Although most often identified in young cats, ear mites (*Otodectes cynotis*) are a common cause of otitis externa and pruritus in cats and dogs worldwide. Most veterinary healthcare team members are familiar with the copious dark, granular otic discharge of newly adopted kittens that indicates mites are likely to be found on otoscopic or microscopic examination. Some patients with ectopic mites present with generalized alopecia and pruritus similar to flea allergy dermatitis.1 Although under-recognized, ear mite infestations can be readily addressed. Being aware of this common parasite is a key first step.

**BIOLOGY**

**Life Cycle**

Female *O cynotis* mites cement developing eggs to the epidermal lining of the ear canal; larvae hatch in a few days and molt through 2 nymphal stages to the next generation of adults. Ear mites feed on epithelial cells, exudate, and tissue fluid but do not burrow. The entire life cycle takes less than 3 weeks. Infestation follows direct contact and commonly occurs from dam to offspring in the neonatal period. Although documented, off-host mite survival is considered limited.2,3

**Morphology**

Adult *O cynotis* are large mites; at approximately 400 μm, females may be visible without magnification. When examined by microscopy, mites are usually active and a large, single egg is often present within females (FIGURE 1A). The first 2 pairs of legs of the female end in caruncles (suckers) attached to very short stalks; the fourth pair of legs on the female is vestigial. Males (FIGURE 1B) are slightly smaller than females and have distinct copulatory structures on the ventral surface. All legs on male *O cynotis* end in suckers attached to short stalks.4

**Epidemiology**

Prevalence estimates vary widely based on the population examined and the sensitivity of the diagnostic method used. A survey of pet cats from 7 European countries found ear mites were the most common ectoparasite, present in 17.4% of cats, and more commonly recovered from cats than fleas.5 In a survey in northern Italy, over half of the free-roaming cats examined had clinical evidence of otitis externa and *O cynotis* was found in the majority.6 Infested animals with asymptomatic infestations serve as important reservoirs.

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**ON THE LOOKOUT**

Routine diagnostic tests can miss *Otodectes cynotis* infestations, but safe treatment is readily available for both dogs and cats.
In general, ear mites are most common in young, free-roaming cats and dogs and in pets with outdoor access, although as many as 25% of pet cats and 6.7% of pet dogs are infested.7-10 Although mites are most commonly identified in kittens, age-related differences in ear mite prevalence are not consistent and adult cats are frequently infested. Similarly, breed, sex, and age have not been associated with increased infestation prevalence in dogs.11 Ferrets and wild canids, especially foxes, are commonly infested.12,13

Transmission
Because mite survival off-host is limited, direct contact with an infested animal is the most likely mode of transmission.3,4 Mites are transmitted among all age classes and between infested dams and nursing young. Transmission between cats, dogs, and ferrets is also possible.2 As many as 10% of cats harbor subclinical infestations, serving as a source for future infestations.9,14 *O. cynotis* does not pose a major zoonotic risk; however, reports of human infestations exist, as do cases of dermatitis following close contact with an infested animal.2,12

**CLINICAL SIGNS**
Animals with *O. cynotis* infestations present clinically normal or with otic pruritus that is usually bilateral.7 Magnitude of clinical signs appears to be independent of the number of mites. Cats may have significant infestations with minimal pruritus, whereas dogs are more likely to be pruritic.1 Symptomatic animals display varying degrees of irritation and pruritus associated with head shaking, head tilt, and circling; a pinnal-pedal reflex can be elicited when the infested ear canal is massaged.15

A dark, “coffee ground” otic discharge is a classic presentation (**FIGURE 2**), although the color and

**FIGURE 1.** (A) Adult female *Otodectes cynotis* with large egg evident (arrow). The first 2 pairs of legs have suckers at the end of short stalks (arrowheads); the fourth pair of legs is vestigial (V). (B) Adult male *O. cynotis* with copulatory structures (arrows) evident. All 4 pairs of legs have suckers (arrowheads) at the end of short stalks.

**FIGURE 2.** (A) Otoscopic view of external acoustic meatus of a cat infested with ear mites showing the characteristic dark, granular, “coffee ground” appearance of the discharge. (B) A moderate number of mites (arrow) in an erythematous vertical otic canal at the level of the intertragic incisure. Mite populations may be reduced when inflammation is severe.
consistency vary, and some infested cats have scant cerumen.\textsuperscript{12} Severely infested animals or those with hypersensitivity reactions can present with self-excoriation and dermal trauma. Hematomas and secondary infections are not uncommon.\textsuperscript{12} Less common clinical presentations include miliary dermatitis of the head, feet, or tail due to ectopic mites.\textsuperscript{1,12} Left untreated, infested animals, particularly cats, may become emaciated or develop neurologic signs.\textsuperscript{15}

Ear mites are a common cause of otitis externa, with as many as 85\% of feline cases and 50\% of canine cases reportedly associated with \textit{O. cynotis} infestation.\textsuperscript{16} Additionally, chronic, uncontrolled \textit{O. cynotis} infestation and the resultant ceruminous gland hyperplasia have been linked with development of ceruminous gland tumors in some animals.\textsuperscript{1,17} A diffuse hypersensitivity reaction resembling flea allergy dermatitis, in which pets present with widespread pruritus, excessive grooming, and alopecia, has been described as associated with ectopic ear mites in some patients.\textsuperscript{1,15}

Pathology of \textit{O. cynotis} infestation develops from inflammation caused by mite feeding and includes accumulation of moderate to excessive dark brown ceruminous exudate.\textsuperscript{1} Some infested pets display minimal pathology even though the presence of mites is confirmed.\textsuperscript{9} When pathologic changes are present, the epithelium of the ear canal is usually erythematous, hyperplastic, and hyperkeratotic. Histopathologic examination shows hyperplastic sebaceous and ceruminous glands, dilated blood vessels, and macrophage and mast cell infiltrates.\textsuperscript{1,2} When treatment is delayed, secondary bacterial and fungal infections can develop; \textit{Staphylococcus} and \textit{Malassezia} species are most commonly identified.\textsuperscript{18}

**DIAGNOSIS**

Mites can be visualized directly in the ear canal, crawling on the surface of otic discharge, during routine otoscopic examination (\textbf{FIGURE 3}). However, relying on this method alone misses many infestations.\textsuperscript{9} In one comparison study, one-third of infested cats were not diagnosed when examined by otoscope alone.\textsuperscript{19} Infestations are more likely to be detected by microscopic examination of samples collected from both ears.\textsuperscript{7,19} Although otic discharge, pruritus, acne-like lesions, and head shaking are present in some infested pets, others will have large numbers of mites with scant evidence of pruritus or discharge, and the ears of some animals that harbor \textit{O. cynotis} appear normal.\textsuperscript{9}

To examine for ear mites, material from both ears can be collected with a cotton-tipped swab lightly coated in mineral oil and then transferred to a microscope slide (\textbf{FIGURE 4}).

### TABLE 1 Products for Treating \textit{Otodectes cynotis} Infestations in Cats\textsuperscript{a}

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>ROUTE</th>
<th>REGIMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ivermectin (Acarexx)</td>
<td>Otic</td>
<td>Once in each ear; repeat in 2 weeks\textsuperscript{3}</td>
</tr>
<tr>
<td>Milbemycin oxime (MilbeMite)</td>
<td>Otic</td>
<td>Once in each ear; repeat in 2 weeks\textsuperscript{1}</td>
</tr>
<tr>
<td>Imidacloprid + moxidectin (Advantage Multi for Cats)</td>
<td>Transdermal</td>
<td>Once to back of neck; repeat monthly as needed</td>
</tr>
<tr>
<td>Selamectin (Revolution)</td>
<td>Transdermal</td>
<td>Once to back of neck; repeat monthly as needed</td>
</tr>
<tr>
<td>Moxidectin + fluralaner (Bravecto Plus)</td>
<td>Transdermal</td>
<td>Once to back of neck; repeat every 8 weeks as needed</td>
</tr>
<tr>
<td>Selamectin + sarolaner (Revolution Plus)</td>
<td>Transdermal</td>
<td>Once to back of neck; repeat monthly as needed</td>
</tr>
<tr>
<td>Fluralaner (Bravecto)\textsuperscript{b}</td>
<td>Transdermal</td>
<td>Once to back of neck; repeat every 12 weeks as needed\textsuperscript{20,21}</td>
</tr>
</tbody>
</table>

\textsuperscript{a}All products listed are FDA (Food and Drug Administration)-approved but may not be approved for treatment of ear mites in cats.  
\textsuperscript{b}Products effective for treatment would also be expected to support prevention of reinfection.  
\textsuperscript{c}Not FDA-approved for treatment of \textit{O. cynotis} in cats, but cited publications support efficacy.
shown that, when present in low numbers, mites can be missed by swabbing alone. Curettage to collect cerumen or flushing the external ear canal with a small amount of mineral oil increases sensitivity of detection but is often impractical in a clinical setting. Response to treatment—resolution of either otic pruritus or, in the case of hypersensitivity, diffuse allergic pruritus—can be used to support a clinical diagnosis if ear mites are not recovered.

**TREATMENT**

Several safe, effective ear mite treatments are available for both cats (TABLE 1) and dogs (TABLE 2). Macrocyclic lactones are label-approved to treat ear mites in cats or dogs, including transdermal, systemic formulations of moxidectin and selamectin and otic formulations of ivermectin and milbemycin oxime. Systemic isoxazolines (afoxolaner, fluralaner, lotilaner, sarolaner) are also effective and can be used alone or in combination with a macrocyclic lactone. Use of systemic products targets mites outside the ear canal and can limit the diffuse hypersensitivity reaction seen in some patients.

Historically, other treatments were commonly used to clear ear mite infestations. Mineral oil applied to the ear canal reduces mite populations; however, many repeated treatments are needed, aggressive cleaning can exacerbate otitis or cause trauma, and an oily residue can be left on the animal. Other otic formulations have been suggested, including preparations containing pesticides, but insufficient evidence supports their use and adverse events are reported. Prior to the development of safer and more effective treatments, ear mites were sometimes managed by administering large animal preparations of macrocyclic lactones off-label. This approach has safety concerns and is no longer necessary or recommended.

Common sequelae of infestation, such as ear discharge and inflammation, should be addressed to support resolution of clinical signs. Although not necessarily required per label, the debris within the ear canals can be cleared away with a mild ceruminolytic agent formulated for otic use before initial treatment to ensure proper contact with an otic acaricide, address the clinical signs, and relieve patient discomfort. Cleaning the ears may need to be repeated if debris persists or recurs, but care should be taken to avoid irritating the ear canal. When present, secondary bacterial or fungal infections should be treated concurrently with acaricide administration.

Reinfestation following treatment readily occurs. Regardless of clinical signs, all pets in the home that

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**TABLE 2 Products for Treating *Otodectes cynotis* Infestations in Dogs**

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>ROUTE</th>
<th>REGIMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selamectin (Revolution)</td>
<td>Transdermal</td>
<td>Once to back of neck; repeat monthly as needed</td>
</tr>
<tr>
<td>Imidacloprid + moxidectin</td>
<td>Transdermal</td>
<td>Once to back of neck; repeat monthly as needed</td>
</tr>
<tr>
<td>(Advantage Multi for Dogs)²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milbemycin oxime (MilbeMite)</td>
<td>Otic</td>
<td>Once (0.5 mL, 2 tubes) in each ear; repeat in 2 weeks</td>
</tr>
<tr>
<td>Milbemycin oxime (Interceptor)</td>
<td>Oral</td>
<td>Monthly as needed²⁴</td>
</tr>
<tr>
<td>Afoxolaner (NexGard)</td>
<td>Oral</td>
<td>Monthly as needed²⁵,²⁶</td>
</tr>
<tr>
<td>Fluralaner (Bravecto)</td>
<td>Transdermal, Oral</td>
<td>Every 12 weeks to back of neck or orally as needed²⁵</td>
</tr>
<tr>
<td>Sarolaner (Simparica)</td>
<td>Oral</td>
<td>Monthly as needed²⁷</td>
</tr>
</tbody>
</table>

All products listed are FDA (Food and Drug Administration)-approved but may not be approved for treatment of ear mites in dogs.

¹Products effective for treatment would also be expected to support prevention of reinfestation.

²Not FDA-approved for treatment of *O. cynotis* in dogs, but cited publications support efficacy.
CLARO® (furfenicol, terbinafine, mometasone furoate) Oral Solution

Antibacterial, antifungal, and anti-inflammatory
For Oral Use in Dogs Only

CAUTION: Federal (U.S.A.) law restricts this drug to use by or on the order of a licensed veterinarian.

DESCRIPTION:
CLARO® contains 16.9 mg/mL furfenicol, 14.8 mg/mL terbinafine (equivalent to 16.4 mg/mL terbinafine hydrochloride) and 2.2 mg/mL mometasone furoate. Inactive ingredients include purified water, propylene carbonate, propylene glycol, ethyl alcohol, and polyethylene glycol.

INDICATIONS:
CLARO® is indicated for the treatment of otitis externa in dogs associated with susceptible strains of yeast (Malassezia pachydermatis) and bacteria (Staphylococcus/Escherichia coli). See PRECAUTIONS.

DOSEAGE AND ADMINISTRATION:

Shake before use.

CLARO® should be administered by veterinary personnel.

1. Administer one drop (1 dropperett) per affected ear. The duration of effect should last 30 days.
2. Clean and dry the external ear canal before administering the product.
3. To prevent the vertex membrane to be raised to the administration. See PRECAUTIONS.
4. Remove single dose dropperette in the package.
5. Use the cap to break the seal and then remove cap from the dropperette.
6. Insert the tip of the dropperette into the affected external canal in the ear(s).
7. Do not insert the tip of the dropperette into the middle ear(s).
8. Gently massage the base of the ear to allow distribution of the solution.
9. Repeat with other ear(s) as prescribed.

Cleaning the ear after using this product is an important part of the treatment effectiveness.

CONTRAINDICATIONS:
Do not use in dogs with known tympanic membrane perforation (see PRECAUTIONS).

WARNINGS:

ANIMAL SAFETY:
CLARO® is contraindicated in dogs with known or suspected hypersensitivity to furfenicol, terbinafine hydrochloride, or mometasone furoate.

Do not administer orally.

PRECAUTIONS:
CLARO® contains an antibiotic (furfenicol) in a single-use dropperette. Each dropperette contains 1 mL of CLARO® solution.

CLARO® is contraindicated in dogs with known or suspected hypersensitivity to furfenicol, terbinafine hydrochloride, or mometasone furoate.

No studies have been conducted to evaluate the safety of CLARO® in pregnant or lactating dogs. CLARO® has not been evaluated in dogs of reproductive potential; therefore, female dogs are not recommended for use during pregnancy or lactation.

CLARO® solution is supplied in a single-use dropperette in a blister. Each dropperette contains 1 mL of CLARO® solution.

Storage:

CONCLUSION:
Although common in free-roaming animals,2,3,2 the true prevalence of O cytis in cats and dogs across the United States is not fully understood. Routine diagnostic tests can miss infestations, meaning ear mites are likely under-diagnosed. Careful diagnostic evaluation and routine use of acaricides—including transdermal macrocyclic lactones and isoxazolines commonly used for flea, tick, and internal parasite control—help mitigate infestation with this common parasite. TVP

References: