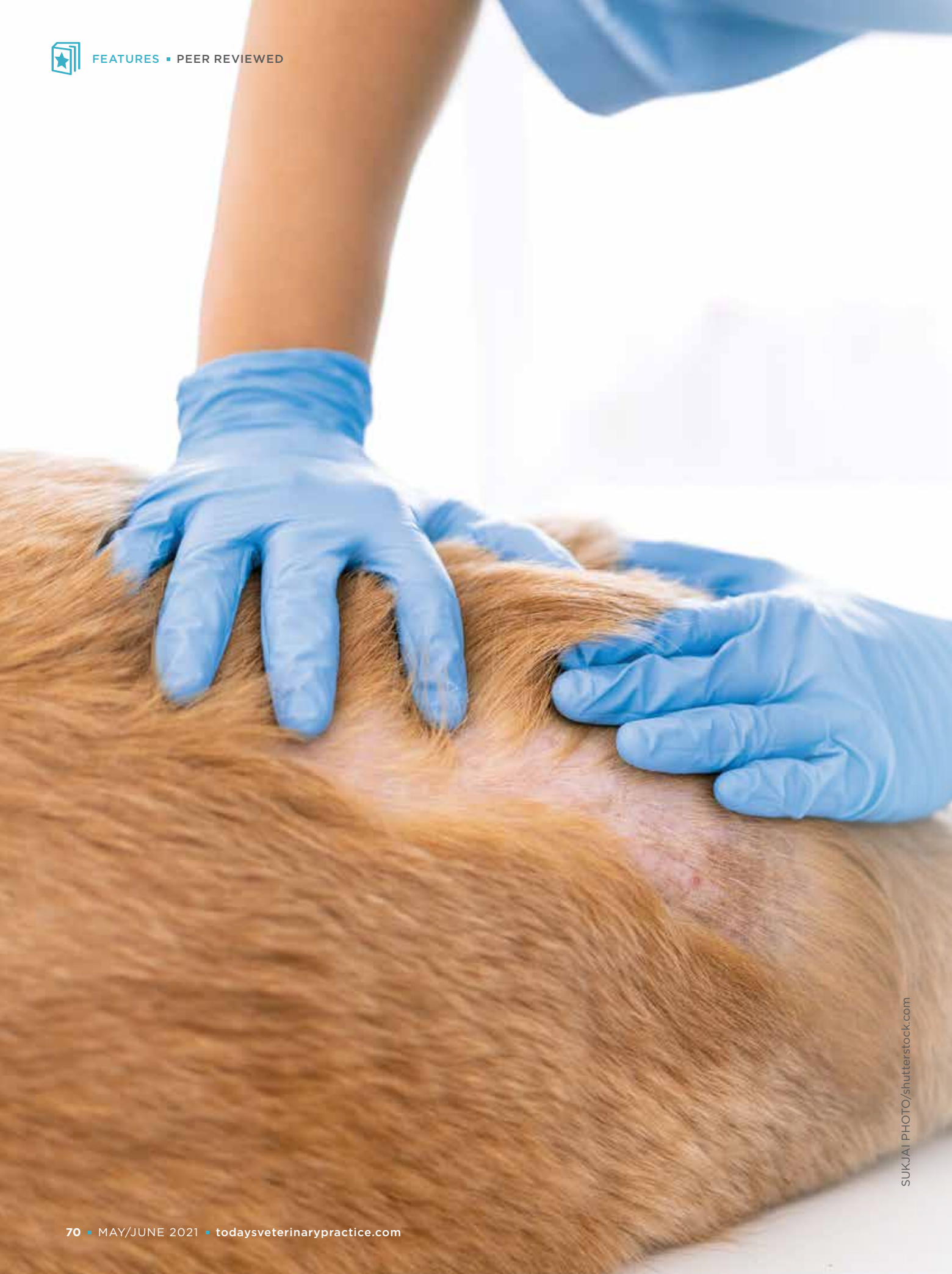

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ISSUES IN DERMATOLOGY

Diagnostic Approach to the Pruritic Dog

***Cherie Pucheu-Haston**, DVM, PhD, DACVD*
Louisiana State University School of Veterinary Medicine

Pruritus is one of the most common reasons why clients bring their dog to the veterinarian. Sometimes the cause of the pruritus is obvious (e.g., the dog is covered with fleas), and sometimes it is not so simple. The patient's primary condition may be exacerbated by secondary infections or development of (new) allergic skin diseases. If necessary, the veterinarian must be ready to "peel back" diagnostic layers to get to the underlying cause—or causes. This article provides a logical approach to the workup of the pruritic dog.

MAJOR CATEGORIES OF CONDITIONS RESPONSIBLE FOR PRURITUS

Although there are definitely exceptions, most conditions responsible for pruritus in the dog fall into 3 broad categories: infection, infestation/ectoparasitism, and allergy (**TABLES 1-3**).[1-9] Frequently, conditions in more than 1 category are present simultaneously (e.g., the patient with atopic dermatitis may also have fleas and a secondary yeast infection). Furthermore, the sensation of pruritus can be considered to be an additive phenomenon in which each condition builds on the discomfort generated by the other(s).

Infection

The most common infectious conditions that can be associated with pruritus in the dog are staphylococcal pyoderma and yeast dermatitis (typically *Malassezia*, although *Candida* may also be seen, albeit rarely).[9] Dermatophytosis may also be associated with pruritus, although less commonly than bacterial and yeast disorders.[9] With the exception of dermatophytosis, infection is generally a secondary cause of pruritus.[10] However, any microbial overgrowth or invasion can trigger production of a nonspecific inflammatory response in the skin by activating and recruiting inflammatory cells, which subsequently release inflammatory and pruritogenic substances. Together, these events induce or enhance the sensation of pruritus.[11] **TABLE 1** describes the most common infectious causes of pruritus and their distributions.

ROOT OF THE PROBLEM
There are many differential diagnoses for pruritus in dogs, but following a few guidelines in the correct order can greatly facilitate the workup.

TABLE 1 Common Differential Diagnoses for Causes of Pruritus (Infectious)

CONDITION	TYPICAL DISTRIBUTION	TYPICAL LESIONS	ASSOCIATED DIAGNOSTICS
Staphylococcal pyoderma (surface, superficial, or deep)	▪ Primarily on the lateral trunk and abdominal/inguinal area, occasionally dorsal ▪ Deep folliculitis/furunculosis interdigitally and on skin ▪ Surface overgrowth in skin folds (e.g., lip, face, neck) ▪ Papules, pustules, epidermal collarettes	▪ Papules, pustules, epidermal collarettes ▪ Furuncles ▪ Cellulitis ▪ Moist dermatitis in fold areas	▪ Examination of the contents of an intact pustule (ideal) ▪ Skin swab cytology ▪ Direct impression cytology ▪ Tape cytology ▪ Culture generally not required unless antibiotic resistance is suspected[1,2]
Yeast dermatitis (FIGURE 1)	▪ Skin folds (ventral neck, lip folds, interdigital, elbow folds) ▪ Perivulvar ▪ Otitis ▪ Claw beds/claws[1,3]	▪ Erythema ▪ Lichenification ▪ Greasy skin ▪ Foul odor ▪ Nail bed infections sometimes associated with bronzing of the claw or brown material at the nail bed	▪ Skin swab cytology ▪ Direct impression cytology ▪ Tape cytology ▪ Histology (not a reliable method of detection), culture (may yield false-negative results and may be impractical)[1-3]
Dermatophytosis	▪ Face, pinnae ▪ Almost anywhere ▪ Possibly generalized ▪ Claws	▪ Alopecia, often inflammatory ▪ Scale ▪ Kerion: focal area of rapidly progressive erosion or ulceration, typically secondary to *Microsporum gypseum* infection ▪ Claws possibly malformed, fragile, prone to splitting	▪ Wood's lamp (*Microsporum canis* only) ▪ Dermatophyte culture ▪ Fungal polymerase chain reaction test (false-positive results possible if environment is contaminated) ▪ Trichogram[4,5]

Infestation/Ectoparasitism

Parasites typically associated with the development or perpetuation of pruritus in the dog can be classified into those infesting the skin surface, the superficial aspect of the skin (e.g., the stratum corneum and epidermis), or the deep portions of the skin (especially the follicles).[6]

- Surface-dwelling parasites include fleas, lice, *Otodectes* and *Cheyletiella* mites, and chiggers (*Eutrombicula, Walchia*).
- Superficial parasites include *Sarcoptes* mites.
- Deep-dwelling parasites include *Demodex canis* and *Demodex injai* mites.

Other insects and mites may also contribute to pruritus through means other than direct parasitism, including mosquitoes, stable flies (*Stomoxys*), and black flies (*Simulium*). **TABLE 2** describes the typical clinical appearance and distribution of dermatitis associated with parasites as well as relevant diagnostic techniques.

Allergy

The 3 most common allergies associated with pruritus in the dog are flea allergy, food allergy (sometimes called adverse food reactions), and atopy (or atopic dermatitis) (**TABLE 3**).[1,9,10] Dogs may be affected with 1 or more of these conditions or even all 3 concurrently. Dogs can also experience contact allergy, although less commonly than the other 3 allergy conditions. With the exception of flea allergy, workup of the other hypersensitivity disorders is more complex and involved than that of infectious and parasitic conditions. For this reason, an in-depth workup for allergy is often deferred until nonallergy causes of pruritus are identified and controlled or eliminated.

FIGURE 1. Brown discoloration on the claw of a dog with yeast pododermatitis.

TABLE 2 Common Differential Diagnoses for Causes of Pruritus (Parasitic)

CONDITION	TYPICAL DISTRIBUTION	TYPICAL LESIONS	ASSOCIATED DIAGNOSTICS
Sarcoptes scabiei	▪ Pinnal edges ▪ Elbows ▪ Hocks ▪ Ventrum ▪ Possibly generalized[1]	▪ Crusting ▪ Excoriation ▪ Lichenification ▪ Possibly widespread papular dermatitis	▪ Superficial skin scraping, particularly of pinnal margins and inside Henry's pocket ▪ Fecal examination (may occasionally demonstrate mites) ▪ Response to empiric treatment[1,2]
Demodicosis (FIGURES 2-4)	▪ Most commonly on face and feet (especially interdigital skin) ▪ Almost anywhere ▪ Sometimes most of the body ▪ *Demodex injai* particularly likely on dorsal neck and shoulders	▪ Alopecia ▪ Comedones ▪ Papules ▪ Furuncles/cellulitis (if secondarily infected) ▪ Greasy dermatitis (especially *D injai*)	▪ Deep skin scraping for *D canis* or *D injai* (examination of skin scrapings best performed with the microscope condenser down to increase contrast and visualization) (FIGURE 3) ▪ Superficial skin scraping (for short-bodied morphologic variants of *D canis*) ▪ Hair plucks ▪ Tape impression of squeezed skin ▪ Fecal examination (may occasionally demonstrate mites)[1,2]
Fleas	▪ Tail/tailhead ▪ Perianal and perineal regions ▪ Caudal and caudolateral thighs ▪ Inguinal area ▪ Ventral flanks ▪ Possibly generalized[1]	▪ Papules (often not seen because of self-trauma) ▪ Erythema ▪ Lichenification ▪ Excoriation ▪ "Flea dirt" ▪ Pyotraumatic dermatitis (hot spots)	▪ Direct visualization ▪ Flea combing and examination of debris for fleas and "flea dirt" ▪ Examination of in-contact animals (may increase likelihood of detection) ▪ Response to aggressive flea control[1,2]
Otodectes	▪ Otitis/ear canal ▪ Face ▪ Occasionally rump	▪ Greasy otitis, sometimes with "coffee ground"–consistency discharge ▪ Excoriation of face and pinnae ▪ Excoriation of neck, rump, or tail	▪ Direct visualization by otoscopic examination ▪ Examination of otic debris suspended in mineral oil ▪ Superficial skin scraping[1,2]
Cheyletiella	▪ Dorsal and lateral thorax	▪ Papules ▪ Dry scale (may be profuse)	▪ Direct visualization using magnifying glass ▪ Examination of flea-combed material under microscope or magnifying glass ▪ Eggs (nits) (may be seen clinging to plucked hairs) ▪ Tape impressions[1,2]
Lice (*Linognathus setosus*, sucking louse; *Trichodectes canis*, biting louse)	▪ Anywhere ▪ Trunk, neck	▪ Disheveled fur ▪ Dry scale ▪ Alopecia ▪ Excoriation ▪ Papules, crusts	▪ Direct visualization ▪ Tape impression ▪ Examination of flea-combed material under microscope or magnifying glass ▪ Eggs (nits) (may be seen clinging to plucked hairs) [1,2]
Chiggers	▪ Areas that touch the ground (e.g., feet and ventrum) ▪ Legs ▪ Ears, especially in Henry's fold	▪ Bright orange mites ▪ Papules ▪ Crusts ▪ Wheals ▪ Excoriation	▪ Direct visualization ▪ Examination of flea-combed material under microscope or magnifying glass ▪ Skin scraping[2]
Mosquito bites	▪ Thinly furred areas ▪ Face, ventrum ▪ Anywhere on short-coated dogs	▪ Papules ▪ Wheals ▪ Excoriation	▪ Histology (may demonstrate eosinophilic dermatitis but is not pathognomonic) ▪ History of known mosquito exposure ▪ Improvement after application of repellent agents[6]
Fly bites	▪ Pinnae, especially the edges, tips, or the fold in floppy-eared dogs ▪ Occasionally the face	▪ Papules ▪ Bruising (*Simulium* species) ▪ Excoriation ▪ Crusts	▪ History of known exposure to flies ▪ Improvement after application of repellent agents[6]

DIAGNOSTIC TOOLS

Initial Visit

- **Cytology:** The initial workup of the pruritic dog should include at least skin and/or ear cytology.
- **Skin scrapings:** The initial workup of the pruritic dog should also include skin scrapings of affected areas. Superficial skin scrapings may demonstrate many surface and superficial mites; deep skin scrapings may demonstrate *Demodex* mites.
- **Flea combing and/or surface tape impressions:** Examination of debris obtained by flea combing or with surface tape impressions may be helpful for demonstrating surface-dwelling mites, fleas, "flea dirt," and lice.
- **Flea control:** Aggressive flea control is an essential part of the workup and management of the pruritic dog. It is the author's opinion that a good-faith effort to institute a flea control trial program is worthwhile even in areas where fleas are considered uncommon.[1] This is particularly true given the potential effects of climate change and energy-efficient housing, which minimizes the effects of seasonal variations in temperature, humidity, etc., creating micro-environments that may be more conducive to flea survival.[12]

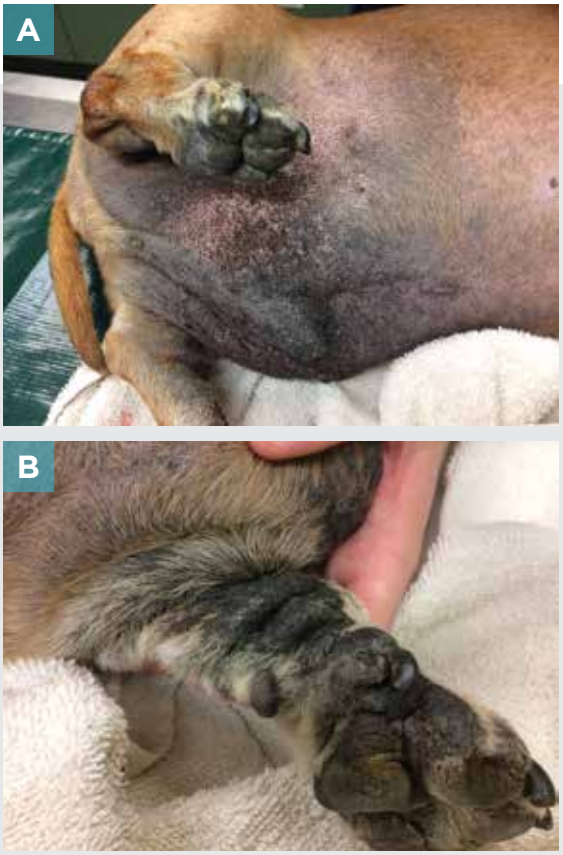

FIGURE 2. Hyperpigmentation, lichenification, and comedones on the ventral abdomen **(A)** and antebrachium **(B)** of a dog with demodicosis. This dog received treatment with oclacitinib for months along with increasing doses of glucocorticoids for allergic dermatitis.

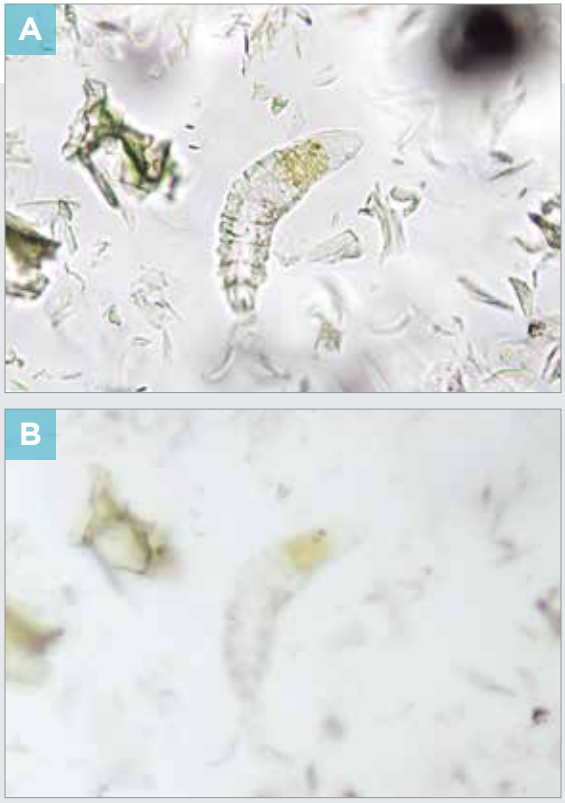

FIGURE 3. *Demodex canis* photographed with the microscope condenser down **(A)** and up **(B)**. Note the marked increase in clarity and contrast when the microscope condenser is lowered.

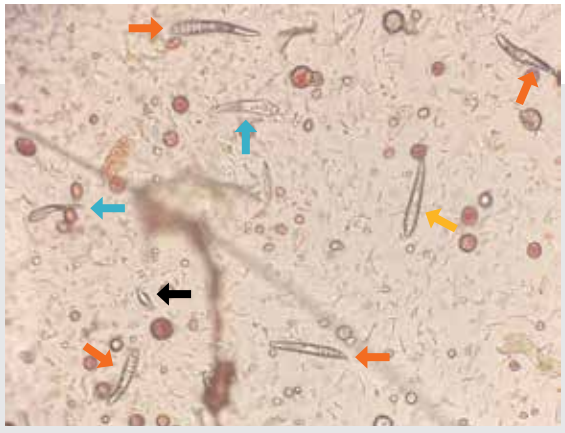

FIGURE 4. Deep skin scraping demonstrating adult *Demodex* mites **(orange arrows)**, mite fragments **(blue arrows)**, a nymph **(black arrow)**, and an egg **(yellow arrow)**.

TABLE 3 Common Differential Diagnoses for Causes of Pruritus (Allergic)

CONDITION	TYPICAL DISTRIBUTION	TYPICAL LESIONS	ASSOCIATED DIAGNOSTICS
Flea allergy (FIGURE 5)	▪ See Fleas in TABLE 2 ▪ Long-standing infestations/ allergies may extend cranially, eventually covering much of the body		
Food allergy (FIGURES 6, 7)	▪ Very pleomorphic (may be associated with almost any distribution) ▪ Pinnae/ears ▪ Face, feet, axillae, and groin ▪ Perineal, perianal, and perivulvar ▪ Recurring bacterial infections ▪ Associated gastrointestinal signs (may or may not be present)	▪ Pleomorphic ▪ Papules ▪ Excoriations ▪ Alopecia ▪ Lichenification ▪ Erythema ▪ Urticaria/angioedema ▪ Otitis (may be unilateral, frequently recurring)	▪ Dietary elimination trial ▪ Typically nonseasonal (but signs may wax and wane if diet is changed frequently)[7]
Atopic dermatitis (FIGURES 7, 8)	▪ Face, feet, axillae, and groin ▪ Pinnae/ears ▪ Fold areas (antecubital, stifle) ▪ Associated rhinitis, sneezing or conjunctivitis (may or may not be present)	▪ Possibly pruritus with no associated lesions ▪ Papules ▪ Erythema ▪ Lichenification ▪ Excoriation ▪ Alopecia ▪ Urticaria/angioedema ▪ Otitis (frequently recurring)	▪ Atopic dermatitis (diagnosed by ruling out all reasonable differentials) ▪ Exclusively seasonal pruritus in absence of infectious or parasitic causes (strongly suggestive) ▪ Intradermal skin testing or IgE serology (supportive but not sufficient for diagnosis by themselves)[1,8]

Flea control should be included in the workup of the pruritic dog even when flea allergy is not considered to be a likely differential because fleas and their bites can produce irritation even in nonallergic patients. It is beyond the scope of this article to provide a detailed discussion of the available agents, but other resources are available.[13] The author particularly favors drugs in the isoxazoline class; however, in certain circumstances (e.g., patients with pre-existing neurologic disease or seizure history), these drugs should be used with caution, if at all. For these patients, other drugs (e.g., monthly indoxacarb or dinotefuran or weekly imidacloprid) may be sufficient.

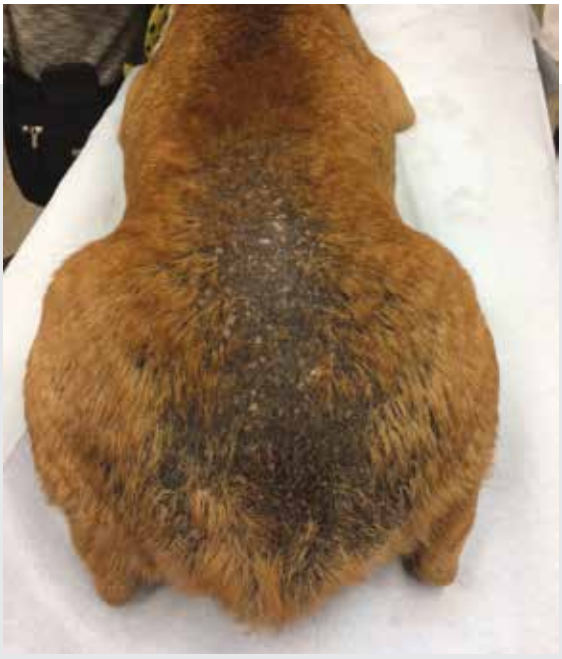

FIGURE 5. Tailhead alopecia, hyperpigmentation, and scarring in a dog with chronic flea allergy dermatitis.

To ensure that flea control products are being used appropriately, question clients carefully about their current flea control measures. Ask specifically about the presence and treatment of other animals that may have contact with the patient. Also ask whether the dog has been exposed to situations in which fleas can be transmitted (e.g., dog parks, doggie day care). Free-roaming animals should be confined to a controlled space for the duration of the flea control trial. Measures should be taken to ensure that the dog and in-contact animals do not have access to open sheds, crawl spaces, etc., which may be reseeded with fleas by wildlife that might also access these areas.[14] In cases of heavy infestation (or if the clinical signs are particularly suggestive of flea allergy), treating the environment may be warranted. Indeed, many practitioners believe that environmental flea control is essential in geographic areas prone to heavy flea infestations (e.g., the southeastern U.S.). Environmental flea control measures may include frequent vacuuming of the area to which the dog has access and spraying the household with insect growth regulators (e.g., pyriproxyfen).

Other Diagnostics That May Be Useful

- **Wood's lamp examination, dermatophyte culture, dermatophyte polymerase chain reaction test, or careful examination of plucked hairs (trichogram):** Any of these procedures may be helpful if dermatophytosis is suspected.
- **Culture and sensitivity testing:** For patients with a history of repeated antibiotic administration, deep pyoderma, or failure to respond to empirical antibiotic therapy, consider bacterial culture and sensitivity testing.
- **Biopsy:** For patients demonstrating little to no improvement despite appropriate antimicrobial and antiparasitic therapy, skin biopsy may be considered. A skin biopsy should not be performed in lieu of a good-faith effort to evaluate the patient for infectious, ectoparasitic, and (later) allergic disease. Although histology can demonstrate some infectious conditions (e.g., dermatophytosis, demodicosis), it is usually not the most efficient way to do so. Histology alone is unable to distinguish between many of the conditions described in this article.[15] Nonetheless, with these limitations in mind, a biopsy may be considered to

FIGURE 6. Ventral interdigital **(A)** and axillary **(B)** erythema and alopecia in a food-allergic dog.

FIGURE 7. Pinnal erythema and pyotraumatic dermatitis in a dog with food allergy and atopic dermatitis.

FIGURE 8. Allergic otitis. Note the marked erythema even in the absence of significant signs of infection.

provide further information and to help rule out more esoteric causes of pruritus, such as cutaneous lymphoma. The author typically reserves biopsies for patients that did not respond to appropriate therapy or patients with atypical presentations (e.g., persistent diffuse erythema or scale, ulceration, involvement of mucocutaneous junctions).

DIAGNOSTIC APPROACH

1. Take a Thorough History

For evaluating a pruritic dog, a thorough medical history is invaluable. A good history can help point the veterinarian toward likely diagnoses and, of equal importance, away from unlikely diagnoses. **TABLE 4** shows questions to ask when taking a dermatologic history, some follow-up questions, and a brief synopsis of information to be gained from the answers.

2. Perform Physical and Dermatologic Examinations

Every pruritic dog should undergo thorough physical and dermatologic examinations. It is beyond the scope of this article to cover all possible relevant findings; however, some areas are particularly important to evaluate. These areas are the dorsal and ventral interdigital skin, the claws and skin around the claw beds, the perianal and perineal skin, the elbow folds, and the ventral lip folds. In addition, a rectal exam is indicated for any patient with caudal pruritus since some patients with impacted anal sacs will lick or chew over the tailhead rather than scoot.[19] Evaluation of areas demonstrating erythema, pustules, bronzing (especially on the claws), or moist or greasy dermatitis may be particularly useful. **TABLES 1–3** list some of the more common differential diagnoses, the typical distribution of these conditions, and relevant diagnostic techniques.

3. Identify and Eliminate Infectious and Ectoparasitic Causes First

Although true that a significant percentage of pruritic dogs experience 1 or more types of allergic skin disease, it is often a better use of time to first evaluate the patient for infectious or parasitic causes of pruritus. With the exception of flea allergy (for which institution of aggressive flea control is always indicated), a workup for food allergy or atopic dermatitis may or may not be indicated at the first examination. If significant infection with fleas, bacteria, or yeast is found, elimination of these conditions may provide a better baseline assessment of the patient's true condition.

Another reason to identify and eliminate infectious and ectoparasitic conditions first is because they are typically easier to identify and treat, whereas a thorough workup for allergic skin disease may be fairly expensive and lengthy. In addition, because pruritus can result from the combination of all factors present, failure to eliminate nonallergic conditions may interfere with an accurate assessment of the patient's condition, potentially skewing the results of an allergy workup.[1] Although the infectious and parasitic categories together represent a very large number of potential differential diagnoses, most of these conditions can be rapidly and inexpensively identified by using a relatively small number of diagnostic and therapeutic techniques (**TABLES 1, 2**). Should the pruritus persist after elimination of infections or parasites, an allergic skin disease workup would then be warranted.

At the first visit, institution of some form of anti-inflammatory therapy is generally indicated. Pruritic behaviors create cutaneous microtrauma, which causes the release of inflammatory mediators and favors the development and perpetuation of infection. Although anti-inflammatory medications could interfere with assessment of the patient's condition in the short term, the decreased inflammation not only provides relief for the patient but also allows traumatized skin to heal and could facilitate elimination of secondary infections.

4. Treat and Reassess

Reassessment is an important part of the workup of the pruritic dog. All too often, the veterinarian sees a patient months after the initial diagnostics and treatment were performed and prescribed, only to be told that the therapy "didn't work." Sometimes the patient did improve after initial therapy but started to worsen again after the initially prescribed medication ran out. If the client takes no action at this point, the condition will most likely continue to degrade, and by the time the client again seeks veterinary care, the brief respite from pruritus may be long forgotten. The author recommends that clients come in for a recheck or check in by phone or email 2 to 3 weeks after the initial visit. If necessary, the veterinarian or veterinary nurse can initiate contact. Patients should also be rechecked before medication is finished to confirm resolution of the infection/infestation. If the patient has improved, it may then be possible to begin an

TABLE 4 History-Taking Guidelines for the Workup of a Pruritic Dog

QUESTION	FOLLOW-UP QUESTION(S)	RELEVANCE
Age of onset		Onset <6 months or ~≥5 years of age is more likely associated with food allergy than atopy; onset ~1–3 years of age is consistent with either atopy or food allergy.[8]
If dog has always lived in this geographic area	Time since geographic move	A major geographic change may be associated with development of clinical signs if the patient moved to an environment in which specific allergens are enriched.[8]
Speed of onset		Sudden onset is more suggestive of infectious or parasitic causes or exposure to a food item or environmental allergen to which the patient has previously been sensitized.
Area(s) affected		See **TABLES 1–3**
Whether the affected area has changed/expanded		Relatively rapid expansion may suggest a secondary infection, parasitic infestation, or possibly development of a (new) allergic disease.
Severity of pruritus		A validated pruritus scale (e.g., Pruritus Visual Analog Scale) may provide meaningful, minimally biased quantification of pruritus over time.[16]
Living environment of patient: indoor only, outdoor only, indoor/outdoor, free roaming	Living environment of other in-contact animals	Free-roaming dogs (or dogs that contact other free-roaming animals) are at increased risk for ectoparasitism and other contagious diseases; dietary elimination trials may be more difficult in primarily outdoor dogs and impossible in free-roaming dogs.
Seasonality	Completely seasonal, previously seasonal, nonseasonal with seasonal flares	Purely seasonal disease is strongly suggestive of atopic dermatitis if fleas and other seasonal parasites (e.g., chiggers) have been eliminated.[8,17]
Other animals that come into contact with the patient, regardless of whether they are owned by the client		Pets owned by friends, outdoor-only pets, or free-roaming pets that occasionally contact the dog can be parasite vectors; clients sometimes neglect to inform the clinician about other pets that they own.
Presence of other affected animals or humans		Strongly suggests contagious ectoparasitism or dermatophytosis.
All medications that the dog is taking	Including heartworm and flea preventive(s), chewable tablets, etc.	Any flavored or chewable medication may be a confounding factor if a dietary elimination trial is to be attempted.
Known concurrent diseases		Hypothyroidism and hyperadrenocorticism may be associated with clinically significant immunosuppression, leaving the patient open to secondary infections, demodicosis, etc.
Noncutaneous signs	Vomiting, diarrhea, flatulence, chronically soft stool, defecation >3 times daily	Concurrent gastrointestinal signs (even if subtle) are suggestive of food allergy.[18]
	Rhinitis, sneezing, conjunctivitis	Respiratory signs or conjunctivitis may support a diagnosis of atopic dermatitis but are neither consistently seen nor specific to atopic dermatitis.[8]
Current and previous diets, if known	Specific diet formulation rather than just the brand name, including all treats, table foods, etc.	Identification of food protein sources may assist in the choice of a diet for a food allergy elimination trial; knowledge that the dog is often given table food or treats allows the clinician to identify possible confounding food sources and specifically address them when starting a dog on an elimination diet.
Prior diagnostics, treatments, and responses		Atopic dermatitis is generally glucocorticoid responsive, at least in the early stages; knowledge of what has not worked may help the veterinarian minimize unnecessary duplication.[8]
Whether the patient is receiving flea control and, if so, which agent(s) is/are being used and how frequently	Whether other in-contact animals are also receiving flea control and, if so, which agent(s) is/are being used	Clients may provide flea control for the affected dog but not for other in-contact animals because they "aren't having problems." In addition, clients may be unaware of factors that may inhibit the effectiveness of their products (e.g., poor water resistance in an animal that swims frequently).

allergic skin disease workup. If the patient has not improved sufficiently, workup may need to be delayed and the patient further evaluated (or re-evaluated) for the presence or recurrence of infectious or parasitic agents.

5. Perform Workup for Allergic Pruritic Skin Disease

Flea Allergy

As stated above, good flea control is important in the workup of any pruritic dog, regardless of whether flea allergy is considered to be a differential. Fortunately, modern flea control agents have made the elimination of fleas possible in all but the most challenging circumstances. Regardless of the agent(s) chosen, treatment of the patient and all in-contact animals must be maintained for a minimum of 12 weeks to be certain that the local flea population has been eliminated.[1]

Food Allergy

Many "diagnostic tools" are marketed for the diagnosis of food allergy, including measurement of serum IgE, fecal IgE, or salivary food-specific IgE. Unfortunately, those modalities can neither reliably diagnose food allergy nor identify problematic or tolerated food items.[20] Patch testing and lymphocyte stimulation tests may be of some use but are typically restricted to investigational settings or academic institutions.[21,22] To date, the only practical method for the diagnosis of food allergy and identification of culprit foods is the dietary elimination trial.[20]

Elimination trials may be conducted by using either hydrolyzed diets (processed to minimize peptide size) or novel protein diets (commercial or home cooked). Both approaches are valid, but neither is guaranteed to succeed. If hydrolyzed protein diets are used for diagnostic purposes, ultrahydrolyzed diets (1- to 2-kilodalton fragments) are considered superior to semihydrolyzed diets (~10-kilodalton fragments).[23] The small peptide fragments in ultrahydrolyzed diets makes clinical reactivity unlikely (but still possible) even if the protein from which that diet is sourced is one that the patient has been fed before. If desired, an ultrahydrolyzed diet could be selected from a different protein source (e.g., salmon-based diet for a patient previously fed chicken). However, even this approach has its limitations since recent work has demonstrated that allergenic cross-reactivity is possible between surprisingly disparate sources, such as fish and chicken.[24]

If a novel protein diet is selected, the patient's dietary history should be reviewed to identify dietary items to which the patient has been exposed. Appropriate diets should consist of ingredients from sources phylogenetically distant from those in the patient's previous diet. For example, a kangaroo-based or alligator-based diet might be a good empirical choice for a dog previously fed chicken. Again, cross-reactivity remains a potential limitation of these diets as well.

Selecting the diet is only part of a dietary elimination trial. The client must also ensure that the dog does not receive food or food-based items from other sources, which may include foods eaten by other animals in the house, table scraps, dropped food, pill pockets, food-based chew toys (rawhides, hooves), and treats. Commonly overlooked food sources are chewable medications (including heartworm and flea preventives), animal feces, licking other animals' food bowls, and dirty dishes in the sink.[1]

BOX 1 Favrot's Criteria for Canine Atopic Dermatitis[8]

Set 1
- Age at onset <3 years
- Mostly indoor
- Corticosteroid-responsive pruritus
- Chronic or recurrent yeast infections
- Affected front feet
- Affected pinnae
- Nonaffected ear margins
- Nonaffected dorsolumbar area (if fleas have been eliminated)

Fulfillment of 5 of these criteria has high sensitivity (85.4%) and medium specificity (79.1%).

Fulfillment of 6 of these criteria has low sensitivity (58.2%) and high specificity (88.5%).

Set 2
- Age at onset <3 years
- Mostly indoor
- "Alesional" pruritus at disease onset
- Affected front feet
- Affected pinnae
- Nonaffected ear margins
- Nonaffected dorsolumbar area (if fleas have been eliminated)

Fulfillment of 5 of these criteria has medium sensitivity (77.2%) and high specificity (83%).

Fulfillment of 6 of these criteria has low sensitivity (42%) and very high specificity (93.7%).

There is no consensus on the required length of a diet trial. A recent review article recommended a minimum of 8 weeks to identify 95% of food-allergic patients; in a small number of dogs, food allergy was not identified until 13 weeks.[25] For at least the first few weeks of the trial, it may be prudent to provide anti-inflammatory/antipruritic support (such as prednisolone). Doing so may be advisable not only for patient welfare but also because some evidence suggests that early suppression of cutaneous inflammation may shorten the necessary duration of the diet trial.[26] Ideally, all elimination diets should be followed by rechallenge with the dog's previous diet even if the dog does not become asymptomatic. Exacerbation of clinical disease after the challenge both confirms the diagnosis of food allergy in asymptomatic dogs and suggests a food allergy component in dogs demonstrating only partial improvement during the trial. Resolution of clinical flare after reinstitution of the elimination diet further solidifies the diagnosis.

Atopic Dermatitis

Atopic dermatitis may be best thought of as a syndrome rather than a specific diagnosis. The condition is generally associated with hypersensitivity to environmental allergens. In addition, the additive nature of pruritus means that the presence of other irritating or allergic factors (e.g., infections, fleas, food allergy) can trigger clinical flares of atopic dermatitis.[1,27] This hypersensitivity may be IgE mediated, although for some patients that are otherwise identically affected, allergen-specific IgE cannot be demonstrated by serology or intradermal testing. These patients are referred to as having "atopic-like dermatitis."[28]

Recently, 2 sets of criteria have been developed to help veterinarians diagnose atopic dermatitis (**BOX 1**).[8] By themselves, these criteria do not prove that a patient does or does not have atopic dermatitis, and they do not replace an appropriate workup to identify and eliminate other potential causes of atopic dermatitis. However, they do provide useful information about which clinical signs (and combination of signs) may best support a diagnosis of atopic dermatitis. Either set of criteria may be used. The first set is relatively sensitive and has moderate to high specificity; the second set is not sensitive but is highly to very highly specific.

Because of the many potential contributing factors, it is prudent to ensure that all reasonable differentials are ruled out or (in the case of concurrent allergic skin disease) under control before the diagnosis of atopic dermatitis is made. For this reason, atopic dermatitis is considered to be a clinical diagnosis of exclusion. Although allergy testing (serology or intradermal) is often used to "diagnose" atopic dermatitis, these diagnostics cannot reliably discriminate between healthy and atopic dogs and can only support a clinical diagnosis of atopy.[29]

Although allergy testing alone cannot diagnose atopy, it is useful for identifying potential allergenic triggers so that desensitization can be attempted.[1] The preferred diagnostic test is generally intradermal testing because it mimics the interaction between the allergen and the patient. However, intradermal testing is not always possible or practical, in which case a good serologic test can provide useful information. Because variations in laboratory methods can significantly affect serologic assay results,[30] consulting a veterinary dermatologist before selecting a laboratory is recommended.

CONCLUSIONS

The number of differential diagnoses for pruritus in dogs can seem overwhelming. However, following a few simple guidelines can greatly facilitate the workup.

- Get a good history—ask questions rather than assume that the client has told you everything of relevance.
- First screen the patient for infectious or parasitic causes of pruritus before leaping into an allergic skin disease workup.
- Treat and reassess—evaluate the response to initial treatment to help avoid basing decisions on client memory (lapses) and to get a better idea of the patient's true baseline.
- Leave atopic dermatitis for last. Unless the patient demonstrates purely seasonal pruritus, investigate infections, ectoparasitism, and food allergy first. Even patients with purely seasonal pruritus should be evaluated for the possible presence of seasonally influenced parasites, such as fleas and chiggers. TVP

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Cherie Pucheu-Haston

Dr. Pucheu-Haston is an associate professor of veterinary dermatology and immunology at Louisiana State University. She received her veterinary degree from LSU and completed residency training at North Carolina State University. After a brief hiatus in private practice dermatology, she returned to NCSU to pursue a PhD in immunology, followed by 3 years of postdoctoral study at the U.S. Environmental Protection Agency, Immunotoxicology Branch. Her clinical and research interests are cutaneous and respiratory allergic diseases in cats, dogs, and horses and the immunologic response to cutaneous fungal infections.