Snake Fungal Disease: Frequently Asked Questions

Since the early 1990’s there have been reports of a skin disease affecting snakes in the eastern US that appear to be caused by a fungal infection. Over the past several years these reports have been increasing, and the disease, informally called snake fungal disease (SFD), has received attention from conservationists because it was determined to be affecting timber rattlesnakes in New England, and eastern massasaugas in Illinois. The timber rattlesnake is listed as threatened or endangered in 11 states, and the eastern massasauga is listed as endangered in 2 states and is a candidate for federal listing under the Endangered Species Act.

What causes SFD?
Genetic testing has identified a novel species of fungus named *Ophidiomyces ophiodiicola* (formerly *Chrysosporium ophiodiicola*) that has been isolated from many of the affected snakes. At this time, we do not know if infection by *Ophidiomyces* is the sole cause of the disease, or if SFD occurs secondary to some other factor (environmental factors, other disease agents, etc.). The relationship between *O. ophiodiicola* infection and SFD is currently under investigation.

What species of snake are affected?
*Ophidiomyces ophiodiicola* has been confirmed in 8 species of snake, and at least 7 more species have been reported with signs of SFD but have not yet been tested for the fungus. The disease is most frequently reported in rattlesnakes and several species of colubrids including racers and rat snakes. Copperheads, cottonmouths, water snakes, garter snakes, ribbon snakes, milk snakes, corn snakes, indigo snakes, and ring-necked snakes have all been reported with signs of SFD as well.

What does an infected snake look like?
Affected snakes may have swelling, crusty scabs, or open wounds on the skin. In pit vipers the signs are most severe on the head, although any area of the skin can be affected. Some snakes only show subtle signs, such as swelling in the area in front of the eye, thickened skin on the snout, abnormal scales, or small bumps under the skin. Snakes often appear most severely affected when they emerge from hibernation and may improve in appearance over the summer months, although this is not always the case. It is not known if the condition commonly referred to as “hibernation blisters” is related to fungal infection or SFD.

Above: This ratsnake emerged from hibernation with a subtle “blister” on the lower jaw.

Left: This timber rattlesnake was biopsied and diagnosed with *O. ophiodiicola*. The snake was released without any treatment and tracked for over two years.

Right: The same male 2 years later, disfigured but alive.
Where is SFD found?
Animals with similar signs have been reported across the eastern US from Florida to New Hampshire and as far west as Arkansas and Minnesota.

How does SFD affect the snake?
SFD affects different species in different ways. It has been uniformly fatal in massasaugas. In timber rattlesnakes the mortality rate is also high, however some animals have survived multiple years after infection, and a few appear to have responded well to treatment and rehabilitation. The mortality rate is not known for other species.

Left: A massasauga with a severe *Ophidiomyces* infection. The mouth, eyes, and heat pits are all critically important organs that are commonly damaged.

Below: Very young animals such as this juvenile Timber rattlesnake have been found already showing signs of SFD.

Where did SFD come from?
The ultimate cause of SFD has yet to be definitively determined. We do not know if *O. ophiodiicola* has always been present in the environment, if it was introduced, or if perhaps it has recently mutated allowing it to cause more severe disease. Related species of fungi have long been known to cause disease in both wild and captive reptiles. Although it is possible, there is currently no evidence to suggest that *Ophidiomyces* or SFD came from the pet trade, or any other anthropogenic activities.

How is SFD transmitted?
How the disease spreads is not known. It is possible that it is spread by direct contact with other infected snakes, or that the causative agent is present in the environment. It may be possible to transfer the associated fungus on clothing, boots, or field equipment used to handle snakes. Until more is known about the cause and spread of SFD, it is best to disinfect potentially contaminated equipment when moving between different sites. Any item that has come in contact with a potentially infected snake or environment should be washed with soap and water and then soaked for 15 minutes in a dilute (10%) bleach solution. It should then be rinsed and allowed to dry.

Is the fungus dangerous to people?
The potential risks to human health from this disease are currently unknown. This type of fungus rarely causes disease in healthy mammals, and there has never been a report of *O. ophiodiicola* infection in a human. Anyone in contact with affected reptiles should take the basic safety precautions of wearing gloves and washing hands thoroughly.
What is currently being done?
Veterinarians, pathologists, and wildlife biologists from several universities, zoos, the USGS, the USFWS, and multiple state wildlife agencies are collaborating to determine if *O. ophiodiicola* is in fact the underlying cause of SFD, whether the disease is causing population-level impacts, the best techniques for sampling and diagnostics, how it is transmitted, and how to treat and rehabilitate affected snakes. Study proposals have been developed that will hopefully facilitate a broader investigation.

What should you do if you see an infected snake?
If you see a snake in the wild that you think may be suffering from this disease, please report the sighting to your state wildlife agency. Please obey all laws and regulations regarding interacting with wildlife. Many of the affected species are protected. Do not approach or attempt to handle venomous snakes unless you are trained and permitted to do so.

For more information and photographs see the bulletin from the National Wildlife Health Center at: [http://www.nwhc.usgs.gov/disease_information/other_diseases/snake_fungal_disease.jsp](http://www.nwhc.usgs.gov/disease_information/other_diseases/snake_fungal_disease.jsp)

Images courtesy of Matt Allender, Anne Stengle, Zach Whitman, Kevin McCurley & James Condon.

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