

SARCOPTES SCABIEI

Aetiology Epidemiology Diagnosis Prevention and Control
Potential Impacts of Disease Agent Beyond Clinical Illness References

AETIOLOGY

Classification of the causative agent

Sarcoptes scabiei also referred to as mange or scabies, is caused by the *Sarcoptes scabiei* mite, which is a highly contagious mammalian ectoparasite. It is an infectious agent of wildlife, domestic animals, and humans worldwide.

Resistance to physical and chemical action

Temperature:	Freezing at -25 °C and 50% relative humidity is lethal. Pupae are destroyed in freezing temperatures or above 122°F/50°C.
pH:	Not determined
Chemicals/Disinfectants:	Not determined
Survival:	Low temperature and high humidity prolongs survival outside of the host. The mites typically do not survive more than 2-3 days off of their host, but may persist over a week pending environmental conditions. Mites dehydrate rapidly.

EPIDEMIOLOGY

Hosts

- Domestic and wild canids in North America, Europe and Australia
- Domestic and wild hoofstock in North America and Europe
- European carnivores, particularly red and Arctic foxes (*Vulpes vulpes*, *Vulpes lagopus*)
- Lagomorphs in Europe
- Wild felids in Europe and Africa
- Great apes and various bovids in Africa
- Koalas (*Phascolarctos cinereus*) and wombats (*Vombatidae* species) in Australia
- Raccoon dogs (*Nyctereutes procyonoides*) in Japan, Japanese badgers (*Meles anakuma*), Japanese martens (*Martes melampus*), and Japanese serows (*Capricornis crispus*)
- Camelids in Latin America
- Maras (*Dolichotis* species) in Argentina
- Wild boars (*Sus scrofa*)
- Raccoons (*Procyon lotor*)
- Capybaras (*Hydrochoerus hydrochaeris*)
- American black bears (*Ursus americanus*)
- Infestations have been documented in captive groups of red pandas (*Ailurus fulgens*), sika deer (*Cervus nippon*), Chinese mountain cats (*Felis bieti*), and rhesus monkeys (*Macaca mulatta*)

Transmission

- The transmissibility of *S. scabiei* mites depends on the life stage of the mite; the entire life cycle of *S. scabiei* is approximately 17-21 days

- *S. scabiei* mites burrow in the outer layer of the skin, forming tunnels and consuming living cells and tissue fluid
- Female mites lay their eggs within these tunnels and in approximately three days, the eggs hatch into larvae
- The larvae can either remain in the tunnels or burrow their way to the skin surface. The larvae develop into nymphs, which then develop into adults within five to seven days
- Transmission can occur through direct contact of one infested animal to a non infested animal or indirectly through proximity in the environment (e.g., nest or burrow sharing)

Sources

- Other Infected animals

Occurrence

- Mange caused by *Sarcoptes scabiei* is responsible for disease with a world-wide prevalence, including North America, Europe, Africa, Australia, and Asia.

For more recent, detailed information on the occurrence of this disease worldwide, see the OIE World Animal Health Information System - Wild (WAHIS-Wild) Interface [http://www.oie.int/wahis_2/public/wahidwild.php/Index].

DIAGNOSIS

The period of time between oviposition at a wound site and the presentation of disease due to burrowing larvae can be seen anytime from 10 days to 8 weeks.

Clinical diagnosis

- Visual observation of an infected animal can be the first step in identifying *S. scabiei*, but should be confirmed via skin scrape and microscopic identification
- Affected animals are extremely pruritic and may self-mutilate
- *S. scabiei* should be considered in the event of any atopy

Lesions

- Skin lesions may be present on the entire body, but are often seen on the ears, face, and tail
 - Affected skin becomes thickened, wrinkled, and scabbed, forming yellow crusts with a foul-smelling odour
- If lesions are present around the eyes, mouth, and ears, the animal may experience partial or complete blindness, hearing loss, and difficulty eating
- Secondary bacterial and yeast infections
- Alopecia
- Asymptomatic carriers do exist

Differential diagnoses

- Allergic contact or irritant contact dermatitis
- Dermatophytosis
- Food allergy
- Non-seasonal atopy
- Other parasite infestations, such as: *Pelodera strongyloides*, hookworm dermatitis, demodicosis
- Pyoderma

Laboratory diagnosis

Samples

For isolation of agent

- Skin scrapings

Serologic samples

- Blood, faeces

Procedures

Identification of the agent

- Microscopic examination of skin scrapings can confirm the presence of *S. scabiei*
 - Features of note: mites with a round or globoid body, very short legs, and terminal anus

Serological tests

- Enzyme-linked immunosorbent assay (ELISA) may be used to detect antibodies specific to *S. scabiei*, but is typically only indicated in animals with abundant hair when skin scrapings may be difficult to perform

PREVENTION AND CONTROL

Sanitary prophylaxis & control

- Mange is a naturally occurring, common disease of wildlife, which makes control challenging.
- The mites typically do not survive more than 2-3 days off of a host
- Those handling mange-affected animals should wear gloves and properly wash hands and arms immediately after. Gloves should be washed and disinfected accordingly
- Infested carcasses should be frozen to kill mites prior to examination
- Facilities with susceptible hosts (e.g., wildlife rehabilitation facilities) should be washed thoroughly and disinfected on a regular basis

Medical control

- Avermectins have been commonly used to successfully treat a variety of domestic and wild species
- Macrocyclic lactones are commonly used in canids, especially if an avermectin is contraindicated
- If treating topically, clip hair, remove dirt and crusts with antiseborrheic shampoo, and apply an acaricidal dip such as lime sulphur
- Treat all animals and humans in contact with an affected individual regardless of the presence of clinical signs

POTENTIAL IMPACTS OF DISEASE AGENT BEYOND CLINICAL ILLNESS

Risks to public health

- *S. scabiei* mites may be transmitted to humans, but infections are typically self-limiting due to mite subspecies host preference. The course of disease may be prolonged in young children and immunocompromised individuals.

Risks to agriculture

- There is currently no evidence that *S. scabiei* presents a risk directly to agriculture, other than an irritating infection within aforementioned hosts involved in production agriculture.
- In Latin America, *S. scabiei* infestations of camelids are frequently cited causes of economic losses to small farmers due to leather and wool damage

REFERENCES AND OTHER INFORMATION

- Arlian, L.G, Morgan, M. S., (2017). A review of *Sarcoptes scabiei*: past present and future. *Parasites and Vectors*, 10, 297.
- Astorga, F., Carver, S., AlMBERG, E. S., et al. (2018). International meeting on sarcoptic mange in wildlife, June 2018, Blacksburg, Virginia, USA. *Parasites and Vectors*, 11, 449.
- Bandi, K. M., and Saikumar C. (2013). - Sarcoptic Mange - A Zoonotic Ectoparasitic Skin Disease. *Journal of Clinical and Diagnostic Research*, 7(1), 156-157.
- Bornstein, S., Mörner, T., and Samuel, W.M. (2001). - *Sarcoptes scabiei* and Sarcoptic Mange.- In *Parasitic disease of wild mammals* (2nd Ed, pp. 107-119). Iowa State University Press, Ames, IA.
- Centers for Disease Control and Prevention (CDC) - Scabies. (n.d.). Website accessed in 2019. <https://www.cdc.gov/parasites/scabies/>
- Dryden, M. (2019). - Mange in Dogs and Cats. The Merck Veterinary Manual. Website accessed in 2019: <https://www.merckvetmanual.com/integumentary-system/mange/mange-in-dogs-and-cats>
- Gakuya, F., Ombui, J., Muchemi, G., Ogara, W., Soriguer, R.C., Alasaad, S. (2012). Sarcoptic mange and cheetah conservation in Masai Mara (Kenya): epidemiological study in a wildlife/livestock system. *Parasitology*, 139(12), 1587-1595.
- Kim, K. T., Lee, S. H., & Kwak, D. (2015). - Sarcoptic mange in captive maras: the first known outbreak and complete recovery with colony-wide acaricide treatment. *The Journal of Veterinary Medical Science*, 77(5), 593–595.
- Makouloutoi, P., Suzuki, K., Yokoyama, M., Takeuchi, M., Yanagida, T., Sato, H. (2015). Involvement of two genetic lineages of *Sarcoptes scabiei* mites in a local mange epizootic of wild mammals in Japan. *Journal of Wildlife Diseases*, 51(1), 69-78.
- Pence, D. B., Ueckermann, E., "Sarcoptic Mange in Wildlife." *Revue Scientifique Et Technique* (International Office of Epizootics), U.S. National Library of Medicine, Aug. 2002.
- Runyan, R.A., Vyszenski-Moher, D.L. (1988). - Water balance and nutrient procurement of *Sarcoptes scabiei* var. *canis*. *J. med. Entomol.*, 25, 64-68.

*

* *

The OIE will periodically update the OIE Technical Disease Cards. Please send relevant new references and proposed modifications to the OIE Science Department (scientific.dept@oie.int). Last updated 2019. Written by Marie Bucko and Samantha Gieger with assistance from the USGS National Wildlife Health Center.