CHAPTER
13

Integument

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Fig 13.1a | Mustached parakeet with facial dermatitis resulting in feather loss and replacement. Pin feathers predominate in the affected area.


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Fig 13.1b | A burn from administrating scalding hot food. Microwaved food is often the source.

Skin and feather problems are common disorders in pet avian species (Fig 13.1a). The skin has limited responses to insults. A variety of causes will lead to similar clinical signs and possibly similar gross and histologic changes. The clinician's challenge is to use available diagnostic methods to determine an etiology and rational therapeutic approach.

Birds often present with feather loss or picking. The appearance of the skin may vary from grossly normal to severely inflamed and/or necrotic (Fig 13.1b). In assessing gross morphologic changes, the effect of self-trauma must be considered. Although the lesions may be due to a primary problem within the skin and/or feathers, a variety of internal disorders, as well as behavioral problems, can also result in external lesions.

History

Arriving at a meaningful diagnosis requires a logical process that considers the differential diagnostic possibilities. History is essential. A complete history should include information on the bird's environment, changes in routine and diet. (See Chapter 4, Nutritional Considerations and Chapter 6, Maximizing Information from the Physical Examination for more specific information).

A description of the physical surroundings of the bird is needed, including such things as temperature and humidity, which can influence normal molting and which may play a part in clinical disease syndromes. The conditions of other birds in the household/aviary should also be determined. References are available for feather anatomy review.[6]

Physical Examination

Refer to Chapter 6, Maximizing Information from the Physical Examination for the description of a complete physical examination. During the physical examination, specific dermatologic lesions should be examined and classified. Examination includes the distribution of lesions, presence or absence of pruritus, relative conditions of the skin and feathers and presence of plaques, ulcers and exudates. The association of individual lesions with specific conditions is not as well documented in birds as it is in domestic pets. Notation of these dermatologic abnormalities will aid in both the clinical description to accompany biopsy submissions and in tracking by the practitioner of the course of the disease. A simple anatomic illustration, such as is used in dog and cat medicine can be valuable in recording these lesions. See Chapter 6, Maximizing Information from the Physical Examination for an example of this stamp.

DIAGNOSTICS

Evaluation of systemic illness and organ function via a complete blood count (see Chapter 22, Diagnostic Value of Hematology) and serum biochemistries (see Chapter 23, Diagnostic Value of Biochemistry) should be performed. Specific tests for syndromes such as PBFD circovirus may be indicated (see Chapter 32, Implications of Viruses in Clinical Disorders). An evaluation for nutritional deficiency or toxicities should be made from the dietary history (see Chapters 4, Nutritional Considerations and Chapter 6, Maximizing Information from the Physical Examination).

Several diagnostic procedures are available in order to gain information about skin lesions (Tables 13.1, 13.2). Scrapings may reveal the presence of mites, but in some lesions the mites are deep within the subcutis and will be missed by superficial scraping. Impression smears can give an indication of inflammation vs. neoplasia. Bacteria and fungi are also seen in impression smears, but their significance may be difficult to determine. Feather pulp smears potentially provide information concerning inflammatory processes within the pulp. Care must be taken not to confuse melanin granules with bacteria. Melanin granules will be uniform with tapered ends and will not be stained, having a natural brown-black color.

Culture is important but must be done correctly or the significance of the isolate is questionable. If folliculitis is suspected, aspiration of the follicle by sterile needle and syringe is necessary.

Skin and feather biopsy is an important tool, but its effectiveness is compromised by the lack of clinical history and description in many submissions. The presence of an overwhelming microbial population can be diagnostic, although the sensitivity of the organism to various antimicrobials cannot be determined from histopathology. In the absence of a definitive etiologic agent, allergy, self-trauma or endocrinopathy may be suggested from the biopsy.

Pulling of feathers and submission for histopathology may lead to a diagnosis in some cases, but if the feathers are normal the possibility of primary skin disease cannot be ruled out.

Because skin disease can reflect internal disease, appropriate laboratory tests or radiographic examination may be indicated in cases where a thorough examination has ruled out primary disease of the skin or feathers. (See Chapter 15, Evaluating and Treating the Liver and Chapter 4, Nutritional Considerations).

Table 13.1 | Diagnostics for Avian Skin Lesions

- Skin scraping
- Gram's stain of superficial skin scrape
- Culture of skin scrape
- Gram's stain of follicle
- Culture of follicle
- CBC
- Biopsy of affected skin/feather follicles
- Serum biochemistries, including bile acids
- Consider radiographs
- Viral DNA test

Table 13.2 | Therapy Pending Diagnostic Results

Clinical Presentations	Therapy
Feather loss or skin abnormality with no self-trauma	• Dietary assessment and correction • Environmental assessment and correction • Preliminary therapy based on Gram's stain results, if applicable • Viral profiling with supportive care
Pruritus	• Topical therapy (see Chapter 9, Therapeutic Agents) • Systemic antipruritic/tricyclic antidepressant (eg, diphenhydramine, amitriptyline, see Chapter 9, Therapeutic Agents) • Dietary assessment and correction • Environmental assessment and correction • Preliminary therapy based on Gram's stain results, if applicable • Behavior consultation
Self-mutilation	• Barrier to mutilation (Elizabethan collar or modified extension collar) • Antibiotics for systemic infection • Topical antibiotic/antifungal (eg, 1% silver sulfadiazine cream[a]) • Preliminary therapy based on Gram's stain results, if applicable • Consider psychotropic medications (see Chapter 3, Concepts in Behavior and Chapter 9, Therapeutic Agents) • Behavior consultation

Congenital and Acquired Malformations

Occasional feather cysts are seen in all species. In some

Courtesy Exotic DVM

Fig 13.2 | Feather cyst containing concentrically laminated keratin that must be differentiated from caseous exudate.

canaries there is an apparent inherited predisposition that is associated with color. Neoplasia has recently been found in the formation of feather follicle cysts in canaries.

Grossly, feather cysts present as an oval or elongated swelling of the feather follicle with accumulation of yellow-white material (keratin) (Fig 13.2). The gross lesions must be differentiated from follicular infections. The causes of acquired feather cyst formation are usually not determined but can include infection, trauma or any condition that interferes with normal growth of the implicated feather.

Resection of a feather follicle cyst is indicated in the presence of self-trauma or recurrent infection. (See Chapter 35, Surgical Resolution of Soft Tissue Disorders for this procedure).

Congenital or developmental beak abnormalities are encountered with some frequency. Improper incubation or feeding techniques have been implicated but have not been documented as causative. The two most common presentations are mandibular prognathism and scissors beak. (See Chapter 14, Evaluating and Treating the Gastrointestinal System for correction of beak deformities).

Abnormalities of the beak or claws can be a reflection of abnormalities of the underlying bone. They can also result from trauma, infection or neoplasia interfering with growth of the germinal epithelium of the beak or claw keratin. The result can be asynchronous growth or incomplete keratinization. Vitamin deficiencies that cause problems in domestic poultry are not well documented in pet avian species. Hepatopathy has been linked to beak and nail deformities in psittacines, but whether this is a direct result of the hepatic insufficiency or a sequela to nutritional disease is not well documented.

See Chapter 6, Maximizing Information from the Physical Examination and Chapter 15, Evaluating and Treating the Liver for photos of feather, beak and nail deformities.

Infectious Diseases

PARASITIC

The primary parasitic skin disease is mite infestation. Several different types of mites are found affecting both feathered and unfeathered skin. Most of these parasites are present in the superficial portion of the skin, which is usually hyperkeratotic and acanthotic, leading to gross thickening, irregularity and flaking. Severe and/or chronic infestation of the cere can result in malformation of the beak (Fig 13.3a).

Mites are usually superficial and can be demonstrated by skin scraping. Some species of mite and some individual cases will require deep scrapings or biopsy to identify.

Knemidocoptes spp. is most prevalent in budgerigars and passerines. The presentation in budgerigars is usually a pronounced hyperkeratosis of the cere and adjacent tissue. Occasionally the vent and legs of budgerigars will be affected (Fig 13.3b). A fine pinhole appearance of affected tissue on the cere is typical with this mite infestation. Clinical disease seems to require some degree of immune compromise.

Passerines with *Knemidocoptes* spp. generally present with "tassel foot." This hyperkeratosis of the legs is often accompanied in chronic cases with a curling and overgrowth of the nails.

Ivermectin has been utilized topically, orally and via injection for the treatment of mites, including *Knemidocoptes* spp. (See Chapter 9, Therapeutic Agents). In budgerigars that are otherwise clinically healthy, the infestation commonly clears, although recurrence is possible. Passerines with *Knemidocoptes* spp. infestation often improve but may not clear with ivermectin therapy. This may be due to secondary staphylococcal or mycotic infections.

Lice are uncommon in well cared for pet birds. See Chapter 6, Maximizing Information from the Physical Examination for photos. Unless the infestation is severe, gross lesions are not seen. Treatment with ivermectin is generally effective, although pyrethrin and carbaryl powders are also used successfully.

MYCOTIC

Folliculitis due to dermatophytes appears to be less common in birds than its counterpart in mammals, based on biopsy material. When present, there may be gross swelling of follicles with variable hyperkeratosis and crust formation (Fig 13.4). A variable amount of necrotic debris may be seen.


Courtesy Exotic DVM

Fig 13.3a | Roughened, inflamed cere and face due to *Knemidocoptes* spp. mite infestation.


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Fig 13.3b | A close up view of a *Knemidocoptes* spp. mite infestation showing the characteristic pin-point tunnels in the skin that can be used to make the diagnosis.


Courtesy Exotic DVM

Fig 13.4 | Swelling of follicles in a bird with dermatomycosis.


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Fig 13.5 | Amazon with *Malassezia* spp. facial dermatitis.

Recent research indicates that *Malassezia* spp., *Aspergillus* spp. and other fungi may play a role in some cases of dermatitis or feather picking. Clinical reports of improvement in feather plucking following nebulization with antifungal agents for respiratory disease lend credence to this possibility. (M. Stanford, personal communication, August, 2001). Further research is needed to determine whether fungal infection or sensitivity to *Aspergillus* spp. may play a role in dermatitis and feather picking.

Malassezia spp. is occasionally found as an etiologic agent, generally documented on cytology or histopathology, for feather loss and dermatitis. Treatment is largely anecdotal and follows the sensitivities of this organism noted in other species. Oral fluconazole and topical clotrimazole or chlorhexidine spray have been used with good results. This may be an under-reported syndrome related to feather destructive behavior (Fig 13.5).

Saprophytic fungi have been noted to cause black discoloration of feathers in birds. The prevalence of this type of fungal growth is unknown but it seems most likely to occur in birds with marginal hygiene and/or health.

BACTERIAL

Two primary forms of bacterial skin disease are commonly seen. Folliculitis is often associated with *Staphylococcus* spp. Grossly there is swelling of the perifollicular skin with a variable amount of reddening. The lesion must be differentiated from mycotic folliculitis.

Generalized bacterial dermatitis (pyoderma) is usually intensely pruritic leading to self trauma that results in a more severe superficial lesion. Reddening, exudation and crust formation are associated with necrosis (Fig 13.6). The necrosis may extend through the epidermis into the dermis in severe cases. Bacteria, usually gram-positive cocci, may or may not be present in samples taken for microscopic examination.

Long-term antibiotic therapy is often needed in these cases. A positive culture and sensitivity will allow the selection of the appropriate antibiotic. A Gram's stain performed at the time of culture may improve interpretation of the culture results. In the absence of a positive culture, treatment may be selected based on the common sensitivities of the class of organisms identified in


Courtesy Exotic DVM

Fig 13.6 | Generalized bacterial dermatitis leading to necrosis, reddening and crust formation.


Courtesy Exotic DVM

Fig 13.7 | Localized periocular inflammation and minimal feather loss in a lovebird with circovirus infection.

the Gram's stain. Treatment failures are often the result of either continued self-trauma or insufficient length of antibiotic therapy.

A specialized form of bacterial dermatitis is severe chronic-active pododermatitis. (See Bumblefoot/Pododermatitis under Non-Infectious Diseases).

Focal granulomatous dermatitis due to mycobacterial infection is also seen. Clinically, the lesion presents as a lump or multiple lumps that histologically are comprised of large macrophages and a variable number of heterophils and plasma cells. Acid-fast bacteria are found in the macrophages.

VIRAL

Circovirus

Psittacine beak and feather disease virus (PBFDV) is one of several avian circoviruses. This virus is enzootic in many species of free-ranging Australian parrots and has also been found in free-ranging African parrots.

PBFDV in nestlings is acute in onset and generalized so that it affects all growing feathers. Acutely affected birds may die within 2 months of the onset of disease. The chronic form of disease is generally seen in older birds when these birds go through their first molt. Dystrophic feathers replace normal ones during the molt. Powder-down feathers may be the first affected in cockatoos (*Cacatua* spp.).

Currently, PBFDV in the United States is most commonly seen in lovebirds (*Agapornis* spp.), budgerigars, lories, lorikeets, *Eclectus* spp. and African grey parrots (*Psittacus erythacus*). Feather lesions in lovebirds are usually not as severe as in cockatoos and may be localized (Fig 13.7). Some lovebirds show no signs of disease.

One study was conducted on 32 peach-faced (rose-faced) lovebirds (*Apapornis roseicollis*) with skin and feather problems.[6] Birds with chronic ulcerative dermatitis (CUD), the feather-less syndrome (FLS) or polyfolliculitis (PF) were screened for avian polyomavirus (APV) and psittacine beak and feather disease (PBFD). Of the birds with CUD, greater than fifty percent were positive for APV, and approximately 20% were positive for PBFDV. Of the birds with FLS, 16% were positive for APV and 65% were PBFD positive. All birds with PF were negative for APV and PBFD. The history of all of these birds also indicated malnutrition (Harrison/Gerlach, personal communication).

A generalized feather disease is seen in African grey parrots infected with circovirus, but often the disease is confined to the tail feathers, or there may be no feather involvement at all. African grey parrots may show ectopic red feathers; however, this abnormal coloration may also be caused by nutritional factors.

Eclectus parrots do not show typical feather lesions of PBFDV, but affected birds may have a delayed molt and old, poor quality feathering. An older age of onset of clinical signs of circovirus has been noted in *Eclectus* spp.

Infection in cockatoos leads to deformed feathers, feather loss and variable skin lesions. Beak lesions are less common than feather changes but are a prominent feature of this disease in some species of *Cacatua*. Variable necrosis and loss of keratin can be seen. Secondary candidiasis of the beak is common in affected cockatoos (Fig 13.8).

Necrosis and annular constriction of the base of the feather shaft and hemorrhage in the feather pulp are noted. There may be severe shedding of affected feathers. Affected feathers are stunted and may have thickened, hyperkeratotic sheaths, pulp hemorrhage, annular


Courtesy Exotic DVM

Fig 13.8 | Severe feather loss and dystrophy as well as beak necrosis in a cockatoo with circovirus infection.

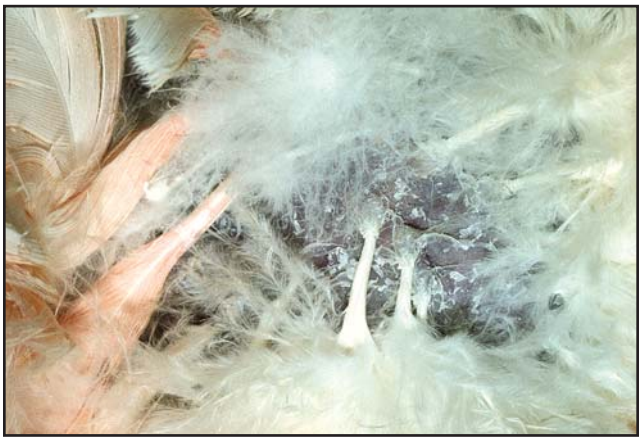
Courtesy Exotic DVM

Fig 13.9 | Detail of feathers from Fig 13.8.


Judith St. Leger

Fig 13.10 | Columbiforme circovirus.


Judith St. Leger

Fig 13.11 | Columbiforme circovirus.


Judith St. Leger

Fig 13.12 | Columbiforme circovirus.


Judith St. Leger

Fig 13.13 | Columbiforme circovirus.

constrictions of the calamus, curling or stress lines on the vanes (Fig 13.9). Discoloration of feathers may be the initial sign in some birds. As mentioned above, African grey parrots may develop red feathers, and yellow feathers have been seen to replace green feathers in other species of parrots.

Gross lesions of circovirus infection are usually not seen in non-psittacine birds; however, feather dystrophy similar to that seen in psittacines has been reported in pigeons, doves and finches (Figs 13.10-13.13).

Polyoma/Papilloma Virus

Papilloma virus can cause proliferative skin lesions that are multiple and may superficially resemble mite infestation (Fig 13.14). This has been confirmed in African grey parrots. The lesions are fronds of hyperplastic epithelial cells supported by a vascular stroma. Radiosurgery, electrocautery and cryosurgery have all been utilized to resect the papillomas and to attempt to stimulate an immune response.


Teresa Lightfoot

Fig 13.14 | Viral-induced papillomas on the face of an African grey parrot.

Polyomavirus was originally reported as a disease of budgerigars with feather loss. Primary feathers may appear abnormal. Polyomavirus infection is also seen in other psittacine species and grossly there may be dermal/follicular hemorrhage. See Chapter 32, Implications of Viruses in Clinical Disorders.

Poxvirus

This is an ubiquitous viral infection seen in all avian species. Fortunately the pox virus is relatively species-specific. Lesions are common on the head face and feet, but can also be present in other locations (Fig 13.15). The lesions are proliferative and may have rough or smooth surfaces depending on chronicity, self-trauma and the degree of secondary bacterial infection. In some cases much of the superficial portion of the lesion can be comprised of necrotic debris and crusts associated with bacterial or yeast infection, and care must be taken to ensure that any material removed for biopsy or cytology contains epidermal tissue (Fig 13.16). If no epidermis is present the correct diagnosis will probably not be made. Impression smears will contain epithelial cells with ballooning degeneration and cytoplasmic inclusion bodies (Fig 13.17).

The severity and location of lesions will dictate whether euthanasia is indicated or if treatment should be


Courtesy Exotic DVM

Fig 13.15 | Facial lesions due to poxvirus infection in a canary.


Courtesy Exotic DVM

Fig 13.16 | Typical poxvirus-induced lesions of the leg and toes in the canary from Fig 13.15.

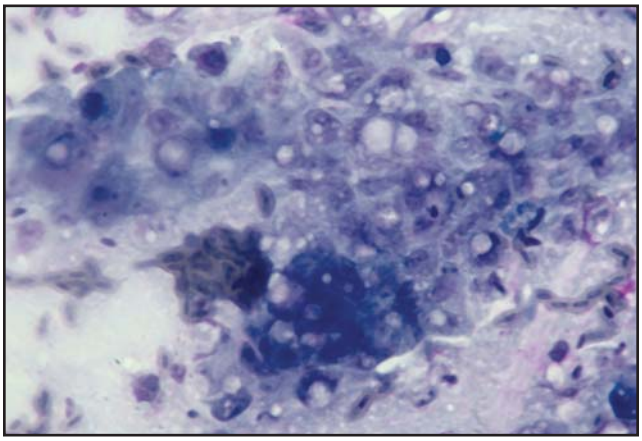
Courtesy Exotic DVM

Fig 13.17 | Impression smear of proliferative epidermis in poxvirus infection. Note ballooning degeneration and cytoplasmic inclusion bodies.


Courtesy Exotic DVM

Fig 13.18 | Depigmented, proliferative lesion (arrow) associated with cytomegalic herpesvirus infection of the skin of a blue and gold macaw.

Courtesy Exotic DVM

Fig 13.19 | Color change in feathers secondary to nutritional problems, possibly a carotene deficiency.

Courtesy Exotic DVM

Fig 13.20 | Stress bars in growing feathers. This is a nonspecific change that can be associated with a variety of insults during feather formation.

attempted. Despite supportive care, permanent deformity of eyelid margins and other facial tissue is common.

Herpesvirus

In cases of systemic herpes infection there is occasionally involvement of the epidermis of the skin or feather leading to necrosis and inclusion body formation. Since the generalized disease is usually catastrophic, little attention is paid to what may be grossly minimal skin lesions. In some psittacines, particularly macaws and cockatoos, proliferative lesions of the lower legs and feet have been described due to a herpes virus infection. Solitary or multiple proliferative nodules or plaques are more common in *Cacatua* spp., while depigmentation is more often encountered in macaws (Fig 13.18). The presence of these lesions in susceptible species should lead to herpes virus infection being included in the differential diagnosis.

Non-Infectious Disease

NUTRITIONAL/METABOLIC

A number of specific and non-specific nutritional problems can result in poor feather quality and skin disease. This may be the most common cause of primary feather abnormalities. See Chapter 6, Maximizing Information from the Physical Examination.

Depigmentation or altered pigmentation, improper molting and poor quality feathers can be seen (Figs 13.19, 13.20) (see Chapter 4, Nutritional Considerations). Gross changes are rarely specific. These lesions are not inflammatory, but poor nutrition can predispose the bird to skin infections and subsequent inflammation.

Metabolic disease could also result from failure of proper nutrient metabolism even though nutrition is adequate. Gastro-intestinal, hepatic and pancreatic diseases are potential underlying causes. The diagnostic approach to chronic non-inflammatory skin disease should include examination and laboratory testing to rule out disease processes in internal organs.

PHYSICAL/ENVIRONMENTAL AGENTS

Trauma, burns, excessive cold and other physical factors often cause skin lesions, and although the cause may be obvious, histories are occasionally not obtained (Tables 13.3-13.5). Gross changes include loss of feathers, varying degrees of hemorrhage, necrosis, and superficial crust formation. Severe necrosis and sloughing of epidermis and possibly portions of dermis can be seen in injuries due to both heat and cold. Discoloration of the lesions is variable. Traumatic injuries are characterized by variable amounts of hemorrhage, edema and inflammation, depending on severity of the insult and time elapsed prior to examination (Figs 13.21, 13.22).

Beak trauma is a common presentation in psittacines. Injury from a bite from another bird is the most frequent cause. Damage from cage wires or cage equipment is also common.

Treatment and prognosis depend entirely on the severity of the injury. If proper beak occlusion is maintained, then treatment can be limited to prevention of infection. Topical and systemic antibiotics are warranted if the injury sustained is extensive or deep.

A hemostatic matrix such as Surgicell®[d] can be used to both stop bleeding and to provide a slow release of antibiotic. Antibiotics that are used in polymethyl methacrylate applications should provide a selection that is not tissue toxic and has good bioavailability (see

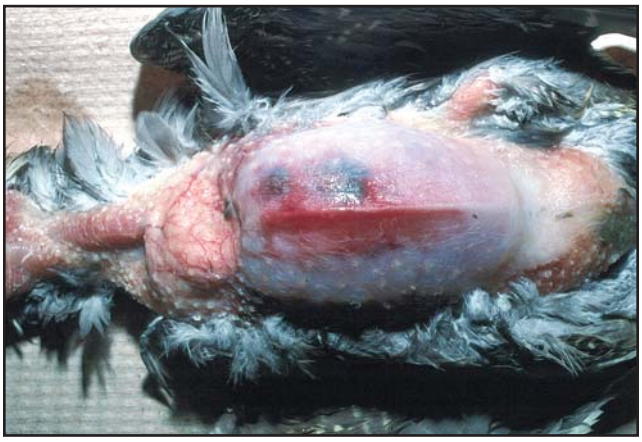
Courtesy Exotic DVM

Fig 13.21 | Subcutaneous hemorrhage secondary to trauma.


Courtesy Exotic DVM

Fig 13.22 | Severe edema of the subcutis following trauma.

Table 13.3 | Thermal Burn Treatment Protocol

- Stabilization of patient first:
  1. Fluids, electrolytes
  2. Treat for potential septicemia/endotoxemia
- Topical treatment if weight bearing surfaces affected (ie, plantar surfaces of feet)
- Bandaging if potential exists for self-mutilation of affected area

Table 13.4 | Treatment of Band Injuries
(Figs 13.23-13.25)

- Removal of band with minimal additional tissue damage (ie, Veterinary Specialty Products band cutters)[b]
- Assessment of distal foot for viability.
- Hydroscopic dressing to preserve tissue, vascularity and innervation (ie, Biodres®)[c]
- Antibiotics as indicated for prevention of infection; both topical and systemic
- Prevention of self trauma and frequent reassessment for continued viability and absence of infection.

Table 13.5 | Broken Blood Feather Treatment

- Keep quiet and confined to allow blood pressure to lower and bleeding to stop.
- Apply a styptic powder to the broken feather area or twist off and apply to the tip.
- If occurs in the hospital, observing the bird for a few hours after powdering is often indicated to prevent excitation and subsequent bleeding in transport.
- When danger of hemorrhage is no longer present, assess feather damage.
- May trim end of feather to decrease movement or pain.
- Pulling of affected feather may result in follicular damage and abnormal growth of subsequent feather.
- Imping may be indicated for cases of chronic/repeat trauma.
- Long-term treatment for recurrent blood feather trauma,
  1. Wing trim should be redesigned (see Chapter 1, Clinical Practice).
  2. Nutrition should be assessed (see Chapter 4, Nutritional Considerations).

Chapter 9, Therapeutic Agents).

More extensive trauma that either involves the occlusal surfaces or the growth plates of the beak warrants a guarded prognosis (see Chapter 14, Evaluating and Treating the Gastrointestinal System). Attention must be paid to adequate supportive care including analgesia, and maintenance of fluid and caloric intake.

BUMBLEFOOT/PODODERMATITIS: DECUBITAL SORES

Plantar decubital ulceration is common in older, obese and nutritionally deficient psittacines. See photos and classification of fat deposition in Chapter 6, Maximizing Information from the Physical Examination. Amazons, budgerigars and cockatiels are over-represented in the current population. Vitamin A deficiency weakens the epithelium of affected birds (see Chapter 4, Nutritional Considerations). Obesity and inactivity produce excessive pressure on plantar surfaces. Subsequent erosions and then ulcers occur. Localized staphylococcal infection is a common sequela (Fig 13.26).

Presentation may be subclinical and encountered on a routine annual examination. Correction of the underlying predisposing factors will often reverse this disease process. Perches must be altered in diameter and texture. The application of Vetrap®[e] or a similar product to the perch provides both padding and change in diameter when the material is wrapped at varying intervals and thicknesses. Diet should be corrected to decrease caloric intake and increase general nutritional balance, with emphasis on replacement of Vitamin A precursors (see Chapter 4, Nutritional Considerations).

More advanced cases of decubital ulceration require additional therapy. Systemic infection may be involved, and a complete blood count should be performed. Bandaging of the feet with the application of topical


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Fig 13.23 | Leg band injury. Aluminum breeder band is embedded in skin and underlying tissue.


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Fig 13.24 | Leg band injury. Removal with the appropriate equipment is necessary to prevent fracturing the leg. In this case, band cutters by Veterinary Specialty Products, Boca Raton, FL, USA, were used.

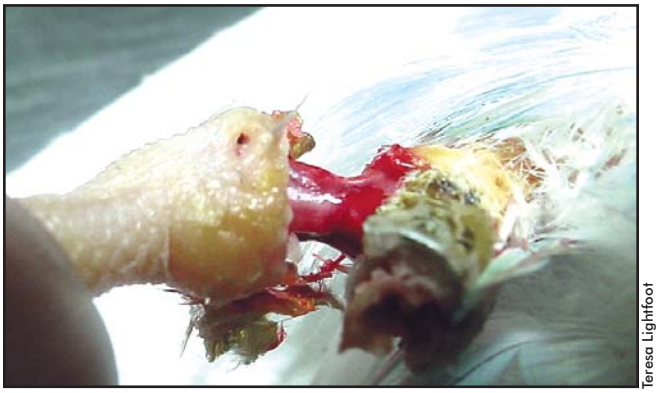
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Fig 13.25 | Leg band injury. Although minimal viable tissue remains beneath the removed band, the innervation and circulation to the foot are still intact. Frequent bandage changes allowed this area to granulate and amputation was avoided. However, many band injuries of this severity will require amputation and the owners should be so forewarned.


Courtesy Exotic DVM

Fig 13.26 | Bacterial pododermatitis. This lesion usually develops following pressure necrosis with a subsequent bacterial infection.

antibiotic and sufficient padding to reduce and better distribute pressure on the plantar surfaces is required in many cases. Pain relief in the form of NSAIDs (nonsteroidal antiinflamatory drugs) or synthetic opioids may be needed (Table 13.6) (see Chapter 9, Therapeutic Agents). Debridement should be approached cautiously, since significant bleeding can occur from the decubitus.

Table 13.6 | Treatment of Decubital Sores (Bumblefoot)

- Topical antimicrobials
- Hydrophilic dressings
- Padded foot bandages
- Anti-inflammatory/analgesics (ie, butorphanol/meloxicam)
- Systemic antibiotics when indicated
- Consider use of antibiotic impregnated matrix
- Debridement and suturing of more extensive lesions
- Long-term treatment requires owner compliance
  1. Alter/pad perches
  2. Exercise
  3. Assess and alter diet with particular attention to correcting obesity and providing adequate Vitamin A precursors

(See Chapter 34, Surgical Resolution of Orthopedic Disorders and Chapter 4, Nutritional Considerations).

When osteomyelitis is involved, the prognosis for recovery decreases dramatically. If systemic infection and pain can be controlled, therapy can be approached as above. The owner must be forewarned that the therapy will be of long duration and the prognosis is guarded. Ethical considerations arise when the degree of affectation is such that the bird can not stand without severe pain.

Endocrinopathies

Endocrine disorders can lead to generalized feather loss and abnormal feathering. There is usually no specific pattern or features that grossly indicate endocrine disor-

Courtesy Exotic DVM

Fig 13.27 | Excessive fat deposits in the skin of a bird with hypothyroidism.

ders. To confirm a diagnosis of endocrine related skin disease, appropriate clinical laboratory testing is necessary. Confirmation can also result from finding appropriate endocrine gland lesions at necropsy (Fig 13.27). Although currently Thyroid Stimulating Hormone (TSH) for avian thyroid stimulation assays is not commercially available, research has shown that a 2 to 4 fold increase in circulating T_4 is a normal response in birds to administration of TSH. Interpretation of a baseline T_4 level has limitations as it does in domestic pet medicine, but may be useful diagnostically (see Chapter 19, Endocrine Considerations).

HYPERSENSITIVITY

Allergic skin disease in birds is occasionally reported, but is not well documented, and confirmation can be difficult. Gross changes include feather loss (often self-induced), reddening and occasionally, surface exudates. Some of the gross lesions may be secondary to self trauma.

Periocular and occasionally periaural pruritic, hyperkeratotic lesions are observed seasonally in outdoor birds in the southeastern US. When a biopsy is performed and these birds are housed indoors pending receipt of histopathology results, the lesion generally clears. Both pollen and insect sensitivity have been theorized.

Definitive diagnosis of allergic skin disease is difficult. Food elimination has lead to improvement in some cases (see Chapter 4, Nutritional Considerations: Section II, Nutritional Disorders) and successful treatment with anti-inflammatory drugs is presumptive evidence of allergy. The greatly diminished response of the avian patient to histamine administration has hindered the development of avian skin testing methods. Recent research has established positive and negative controls and preliminary standards for this testing.[8] Diagnostic skin testing for avian patients may be of great benefit in separating this category of disease from other conditions.

According to Patricia MacWhirter, DVM (personal communication, December 2003) an early researcher into avian intradermal testing: "Intradermal skin testing can be carried out in birds using the apteria on either side of the sternum. A statistically significant difference has been found in the occurrence of positive intradermal skin test reactions to Aspergillus, sunflower, house dust mites (*D. pteronyssinus* and *D. farinae*) and/or maize (corn) in a variety of psittacine species showing evidence of feather plucking, feather chewing or self injurious behavior compared with normal birds. This suggests that allergy may play a role in the occurrence of these syndromes. However, response to treatment by attempted avoidance of the suspected allergen(s) or the use of vaccines has to date often not been successful. Skin testing can be problematic to carry out because of the need for fresh allergens and accurate injection, the small area of bare skin available and difficulties in getting consistent results with positive controls. While promising, the technique is probably best suited to specialist dermatology practices and more research is needed before it can be routinely recommended." See Chapter 4, Nutritional Considerations.

Chronic Internal Disease

In many cases of chronic internal disease, including infectious, degenerative and neoplastic conditions, there is poor feather quality and loss of feathers.

NEOPLASIA

(See Chapter 20, Overview of Tumors).

Epithelial

Epithelial tumors originate in the surface epithelium, follicular epithelium or the uropygial glands. The uropygial gland may become abscessed as a result of occlusion of the papilla. This condition is treated much like an anal sac abscess in a dog, with debridement, reestablishment of patency of the duct and antibiotics as indicated. In some cases, neoplasia of the gland may underlie the infected state. Uropygial gland tumors can be either adenomas or carcinomas, and gross differentiation is difficult. Both will present as swellings that may be secondarily inflamed in some cases. Adenomas are usually well circumscribed and encapsulated with carcinomas being less differentiated and more infiltrative into surrounding tissue. See Chapter 35, Surgical Resolution of Soft Tissue Disorders for surgical considerations.


Courtesy Exotic DVM

Fig 13.28 | Aggressive squamous cell carcinoma with loss of normal skin and severe secondary inflammation.

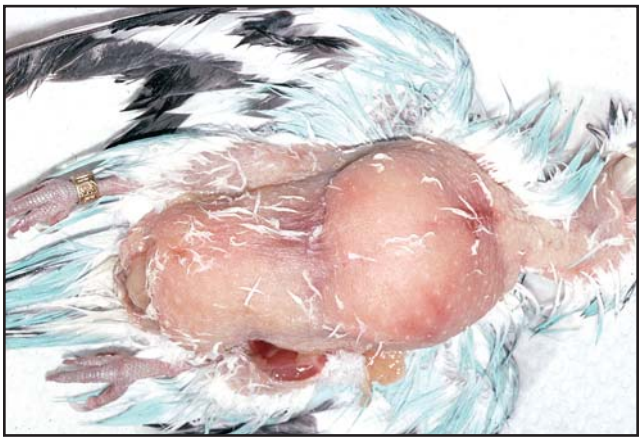
Courtesy Exotic DVM

Fig 13.29 | Large mass typical of subcutaneous lipoma.

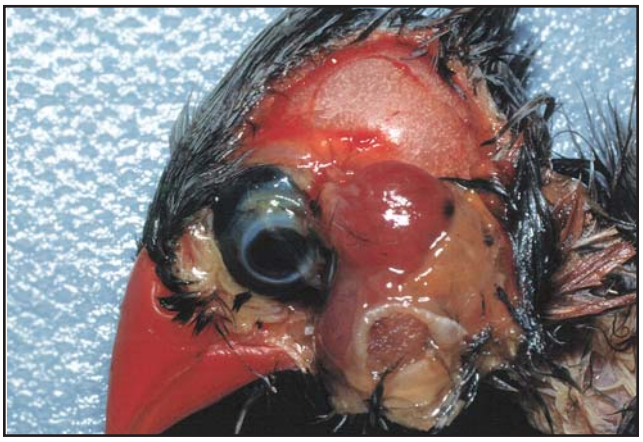
Courtesy Exotic DVM

Fig 13.30 | Circumscribed red mass consistent with hemangioma.


Courtesy Exotic DVM

Fig 13.31 | Deeply located fibrosarcoma replacing soft tissue and bone.

Papillomas of the skin are not common and may be virally induced in African grey parrots (see previous discussion).

Squamous cell carcinomas are often ulcerated and hemorrhagic as well as infiltrative (Fig 13.28). They may involve any portion of the skin and no particular site predilection has been identified. In some cases there is no obvious ulceration or inflammation in the early stages. Metastasis is not common, but occurs, particularly in chronic cases. This neoplasia often appears grossly as a delayed or non-healing cutaneous infection, and diagnosis is therefore often delayed.

Basal cell tumors often originate in feather cysts, and although expansile, are usually benign.

Mesenchymal tumors include those of vascular, fibrous, adipose and connective tissue origin. These tumors originate in the dermis or subcutis but may expand to involve the epidermis with secondary ulceration. Gross differentiation can be difficult with malignant tumors. Lipomas are common and have the gross appearance of a mass of normal fat (Fig 13.29). Hemangiomas are often dark red and hemorrhagic. They must be differentiated from melanomas (Fig 13.30).

Fibromas and fibrosarcomas may both be seen but the later are more common. They present as nodular masses that may be ulcerative and infiltrative into deep tissues (Fig 13.31).

Dermal lymphosarcoma may present as a diffuse thickening of the skin with loss of feathers. This condition can be misdiagnosed as chronic resistant inflammation unless biopsied.

Melanocytic Tumors

Melanoma has been diagnosed in several psittacine birds. The tumor is not common and is usually malignant. These tumors often occur on the face and may involve the beak. They are brown-black, raised masses with poorly defined margins (Fig 13.32).

Mast cell tumors have only been reported in chickens and owls.

Granular cell tumors are infrequent in birds, and are seen primarily in psittacine birds, particularly Amazon


Courtesy Exotic DVM

Fig 13.32 | *Eclectus* spp. female with malignant melanoma of the face and cere.


Courtesy Exotic DVM

Fig 13.33 | Xanthoma that has replaced much of the wing. This is a common location for the condition.


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Fig 13.34 | Seven year old male Eclectus with xanthoma. This bird had been feather picking for 5 years. Hormonal manipulation and psychotropic drugs had temporarily decreased his plucking, but were not curative. When the xanthoma developed, dietary change to an organic formula resulted in resolution of the xanthoma and decreased feather destructive behavior.


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Fig 13.35 | Same Eclectus after 9 months of dietary correction, with no additional therapy.

parrots. They are small smooth nodules. (See Chapter 20, Overview of Tumors).

Non-neoplastic Proliferative Lesions

Xanthomatosis is a condition of uncertain etiology. Xanthomas are seen most commonly in cockatiels and budgerigars and usually are present on the wing as a variable-sized, yellow mass (Fig 13.33). Alternate common presentation sites include the sterno-pubic area and the keel. Surgical resection may be necessary in advanced cases and in those where the affected area is traumatized. In some species and some cases, nutritional therapy has been reported as successful. Feeding a balanced diet with increased Vitamin A precursors is the predominant dietary change initiated in the therapy of affected birds (Figs 13.34, 13.35).

Feather Destructive Behavior

Various degrees of feather destructive behavior, from over-preening to feather plucking and self-mutilation, are commonly encountered in avian practice. Based on skin biopsies, many of these cases have an underlying lesion that would account for pruritus and self-trauma. In some birds there is no evidence of skin or systemic disease or condition and these cases are considered behavioral problems after other causes have been ruled out. Since self-trauma can lead to lesions, histologic changes must be carefully assessed before a diagnosis of behavioral feather picking is made. In addition to complete physical and laboratory examination, history is very important for a proper diagnosis of this condition. (See Chapter 3, Concepts in Behavior and Chapter 4, Nutritional Considerations).

Skin Conditions

Several syndromes with no identified etiologies are commonly recognized by practitioners. These include chronic ulcerative dermatitis, Quaker (Monk) parakeet (*Myiopsitta monachus*) mutilation, and Amazon foot necrosis.

CHRONIC ULCERATIVE DERMATITIS

Chronic ulcerative dermatitis (CUD) is commonly reported in lovebirds and presents as self-trauma. The affected area is usually the patagium or neck and back. A linear lesion is generally encountered, and the bird often presents with either a chronic scarified area or with an acutely lacerated and hemorrhagic wound. As discussed under viruses, recent research on a small population indicates that polyoma virus, circovirus or both may be involved in this syndrome.[6] The finding of a viral etiology in some cases of chronic ulcerative dermatitis in lovebirds would be consistent with reports of flock outbreaks of this condition. Other cases seem to occur in isolated individuals. Antibiotics are often clinically useful in controlling what is likely a secondary bacterial infection. Elizabethan collaring may be necessary to prevent self-mutilation and blood loss. Even when the primary lesion is healed, scar tissue often restricts movement and recurrence of self-mutilation is the rule. Some practitioners have associated Omega-3 fatty acid supplementation with clinical improvement. Use of psychotropic drugs and/or antihistamines has been reported with equivocal results.

QUAKER MUTILATION SYNDROME

A syndrome in Quaker (Monk) parakeets has been noted for many years in which sudden and aggressive self-mutilation is encountered (Table 13.7). Feather destructive behavior does not seem to be a precursor to this syndrome. The mutilation is often directed at the neck and chest area. Self trauma can include fatal damage to the crop and the jugular vein. With no etiology yet determined, treatment is limited to providing a mechanical barrier to the self-trauma and supportive care. Due to the severity and chronicity of this syndrome, euthanasia is often elected. Increased submissions for pathology may identify an etiology. Theories of potential etiologies and/or associated conditions include: viral, obesity, hepatic lipidosis, pancreatic insufficiency and lipemia (M. Rae, personal communication, 2002).

AMAZON FOOT NECROSIS

Amazon foot necrosis has historically been more prevalent on the west coast of the USA than in other areas.

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Fig 13.36 | Bandaging for Amazon foot necrosis. Topical antimicrobial agents and hydrophilic bandage material may aid in healing. Bandaging both feet, even if only one is affected, tends to divert the patient's attention and prevent removal of the bandaging.

Table 13.7 | Treatment Protocol for Quaker Mutilation Syndrome

- E. collar often necessary to prevent severe/fatal self-mutilation.
- Be aware that self-mutilation may be displaced to an accessible body part.
- Diazepam or other anti-anxiety/anti-psychotic drug
- Antibiotic for secondary infection.
- Wound dressing as needed.
- Owners should be informed of guarded prognosis.

The potential for a contact dermatitis would suggest that prior to handling these birds the owners wash their hands to rid them of residual nicotine, hand lotions, etc. Inhalant hypersensitivity has been theorized. Nutritional deficiencies or toxicities and hormonal influences have also been suggested. A recurrence and seasonality is commonly reported (Fig 13.36).

POLYFOLLICULITIS

Follicular malformations and dystrophy are occasionally seen. The most recognized has been called "polyfolliculitis." This is a misnomer as in many cases there is no inflammation. The condition is seen in budgerigars, cockatiels and lovebirds and presents as multiple feather shafts from a single follicle. Feathers are thick and short and may have retained sheaths. Grossly they present as fluctuant subcutaneous swellings that contain slightly viscid fluid.

Calcinosis circumscripta is an unusual condition in birds. It presents as nodular lesions that may have a white, chalky appearance grossly.

OTHER SKIN CONDITIONS

Occasionally severe inflammation is seen associated with collagen necrosis. A severe granulocytic response is present, and many of these cells may be eosinophils, however they are difficult to distinguish from heterophils

histologically. The lesion is similar to idiopathic collagenolytic inflammation seen in several mammalian species.

Autoimmune skin disease has not been documented in birds, but several cases with intraepidermal pustule formation and acantholysis have been seen. Unfortunately these few cases were lost to follow-up.

In many skin diagnoses there are inflammatory lesions whose exact etiology cannot be determined. Based on the pattern and type of inflammation a tentative diagnosis may be made, but until many more cases with complete histories and follow-up information become available, many lesions will have obscure origins.

Products Mentioned in Text

a. Silvadene, Marion Labs, Inc., Kansas City MO
b. Veterinary Specialty Products Bandcutter, PO Box 812005, Boca Raton, FL, USA, 33481, 1-800-362-8138, www.vet-products.com
c. BioDres, DVM Pharmaceuticals, Miami, FL, USA, www.dvmpharmaceuticals.com/about_dvm.html
d. Surgicell®, Johnson & Johnson's, www.jnjgateway.com
e. Vetrap - 3M Animal Care Products, St. Paul, MN, USA, www.3m.com

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