoptes* mites are all distributed worldwide.

Transmission

Sarcoptic mange mites burrow and form tunnels in the outer layer of the skin. Female mites lay their eggs within these tunnels and within 3 days, the eggs hatch into larvae. The larvae then 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 onto the surface of the skin, or create new tunnels. The nymphs develop into adults within 5-7 days. Mites are transferred to a new host when they come into direct physical contact with an uninfected host. Larvae and nymphs wandering on the surface of the skin can also fall off and survive in the environment for several weeks under ideal conditions (low temperature and high relative humidity 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. These mites are acquired by an animal from their mother in the first few hours of the animal's life and remain in the hair follicles for the rest of the animal's life. 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. *Knemidocoptes* mites inhabit the feather follicles and outer skin layer of the face, feet, beak.

Juvenile red fox with severe sarcoptic mange. Photograph by Karen Donahue, CVT

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, though the ears and face are most commonly affected. Severely affected animals may become emaciated, depressed, lethargic, and may lose their fear of humans. 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 typically not den.

Squirrels with notoedric mange experience hair loss that may affect nearly the entire body. 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. Larger species of *Demodex* may cause similar but more severe disease. Animals may also be in poor body condition.

Knemidocoptes mites cause crusty or scaly lesions on unfeathered skin, particularly on the beak, feet, and legs. In severe cases, these areas may become permanently malformed. Mites that reside in feather follicles or the epidermis create pouch-like cavities, causing a honeycombed lesion. Certain species of *Knemidocoptes* mites cause birds to pick at their feathers, resulting in feather loss or secondary infection. These mites have also been linked to decreased egg production in certain species.

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 and mites, but they are not commonly used in free-ranging wildlife. Many affected animals will resolve their mange without intervention if their immune systems function normally.

Management/Prevention

Management of mange and mites in wild populations by reducing the number of infected animals through hunting may not be effective because the mites are likely 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 mange-affected animals should wear gloves and should wash thoroughly immediately after handling. Infected carcasses should be frozen prior to examination, to prevent the spread of these mites.

Suggested Reading

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