SNAKE FUNGAL DISEASE (SFD)

Office of Fish and Wildlife Health and Forensics

Introduction

Also known as Ophidiomycosis, Snake Fungal Disease (SFD) is caused by the fungus *Ophidiomyces ophidiicola*. This species belongs to the order Onygenales, which includes many different species of fungi that break down keratin, the hard organic material found in scales, horns, and hooves.

Species Affected

Species affected by SFD are numerous. Known affected species that are endemic to New Jersey are ring-necked snakes (*Diadophis punctatus*), northern copperhead (*Agkistrodon contortrix*), northern pinesnakes (*Pituophis melanoleucus*), northern watersnakes (*Nerodia sipedon*), eastern racers (*Coluber constrictor*), ratsnakes (*Pantherophis sp*.), timber rattlesnakes (Crotalus horridus), eastern gartersnakes (*Thamnophis sirtalis sirtalis*), and milksnakes (*Lampropeltis triangulum*).

Clinical Signs

SFD presents with lumps and ulcers on the skin, crusted scales, and swelling and disfiguration of the face. In severe cases, this can result in emaciation and death.

Transmission

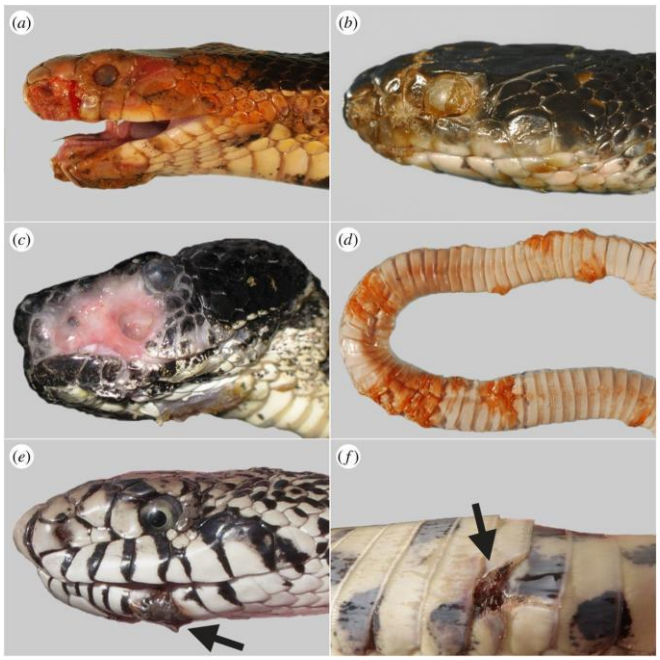
Due to the decomposing nature of the fungus and its high tolerance for environmental conditions, it is considered an environmental saprobe. It is likely that the fungus resides in the soil and can spread through contact with it. The fungus may also spread through direct contact between snakes, specifically while hibernating or mating.

Diagnosis

SFD is diagnosed through identifying the infectious fungal agent, *O. ophiodiicola* through histopathological examination via skin biopsy, fungal culture and real-time or quantitative polymerase chain reaction.

Epidemiology

The fungus typically incubates for around 30 days but can become apparent after as little as 12 days post exposure. When there are secondary open wounds, the fungus can penetrate the body and cause a systemic fungal infection resulting in nodules on the coelomic fat pad, kidneys, liver and air sac. Experimental data shows snakes surviving an average of 90 days with SFD and having a 40% mortality rate. The disease can progress from the nasal cavity internally via the eyes, throat, and lungs causing eye infections and pneumonia.



Snakes with *Ophidiomyces ophiodiicola* infections of varying severity. Severe infections include (*a*) eastern foxsnake (*Pantherophis vulpinus*) with disfigured head, (*b*) eastern ratsnake (*P. alleghaniensis*) with lesions on the eye, snout and lower jaw, (*c*) timber rattlesnake (*Crotalus horridus*) with skin ulceration and (*d*) Lake Erie watersnake (*Nerodia sipedon insularis*) with areas of thickened, necrotic skin on ventral surface. Mild infections include bullsnakes (*Pituophis catenifer sayi*) with small lesions on (*e*) the lower jaw and (*f*) ventral scale (arrows). *Sourced from:* Lorch et. al, 2016. https://doi.org/10.1098/rstb.2015.0457