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Animal Group(s) Affected	Transmission	Clinical Signs	Severity	Treatment	Prevention and Control	Zoonotic
Marine Mammals Birds Snakes Nonhuman primates Canids	Direct	In many cases, animals are asymptomatic; however, in severe infections, they may show signs of upper or lower respiratory disease depending on the host and species of parasite involved.	Dependent on the intensity of infection. Mortality is low.	Ivermectin	Reduce population density, hand rear young.	No

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Susceptible animal groups:

Marine Mammals: Pinnipeds (phocid seals, otariids, walrus), sea otters

Birds: Numerous species, including companion passerines (especially exotic finches), wild passerines, and galliformes.

Snakes: reported in *Elaphe schrencki* (Russia), *Crotalus* and *Pituophis* spp. (southern United States), *Natrix trigrinal* (Korea)

Nonhuman Primates: Old World monkeys (esp. *Macaca mulatta*), apes

Canids: report in a fox in Norway is the first documentation in a species other than the domestic dog.

Causative organism:

Pinnipeds:

- Phocid seals: *Halarachne* spp., including *H. halichoeri*.
- Otariids, walrus: *Orthohalarachne* spp., including *O. attenuata* and *O. diminuta*.

Sea otters: (*Halarachne miroungae*)

Birds:

- *Sternostoma tracheacolum*: Captive birds, primarily finches and canaries. Also reported in numerous wild passerine species as well as wild Gouldian finches in Australia following introduction via domestic canaries. Numerous other species of *Sternostoma* have been reported in wild passerines.
- *Cytodites nudus*: pheasants, canaries, finches, cockatiels, budgerigars, chickens, turkeys, ruffed grouse, pigeons.
- Numerous *Ptilonyssus* spp. have been reported in wild passerines in North and South America.

Snakes: *Entonyssus* spp., including *E. squamatus*, *E. halli*, *E. koreansis*, *E. vitzthumi*.

Primates: *Pneumonyssus* spp., including *P. simicola*, *P. duttoni*, *P. africanus*.

Canids: *Pneumonyssoides caninum*

Zoonotic potential: One report describes a Sea World patron contracting ophthalmic acariasis by getting sneezed on by a walrus. This infection resulted in corneal abrasion and extensive ocular

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discomfort.
Distribution: Worldwide.
Incubation period: Unknown.
<p>Clinical signs: <u>Marine mammals:</u></p> <ul style="list-style-type: none"> • Pinnipeds: nasal discharge, sneezing, facial pruritus, head shaking, and if lung involvement, dyspnea. • Sea otters: may be predisposed to sinus or turbinate infections. <p><u>Birds:</u> wheezing, gasping, open-mouth breathing, head shaking, loss of or change in voice, cessation of singing, dyspnea. <u>Snakes:</u> usually asymptomatic. <u>Primates:</u> usually asymptomatic, but may be predisposed to other pulmonary diseases due to bronchiolar epithelial changes, and sneezing and coughing. <u>Canids:</u> in domestic dogs, sneezing is common but may also have facial pruritus, excessive lacrimation, and nasal discharge.</p>
<p>Post mortem, gross, or histologic findings: <u>Marine mammals:</u> histologically, erosion and inflammation of the nasal turbinates and nasopharynx may be seen associated with mites. Sinusitis, rhinitis, bronchopneumonia. <i>O. attenuata</i> adults primarily occupy the nasopharynx, while <i>O. diminuata</i> are found in the lungs. <u>Birds:</u></p> <ul style="list-style-type: none"> • <i>Sternostoma</i>: Black mites can be found in trachea, air sacs, and lungs. Histologically: tracheitis, air sacculitis, multifocal pneumonia. • <i>Cytodites</i>: Mites can be visualized macroscopically as small white spots within bronchi, lungs, and air sacs. Severe infections may result in granulomatous pneumonia. <p><u>Primates:</u> Small (1-5mm) pale yellow foci containing mites throughout the lungs. In advanced cases, cavitation of the lungs may be present. Gross lesions may resemble those of tuberculosis. Histologically: presence of macrophages containing brown to black pigment and multifocal eosinophilic granulomatous bronchiolitis.</p>
<p>Diagnosis: Antemortem diagnosis is difficult. <u>Marine mammals:</u> identification of larval mites in sputum or nasal exudate, or at necropsy. Rhinoscopy may be useful. <u>Birds:</u> following wetting of the cervical feathers with alcohol, tracheal illumination may reveal the mites as small black spots within the lumen. Failure to visualize mites with this method does not rule out infection. On necropsy, mites can be identified macroscopically in the tracheal lumen, lungs, or air sacs. <u>Snakes:</u> lung wash, necropsy. <u>Primates:</u> tracheobronchial lavage, necropsy. Radiographic lesions may be seen in the lungs during routine screening for tuberculosis, and typical radiographic findings include an interstitial pattern with increased bronchial thickness, pleural thickening, pleural adhesions, and cavitating pulmonary lesions. Pneumothorax is a common complication of pulmonary acariasis and is frequently unilateral. <u>Canids:</u> nasal swabbing, rhinoscopy, necropsy, use of an antibody ELISA has been reported.</p>
Material required for laboratory analysis: Depending on the species and location of infection: sputum, nasal discharge, lung wash, lung tissue.
Relevant diagnostic laboratories: Any veterinary diagnostic laboratory with a parasitologist on staff.
<p>Treatment: Ivermectin. <u>Marine mammals:</u> 200µg/kg twice, 2 weeks apart. <u>Birds:</u> ivermectin or doramectin. Can be given as an injection, or in small birds, can be applied topically</p>

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on the bare skin at the base of the neck (dilute 1:10 with propylene glycol and apply 1 drop per bird up to 50g, repeat in 7-10 days).

Primates, Canids: 200µg/kg subcutaneously.

Prevention and control: Antemortem diagnosis and prevention are difficult, since infected animals are often asymptomatic and identification of those with a low mite burden is not possible. All newly acquired captive animals should be treated during quarantine. High population density facilitates transmission. Animals can be raised free of infection if they are separated from the mother soon after birth and hand-reared.

Suggested disinfectant for housing facilities: Appropriate acaricides (e.g. pyrethroids).

Notification: None

Measures required under the Animal Disease Surveillance Plan: None

Measures required for introducing animals to infected animal: Infected animals should be treated prior to introduction to disease-free animals.

Conditions for restoring disease-free status after an outbreak: Successful treatment of all potentially exposed susceptible animals.

Experts who may be consulted: While no specific researchers are currently reporting expertise in this parasite, parasitology staffs at veterinary colleges would be a good option.

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