

Trichomonas spp. in birds and reptiles (Infection with)

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AETIOLOGY

Classification of the causative agent

This technical card addresses *Trichomonas* spp. infection in **birds and reptiles**. The disease is known generally as Trichomoniasis, “frounce” in raptors, and “canker” in doves and pigeons. Avian trichomoniasis is normally caused by *Trichomonas gallinae*. It has been recently proposed that there are other significant species of the protozoan, including *Trichomonas stableri* found in Pacific coast band-tailed pigeons (*Patagioenas fasciata monilis*) and *Trichomonas gypaetini* in raptors. Both of these species share a genetic similarity with *Trichomonas vaginalis*, which normally infects humans. In both captive and wild reptiles, *Trichomonas* spp. are considered to be part of the normal flora and can be found in faeces.

Resistance to physical and chemical action

Temperature: Able to grow at 32-40°C (optimal temperature of 37°C) in nutrient broth under laboratory conditions

pH: Susceptible to pH <6.5

Chemicals/Disinfectants: Inactivated by 10% bleach solutions

Survival: Does not survive outside of host for extended time periods; while *T. gallinae* does not have an environmentally-resistant cyst stage, it has been shown to persist in wet or moist environments, including moist grain (up to 5 days) or water (many hours). Recently a pseudocyst stage has been described that is thought to protect it against unfavorable environmental conditions.

EPIDEMIOLOGY

Hosts

- Columbiformes
 - Band-tailed pigeon (*Patagioenas fasciata*)
 - Mourning dove (*Zenaida macroura*)
 - Rock pigeon (*Columba livia*)
 - Stock dove (*Columba oenas*)
 - Turtle dove (*Streptopilia turtur*)
 - Wood pigeon (*Columba palumbus*)
- Domestic chickens (*Gallus gallus*) and turkeys (*Meleagris gallopavo*)
- Accipitriformes
 - Bonelli's eagles (*Aquila fasciata*)
 - Cooper's hawk (*Accipiter cooperii*)
 - Northern goshawk (*Accipiter gentilis*)
- Strigiformes
 - Barn owl (*Tyto alba*)
- Falconiformes
 - European kestrel (*Falco tinnunculus*)
 - Merlin (*Falco columbarius*)
 - Peregrine falcon (*Falco peregrinus*)
- Passeriformes
 - Family *Fringillidae*

- Reptiles
 - Snakes (order *Squamata*, clade *Ophidia*)
 - Iguana (*Iguana iguana*)
 - Sand boa (*Eryx jaculus*)
 - Bearded dragon (*Pogona* spp.)
 - Tortoises (order *Testudines*)
 - Leopard gecko (*Eublepharis macularius*)

Transmission

- Ingestion of contaminated water and feed
- Contact with infected birds

Sources

- Infectious hosts and their secretions/excretions
 - Saliva, mucus, faeces, crop and gastrointestinal contents
- Contaminated water and feed, including infectious prey/carrion (gastrointestinal and crop contents)

Occurrence

The rock pigeon is thought to be the cause of the worldwide spread of this parasite, but other dove and pigeon species are also significant hosts and can be spread by migrating birds, such as wood pigeons, turtle doves, and stock doves. There have been several outbreaks of this protozoan that have resulted in high-mortality events for wild bird populations, including deaths of band-tailed pigeons in California, wild finches in the United Kingdom, and large-scale mortality events of mourning doves throughout the United States. Large numbers of deaths have been reported for pigeons feeding on grain at grainfeeders and bird feeders. *T. gallinae* has been shown to persist in wet or moist environments, including moist grain (5 days) or water (many hours). Transmission can occur at bird baths and bird feeders. The infective stage is known as a trophozoite and is passed directly between birds.

T. gallinae is reported to occur most frequently in late spring, summer, and fall. The parasite can be passed from parent to offspring via crop milk. It can also be passed between pigeons during courtship behaviors. In raptors, the parasite is obtained from their prey. Turkeys and chickens acquire the parasite via drinking water or eating feed contaminated by infected pigeons.

DIAGNOSIS

The pathogenicity of *T. gallinae* is not well-understood. Death has been reported to occur as early as 4 days or late as 3 weeks post-infection, if infected with a virulent strain. There are several different strains of the protozoan. Examples of notable virulent strains include the Jones'-Barn and Eiberg strains that infect the liver, and the Mirza strain that causes lesions of the oropharynx.

Clinical diagnosis

In avian species, diagnosis is made based on clinical signs, microscopic examination of the protozoan, and necropsy. The organism is approximately 7-11 µm in length, oval to pyriform in shape, with four anterior flagella, an axostyle, and an undulating membrane.

There are several different lesions and clinical signs that can result from infection with this protozoan. If infected with mild strains of the parasite, excessive salivation and mucosal inflammation of mouth and throat may be observed. Infection with a virulent strain can result in weight loss, dysphagia, dyspnoea, a pendulous

crop, vomiting, ruffled feathers, diarrhoea, and loss of appetite. Lesions that prevent birds from feeding can develop and are characterized by greenish fluid and caseous lesions on oropharyngeal membranes. In doves and pigeons, trichomoniasis is generally observed in young birds. Immunity is thought to be conferred in birds based on infection with nonvirulent strains or recovery from a mild infection.

In reptiles, the protozoan proliferates within the gastrointestinal tract most commonly because of poor husbandry or immunosuppression due to another disease. Clinical signs of an increased *Trichomonas* burden may include poor appetite, diarrhoea, and weight loss. In some cases, *Trichomonas* may migrate to the bile duct or gallbladder and cause inflammation of the biliary system. Ocular lesions due to this protozoan have been reported in geckos.

Lesions

- Birds
 - Diphtheritic membranes
 - Early oral lesions
 - Small cream to yellow spots on oral mucosa to large, thick, caseous lesions
 - Acute infections
 - Discharge, nodules in mouth
 - Chronic infections
 - Caseous lesions in mouth and oesophagus; may travel to beak and eyes
 - Lesions of pharynx and crop
 - Cream colored to yellow and caseous
 - May extend to roof of mouth and sinuses
 - Necropsy
 - Fibrin covering the heart, liver, and air sacs may be observed
- Reptiles
 - Granulomatous inflammation of biliary system
 - Choleliths

Differential diagnoses

- Birds
 - Mycoplasmosis
 - Tuberculosis
 - Salmonellosis
 - Coligranuloma
 - Pigeon herpesvirus
 - Avian paramyxoviruses
 - Fowl adenovirus
 - *Aspergillus* spp.
 - *Candida* spp.
 - *Capillaria*
 - Vitamin A deficiency
- Reptiles
 - Enteritis due to bacterial or other parasitic agents
 - Cholangitis
 - Cholecystitis
 - Cholecystolithiasis

Laboratory diagnosis

Samples

For isolation of agent

- Birds

- Crop wash
- Throat swab
- Mucus
- Lesion sample
- Reptiles
 - Faecal sample

Serological tests

- No serological tests have been developed for diagnostic use

Procedures

Identification of the agent

- Birds
 - Faecal wet mounts (juveniles)
 - Motile parasite is not often identified in faeces
 - Giemsa stain of oral and crop swab samples
 - InPouch™ TF (oral and crop swab samples)
 - Examine organisms in the pouch directly under a microscope or using a wet mount slide of the media
 - Microscopic identification of parasite from lesion at 20x-40x magnification
 - Identify flagellated protozoa with wet saline mount of lesion
 - Can still identify protozoa in warmed saline solution after carcass has been refrigerated for several days
 - Polymerase chain reaction (PCR)
- Reptiles
 - Microscopic identification of parasite from faeces using a wet mount

Serological tests

- No serological tests have been developed for diagnostic use

PREVENTION AND CONTROL

Sanitary prophylaxis

- In captivity or sites where feeding wild birds is common (e.g., backyard bird feeders), it is recommended to ensure feed is properly stored and contained to prevent moisture and inappropriate access by other birds.
 - Change feed and water daily
- Generally, large gatherings of doves and pigeons at feeding and watering sites should be discouraged to reduce the possibility for transmission
- Infected birds should be removed from group housings
- Check wild reptiles for *Trichomonas* spp. before housing with captive reptiles
- Particularly for captive reptiles, maintain proper sanitation and diet to prevent an increase in parasite burden

Medical prophylaxis

- Bird treatment
 - Strategic antiprotozoal administration
 - Infection with lentogenic strains to confer immunity against virulent strains
 - Check doves and pigeons being fed to raptors for *T. gallinae* infection

- Birds held in captivity for rehabilitation with apparent clinical disease, particularly doves and pigeons, should be isolated until clinical signs resolve

POTENTIAL IMPACTS OF DISEASE AGENT BEYOND CLINICAL ILLNESS

Risks to public health

- There is a lack of evidence to suggest that *T. gallinae* poses a risk to human health
 - *T. vaginalis* is a sexually transmitted infection in humans and is not regarded as a significant cause of disease in birds and reptiles
- Raptor breeding centers, pigeon breeders, pigeon racers, and pet bird owners should minimize their birds' contact with wild birds and take preventive measures to minimize infection

Risks to agriculture

- Negative economic impact on poultry operations due to poor thrift of birds infected with this parasite, including cost of treatment and decreased production value (e.g. weight loss)

REFERENCES AND OTHER INFORMATION

- Amin, A., Bilic, I., Liebhart, D., & Hess, M. (2014). Trichomonads in birds-a review. *Parasitology*, 1-15.
- Arabkhaaeli, F., Rostami, A., Gilvari, A., Nabian, S., & Madani, S. A. (2017). Frequently observed parasites in pet reptiles' feces in Tehran. *Iranian Journal of Veterinary Medicine*, 12(1), 19-25.
- Davies, R. R. (2008). Common parasites of pet reptiles. *UK Vet*, 13(4), 1-9.
- Divers, S. J., & Stahl, S. J. (2019). Medicine. In *Mader's Reptile and Amphibian Medicine and Surgery* (3rd ed., p. 667). Elsevier.
- Divers, S. J., & Stahl, S. J. (2019). Therapy. In *Mader's Reptile and Amphibian Medicine and Surgery* (3rd ed., p. 1196). Elsevier.
- Doneley, B. (2010). Chapter 13: Disorders of the gastrointestinal tract. In *Avian Medicine and Surgery in Practice: Companion and Aviary Birds* (p. 157). Manson Publishing.
- Ford, S. (2010). Raptor gastroenterology. *Journal of Exotic Pet Medicine*, 19(2), 140-150.
- Forrester, D. J. & Foster, G. W. (2008). Chapter 6: Trichomonosis. In C. T. Atkinson, N. J. Thomas, & D. B. Hunter (Eds.), *Parasitic Diseases of Wild Birds* (pp. 120-121, 137-140). John Wiley & Sons, Inc.
- Friend, M. & Franson, J. C. (1999). Chapter 25: Trichomoniasis. In Milton Friend and J. Christian Franson (Eds.), *Field Manual of Wildlife Diseases: General Field Diseases and Procedures of Birds* (pp. 201-206).
- Girard, Y. A., Rogers, K. H., Gerhold, R., Land, K. M., Lenaghan, S. C., Woods, L. W., Haberkern, N., Hopper, M., Cann, J. D., & Johnson, C. K. (2014). *Trichomonas stableri* n. sp., an agent of trichomonosis in Pacific Coast band-tailed pigeons (*Patagioenas fasciata monilis*). *International Journal for Parasitology: Parasites and Wildlife*, 3, 32-40.
- Gómez-Muñoz, M. T., Martínez-Herrero, M, Sansano-Maestre, J., & Garijo-Toledo, M. (2018). Oropharyngeal trichomonads in wild birds. In Owen P. Jenkins (Ed.), *Advances in Animal Science and Zoology* (Volume 11, p. 8). Nova Science Publishers.
- Machin, R. A. (2015). Common gastrointestinal parasites in reptiles. *In Practice*, 37, 469-475.
- Martínez-Díaz, R. A., Ponce-Gordo, F., Rodríguez-Arce, I., del Martínez-Herrero, M. C., et al. (2015). *Trichomonas gypaetini* n. sp., a new trichomonad from the upper gastrointestinal tract of scavenging birds of prey. *Parasitology Research*, 114, 101-112.
- Marx, M., Reiner, G., Willems, H., Rocha, G., et al. (2017). High prevalence of *Trichomonas gallinae* in wild columbids across western and southern Europe. *Parasites & Vectors*, 10(242), 1-11.
- Stabler, R. (1954). *Trichomonas gallinae*: a review. *Experimental Parasitology*, 3(4), pp. 368-402.
- Tasca, T. & De Carli, G. A. (2003). Scanning electron microscopy study of *Trichomonas gallinae*. *Veterinary Parasitology*, 118, 37-42.
- Urban, E. H. & Mannan, R. W. (2014). The potential role of oral pH in the persistence of *Trichomonas gallinae* in Cooper's hawks (*Accipiter cooperii*). *Journal of Wildlife Diseases*, 50(1), 50-55.

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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 2020. Written by Samantha Gieger and Erin Furmaga with assistance from the USGS National Wildlife Health Center.