

Pursuing the causes of otitis externa

A thorough diagnostic workup and ongoing management are necessary for preventing recurrence of this disease.



By Jon D. Plant,
DVM, DACVD

Contributing Author

Anybody who has personally experienced the pain and discomfort associated with an ear infection can readily appreciate the tremendous negative impact otitis externa has on a Pet's quality of life. Pet owners are particularly motivated to ensure otitis externa is managed effectively when they see their Pets in obvious discomfort due to pain or pruritus and when there is an abnormal odor or discharge. Unfortunately, the causes of otitis externa are often complex and chronic in nature, necessitating a thorough diagnostic workup and ongoing medical management. Failure to effectively manage otitis externa may cause the Pet owner to seek care elsewhere, abandon treatment when positive responses are not seen and may damage the family-Pet bond. Because ear disease is one of the most common reasons Pets are presented for medical care (See *DataSavant*, page 13), successful general practitioners must be skilled in diagnosing the causes, treating the disease and educating Pet owners regarding the management of otitis externa.

Otitis externa is usually caused by a skin disease

We often focus on the yeast and bacteria associated with ear infections, but we need to remember that the primary causes of otitis externa are usually skin diseases (*Figures 1A-1H*, page 19 and *Table 1*, page 20).¹ An inflamed, waxy or seborrheic ear canal is prone to infection. Dogs with atopic dermatitis account for a disproportionate percentage of those that develop otitis externa (See *DataSavant*, page 13). The ear canals may be the only region affected in some atopic dogs. Most Pets will display other signs of atopic dermatitis, typically erythema and pruritus of the face, feet and/or ventrum. Alopecia, excoriations, lichenification and secondary infections often follow the development of pruritus. Similarly, food-allergic Pets are predisposed to ear infections. The cutaneous distribution and signs are as described for atopic dermatitis. A strict, eight-week, hypoallergenic diet trial is recommended to rule out food allergy.² Either novel-protein or hydrolysate-type diets are suitable for this purpose (*e.g.*, Royal Canin Potato and Duck Formula Limited Ingredient Diet™, Royal Canin Hypoaller-

Figure 1: Primary Causes of Otitis Externa

Figure 1A



Atopic dermatitis in a dog with *Malassezia* otitis externa.

Figure 1B



Food allergy affecting the face and ears of a cat.

Figure 1C



Foxtails migrate deep into the ear canal.

Figure 1D



Demodicosis of the pinnae; note the prominent follicular plugging.

Figure 1E



Hypothyroidism resulting in dry, scaly pinnae and ear canals.

Figure 1F



Pemphigus foliaceus in a cat with prominent ear involvement.

Figures courtesy of Jon Platt, DVM, DACVD

Figure 1G



Erythema multiforme associated with pinnal erythema and erosions.

Figure 1H



Juvenile cellulitis in a 4-month-old Golden Retriever, presented for acute otitis externa.

Table 1: Causes of Otitis Externa

Predisposing causes create an unfavorable microenvironment, impeding normal protective mechanisms of the ear canal. Primary causes are capable of causing otitis externa alone. Perpetuating causes aggravate otitis externa once it has developed.

Predisposing causes

- | | |
|--|---|
| ■ Anatomical stenosis
(e.g., Shar Pei) | ■ Iatrogenic trauma
(overzealous cleaning) |
| ■ Defective epithelial migration | ■ Over-treatment
(resulting in maceration) |
| ■ Conformation
(e.g., pendulous pinnae) | ■ Obstruction by tumors or polyps |

Primary causes

- | | |
|-----------------------|------------------------------|
| ■ Atopic dermatitis | ■ Zinc-responsive dermatosis |
| ■ Food allergy | ■ Sebaceous adenitis |
| ■ <i>Otodectes</i> | ■ Juvenile cellulitis |
| ■ <i>Sarcoptes</i> | ■ Drug eruption |
| ■ <i>Notoedres</i> | ■ Pemphigus foliaceus |
| ■ <i>Cheyletiella</i> | ■ Erythema multiforme |
| ■ <i>Demodex</i> | ■ Cutaneous T-cell lymphoma |
| ■ Chiggers | ■ Hypothyroidism |
| ■ Ticks | ■ Sex-hormone imbalances |
| ■ Fleas | ■ Hyperadrenocorticism |
| ■ Primary seborrhea | |

Perpetuating causes

- | | |
|------------|----------------|
| ■ Bacteria | ■ Otitis media |
| ■ Yeast | |

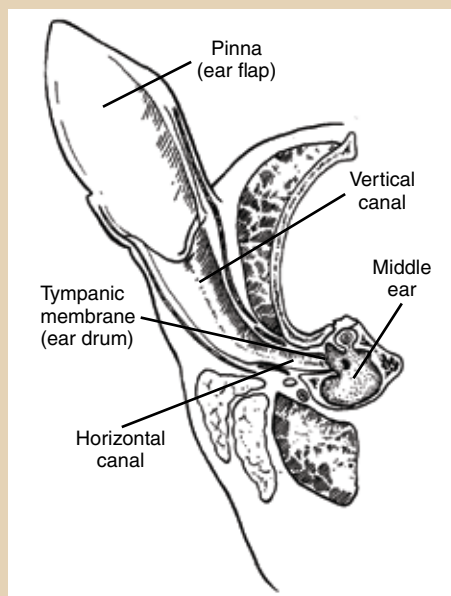
genic™ or Hills Prescription Diet z/d Ultra Allergen Free). Atopic dermatitis and food allergy may occur concurrently, so both should be considered when compatible history and signs are evident.

Parasites that can serve as primary causes of otitis externa include *Otodectes* (ear mites), *Otobius* ticks, *Demodex* and less commonly *Sarcoptes*, *Notoedres*, *Cheyletiella*, fleas and chiggers. Grass seeds and

other plant material can also initiate otitis externa. In the western United States, fox-tails are a common cause of severe, acute otitis externa.

Skin diseases that can result in seborrheic changes in the ear canal include primary seborrhea, sebaceous adenitis, hypothyroidism and other endocrine disorders. These disorders may result in excessive cerumen production and an abnormal

Figure 2: Anatomy of the Ear Canal



epithelial surface in the ear canal. Seboreic changes will be present elsewhere on the skin, providing a clue that seboreic diseases should be considered as the underlying etiology of the otitis externa.

Some uncommon skin diseases, such as juvenile cellulitis, drug eruption, pemphigus foliaceus, erythema multiforme and cutaneous T-cell lymphoma may also affect the pinna and ear canal. In some instances, the ear canal is the first site affected. A thorough dermatological examination and workup are often required to fully assess the primary cause of otitis externa. This will often include skin scrapings, skin biopsy, complete blood count (CBC), serum biochemistry and thyroid testing.

In conjunction with primary causes of otitis externa, certain factors are considered predisposing or perpetuating causes (Table 1, page 20). Predisposing causes are those that affect the microenvironment of the ear canal in such a way as to make it prone to

primary causes of otitis externa by increasing humidity, altering the normal outward epithelial migration, or disrupting epithelial surfaces. For example, the epithelium can be abraded and wax can be packed deep in the canal by overzealous cleaning with cotton-tipped swabs.

Perpetuating causes of otitis externa are those that, although not alone capable of initiating disease, must be addressed in order for it to resolve. Bacteria, yeast and otitis media are the most important perpetuating causes. The bacteria most commonly incriminated in otitis externa are *Staphylococcus intermedius*, *Pseudomonas aeruginosa*, *Proteus mirabilis* and *Escherichia coli*. By far the most commonly isolated yeast is *Malassezia pachydermatis*, but occasionally *Candida* spp. are found. Keep in mind that these organisms may be isolated from normal ears.

Examination of the ear canal

As part of your dermatological examination, examine the pinna and entrance to the ear canal for alopecia, scale, crusts, erythema, swelling or stenosis. Gently palpate the ear canal to evaluate for fibrosis or calcification of the cartilaginous structures. A normal ear canal gives slightly and is non-painful when palpated.

Due to the curvature of the canine and feline ear canals (Figure 2), visualization of the horizontal canal and tympanic membrane necessitates the use of an otoscope. This simple procedure should be part of your regular examination, as occult otitis externa, foreign bodies or aural exudates are sometimes detected. Pet owners understand that a thorough examination necessitates the use of an otoscope. Further, examining Pets' normal ear canals will increase your proficiency and make Pets more comfort-

Figure 3: Cartilaginous Ridge on Dorsal Aspect of Ear Canal

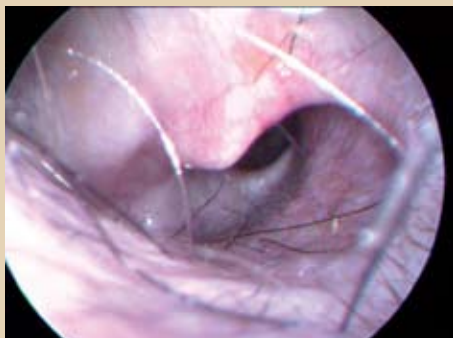


Figure courtesy of Jon Platt, DVM, DACVD

Avoid bumping into the cartilaginous ridge on the dorsal aspect of the ear canal with the otoscope cone, by gently pulling dorsolaterally on the pinna and staying close to the floor of the ear canal.

able with the otoscope when their ears are not painful. You should be able to perform an otoscopic examination in a matter of seconds by applying gentle dorsolateral traction on the pinna while simultaneously inserting the otoscope cone into the distal horizontal canal. In choosing an otoscope cone, err on the small side in order to avoid causing unnecessary discomfort. Care should be taken to guide the otoscope cone below the cartilaginous ridge at the dorsal junction of the vertical and horizontal canals (*Figure 3*).

The normal ear canal is lined by a smooth, light-pink epithelium. A small amount of cerumen and hair close to the tympanic membrane may be seen in some dogs. Note any inflammation, exudate, irregularities of the epithelial surface, stenosis, tumors or foreign bodies. The normal tympanic membrane consists of the thin, semi-translucent pars tensa ventrally and the vascular pars flaccida dorsally (*Figures 4A* and *4B*, page 25). The attachment of the manubrium of the malleus to the medial pars tensa can be seen. Look for increased opacity,

tears, discoloration, bulging or absence of the tympanic membrane (*Figures 4C* to *4F*, page 25). Video otoscopy utilizing fiberoptic technology, if available, provides for increased illumination and is a useful tool for displaying ear pathology to clients.

The diagnostic approach

A generalized diagnostic approach to otitis externa is presented in *Figure 5*, page 26. Ear canals that are acutely inflamed, ulcerated or contain foreign bodies can be particularly painful. These Pets usually require immobilization or anesthesia in order to humanely and safely perform an examination of the canal. Ear canals that are filled with cerumen or exudate must often be flushed in order to visualize the deeper aspects of the canal or the tympanic membrane. Pet owners should be made aware of the diagnostic as well as therapeutic value of an ear flush and be prepared for the possibility that the tympanic membrane is already compromised.

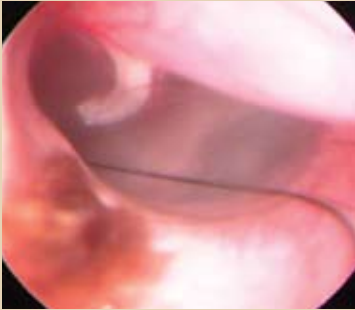
Otic cytology is the most valuable diagnostic test in the management of otitis externa and it should be recommended routinely, both with the initial diagnosis and upon follow-up examination.³ Otic exudate color is not a reliable indicator of the nature of the infection and should not be relied upon to make a diagnosis.

Prior to cleaning the ears, samples should be collected from the horizontal canals with cotton swabs, rolled on a glass slide, stained with modified Wright's stain, and examined for yeast, bacteria and inflammatory cells (*Figures 6A* to *6F*, page 29). Heat-fixing the slide is not necessary.⁴ The sample should be examined with a 100X objective under oil immersion.

When ear mites are suspected, a drop of mineral oil is applied to a cotton-swab

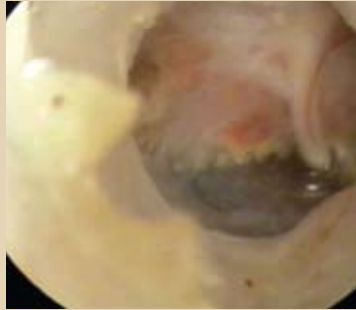
Figure 4: The Normal and Diseased Tympanic Membrane (TM)

Figure 4A



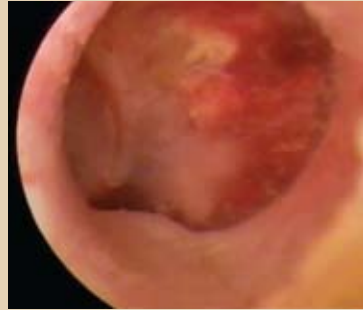
Normal canine TM

Figure 4B



Normal feline TM

Figure 4C



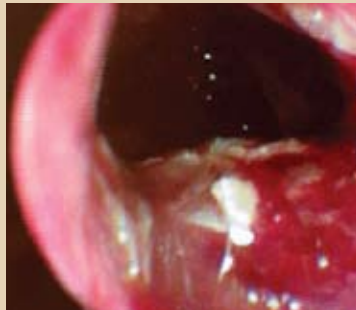
Inflamed TM

Figure 4D



Perforated TM

Figure 4E



Absent TM

Figure 4F



Bulging TM

Figure 4A courtesy of Jon Plant, DVM, DACVD. Figures 4B-4F courtesy of Lou Gotthelf, DVM

prior to sample collection and the material is dispersed in mineral oil and placed on the slide. Ear mites are readily seen with a 4X objective. Adult female *Otodectes* are identified by the cup-shaped pulvilli (suckers) on the first two pairs of legs and whip-like setae on the third and fourth pairs.⁵

Collect a sample for bacterial culture and susceptibility testing from the horizontal canal prior to flushing the ear canal when rod-shaped bacteria are found on cytology, for poorly responsive infections, and when systemic therapy is contemplated.³ Culture results are more pertinent to the selection of a systemic antibiotic than topical antibiotic therapy (See *The challenges of otitis media*, page 42). If a mass is seen, a biopsy can be obtained with an

endoscopic biopsy instrument or in conjunction with ear canal surgery. Alternatively, exfoliative cytology obtained with an ear curette may be helpful to differentiate inflammatory and neoplastic masses.⁶ These samples are best read by a pathologist as the differences between cell types are often difficult to discern.

Additional diagnostic tests may be needed

Additional diagnostic testing is often warranted to investigate the underlying causes of otitis externa. The history and dermatological examination findings should help you prioritize a hypo-allergenic diet trial, skin scrapings, skin biopsies, thyroid testing, CBC and blood chemistry testing.

Figure 5: Diagnostic Algorithm for Otitis

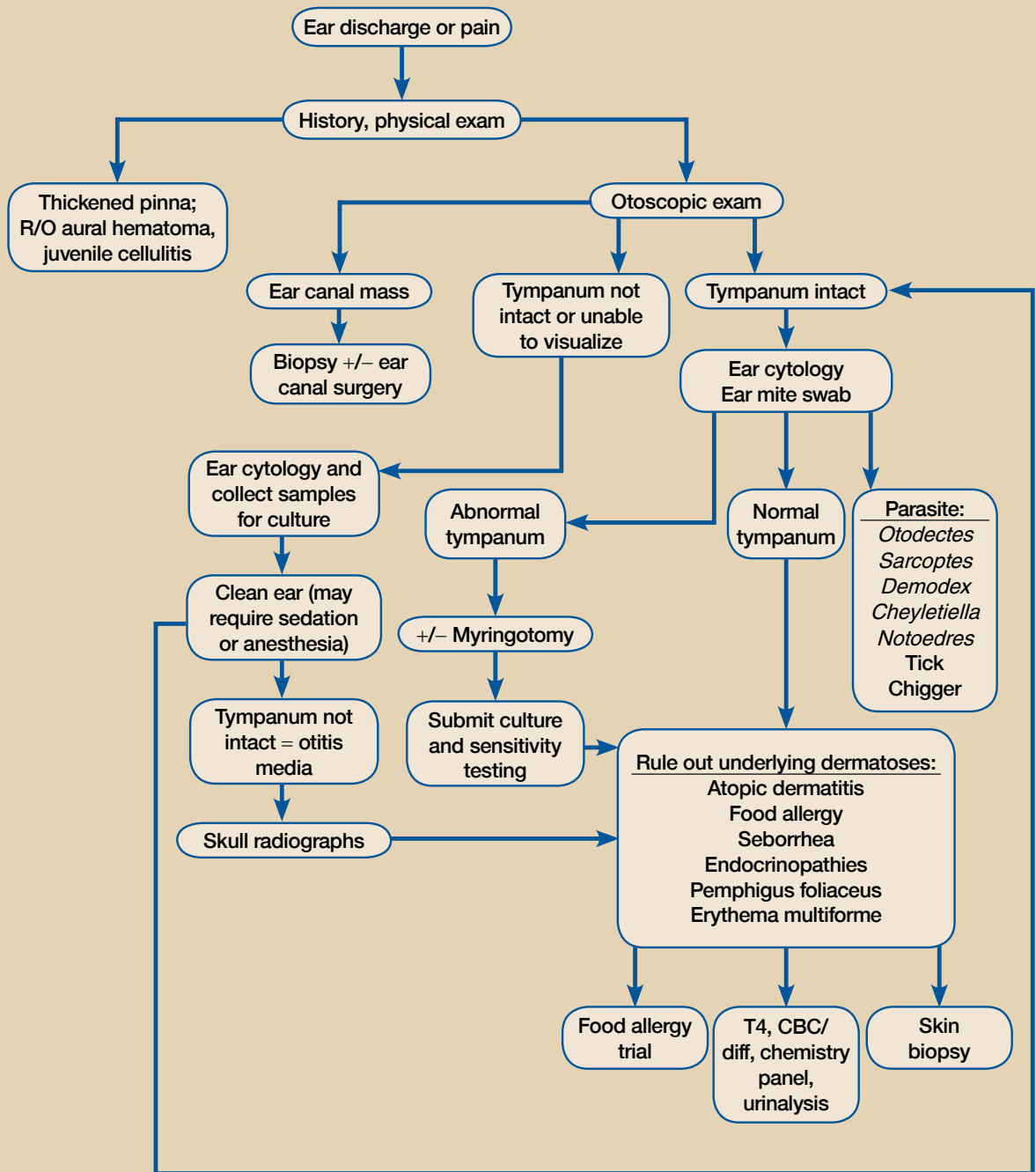
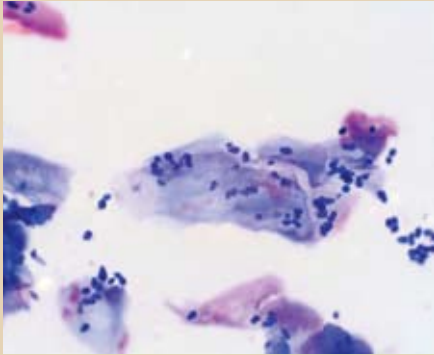


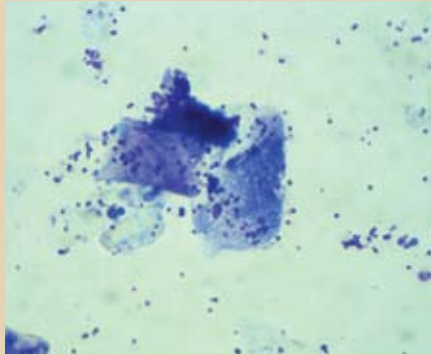
Figure 6: Cytology Findings

Figure 6A



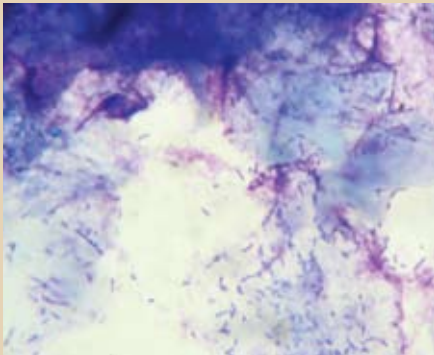
Yeast (*Malassezia pachydermatis*)

Figure 6B



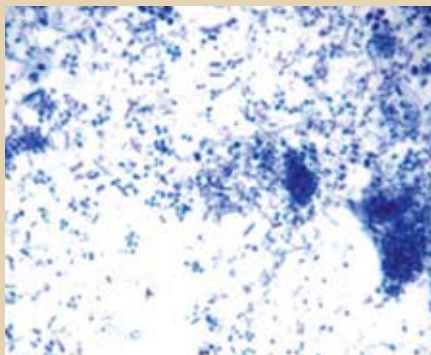
Cocci and *Malassezia*

Figure 6C



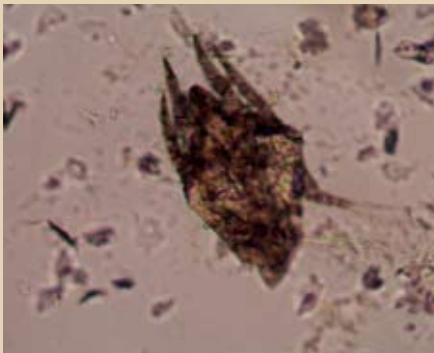
Rod-shaped bacteria

Figure 6D



Mixed rod-shaped and cocci bacteria

Figure 6E



Otodectes cynotis, the ear mite

Figure 6F



Notoedres cati, feline head mange mite

Figures courtesy of Kinga Gertel, DVM, DACVD, and Jon Plant, DVM, DACVD

Your success in preventing recurrence will hinge on managing the cause with the Pet owner's active participation.


Imaging studies are helpful in evaluating patients for otitis media (See *Management of Otitis Externa*, page 31).

Client education essential to success

It is important to begin laying the groundwork for the challenging nature of otitis externa the first time it is diagnosed in a Pet. Let the Pet owner know that this is a common condition that is often caused by a chronic skin disease. If the Pet is fortunate, you will diagnose a curable, primary condition such as *Otodectes*. However, in many cases, determining the primary cause of otitis externa will require additional diagnostic testing, and your success in preventing recurrence will hinge on managing the cause with the Pet owner's active participation.

Conclusion

Just as there are many predisposing, primary and perpetuating factors that contribute to otitis externa there are also many external factors that contribute to the success of treatment. Otitis externa requires a large effort on the doctor's part—properly diagnosing, properly treating and properly educating the client. The client must also be prepared to partner with the doctor and do his/her part at home—treat the ears daily, administer medications as prescribed, comply with diet trials, present the Pet for rechecks and perform routine maintenance. Make the effort to explain the complexity of this disease early before the client becomes frustrated and abandons all efforts to relieve

his/her Pet of this extreme, recurring discomfort. To address this complex disease, we present a series of articles; the second article discusses medical management of otitis externa; the third covers how to properly diagnose and treat otitis media. 

References

1. Rosser EJ, Jr. Causes of otitis externa. *Vet Clin North Am Small Anim Pract.* 2004;34(2):459-68.
2. Kennis RA. Food allergies: update of pathogenesis, diagnoses, and management. *Vet Clin North Am Small Anim Pract.* 2006;36(1):175-84.
3. Merchant SR. Microbiology of the Ear of the Dog and Cat. In: *Small Animal Ear Diseases*. St. Louis, Mo. Elsevier Saunders; 2005;181-195.
4. Griffin JS, Scott DW, Erb HN. Malassezia otitis externa in the dog: the effect of heat-fixing otic exudate for cytological analysis. *J Vet Med A Physiol Pathol Clin Med.* 2007;54(8):424-7.
5. Wall W, Shearer DH. Mites (Acari). In: *Veterinary Ectoparasites*. Oxford, England. Blackwell Science; 2001;23-54.
6. Angus JC. Cytology and Histopathology of the Ear in Health and Disease. In: *Small Animal Ear Diseases*. St. Louis, Mo. Elsevier Saunders;2005;43-78.

Jon Plant, DVM, DACVD, graduated from Oregon State University (OSU) in 1988 and was board-certified in dermatology in 1991. Dr. Plant owned a dermatology referral practice in Marina del Rey, Calif. He then taught at OSU for three years. He joined Banfield in 2008 as a medical specialist in dermatology. He and his wife, Kara, have one daughter, two dogs and two cats.