The purpose of the relationship between an avian veterinarian and the client is to ensure a long, comfortable, disease-free life for the companion bird. Clinicians must thoughtfully combine information from the anamnesis, physical examination and minimum database to advise clients on how to prevent medical problems in a companion bird.

In the practice of avian medicine there is a decisive difference between the diagnosis and treatment of obvious problems and the ability to detect, identify and correct subtle abnormalities. By carefully and systematically evaluating the patient and its environment, subtle abnormalities become increasingly obvious. Avian species attempt to hide signs of disease as a survival adaptation. Individuals that appear sick or injured are easy prey for predators and may also be segregated or attacked by the flock. Birds are less capable of successfully hiding signs of disease from clinicians that have become skilled and acute in their observations.

An incomplete understanding of the physical, nutritional, physiologic and psychologic needs of birds frequently leads to long-term, inadequate care. It is these predisposing factors that must be corrected in order to restore and maintain the health of an avian patient. Because of management faults, finding “normal” birds during a physical examination is, unfortunately, rare.

Establishing these predisposing factors requires identifying a common pathogenesis for the abnormalities noted on physical examination. It is when the interconnection between the clinical signs of disease is determined that the true cause of a problem can be clearly defined and corrected. Feather abnormalities and a respiratory disease may have a common etiology that includes a systemic fungal infection, poor nutrition, inadequate exposure to sunlight or frequent exposure to cigarette smoke.

Clients should be instructed to evaluate the movement, body posture, head position, behavior, appetite, attitude, ocular clarity and excrement output of their birds on a daily basis. This will help identify abnormalities before a disease process progresses to an irreversible point. Advanced stages of disease that a client may recognize include drowsiness, increases or decreases in food or water consumption, changes
in the color or consistency of feces, urine or urates, coarse, ruffled or moist feathers, picking or scratching, or changes in body posture, wing position or talking and singing abilities. Clients that are taught to observe a bird’s fecal output (not food consumption) can be instructed to seek immediate medical assistance when changes are noted.

To help identify management and disease-related problems early, it is advisable to perform a complete physical examination on a new patient twice in the first year, and annually thereafter. The initial evaluation periods will provide the clinician with an opportunity to identify and correct problems before they can cause irreparable organ damage. A well designed preventive medicine program will improve the quality of a companion bird’s life, save the client money and help maintain a positive attitude in the clinical staff.

Anamnesis

Clinically evaluating an avian patient involves combining information collected from the history, physical examination and minimum database. A thorough history frequently provides obscure clues that may identify risk factors important in diagnosing and resolving a patient’s problems. Early identification and correction of subtle abnormalities caused by environmental stresses (e.g., exposure to cigarette smoke, kerosene heaters, chemical fumes, disinfectants), management flaws (poor hygiene) or nutritional inadequacies (e.g., all-seed diet, excess vitamin supplementation) are clinically more rewarding than attempting to stabilize a chronically compromised patient with an acute, life-threatening metabolic crisis (Figure 8.1).

Developing the Anamnesis

When and where was the bird obtained? Birds obtained from traveling dealers are frequently exposed to infectious diseases and may be illegal imports that have not been through a USDA quarantine system. Many high-quality pet retailers are specializing in domestically raised hand-fed chicks, which generally have fewer medical problems and make much better companions than their wild-caught conspecifics (see Chapter 30).

Specific Questions for Developing the Anamnesis

- What is the duration of observed problems?
- Are there other pets?
- What exposure does the bird have to other birds?
- Are other pets ill?
- Are family members ill?
- Has the bird had other medical problems?
- Has the bird received any medications?
- When was the bird first introduced to the home?
- Where was the bird obtained?
- Did the bird come with a health guarantee?
- Where is the bird kept in the home?
- What substrate is used in the enclosure?
- Is the home heater electric or gas?
- What temperature is the home?
- What houseplants does the bird have access to?
- Is the bird frequently exposed to fresh air and sunlight?
- Is the photoperiod natural and regulated, or random and irregular?
- Are exterminators used?
- Is the bird exposed to cigarette smoke?
- What potential aerosols is the bird exposed to (household chemicals, disinfectants, hair sprays)?
- What disinfectants are used in the enclosure and how often?
- Have any changes recently occurred in the home (new enclosure, different diet, painted house, changed carpet, moved to a new location, new pet or strange people in the house, moved bird to a new location in the house)?
- What types of foods are offered?
- What types of foods are consumed?
- What feeding schedule is used?
- Are any dietary supplements used?
- Is the appetite increased or decreased?
- Have the droppings changed in color, frequency, consistency or quantity?
- Has the water intake changed?
- Any coughing, sneezing, diarrhea or vomiting?
- Have noted changes remained the same or progressed?

How long has the bird been in the household? Recently obtained birds (within the last year) are more likely to be suffering from problems associated with infectious disease or stress, while long-term pets are more likely to have problems with malnutrition or chronic systemic diseases.

Have any new birds recently been added to the household or aviary? New birds can invariably be a source for previously unencountered pathogens. A bird obtained from a breeder whose flock is closed to new birds and is constantly being monitored for subclinical problems (e.g., PBFD virus, polyomavirus and...
chlamydia), is less likely to have an infectious disease than a bird obtained from a source that mixes birds from different locations (eg, substandard pet retailers, brokers, bird shows, quarantine stations). The recent addition of birds that are frequent carriers of infectious diseases should also be noted. Contact with free-ranging birds can also expose companion birds to some infectious agents.

Has there been a change in food or water consumption? Subtle increases or decreases in food or water consumption can be signs of disease. It is important to distinguish between the food offered to a bird and the food consumed by a bird. An adequate diet may be offered, but an inadequate diet may be consumed. A bird on a seed-based diet (even with supplements) may develop progressive malnutrition that will become increasingly evident over several months to years depending on the bird's age. Young birds are more susceptible to malnutrition and will develop acute signs of disease, while mature birds are more likely to suffer from chronic malnutrition. Many domestically raised neonates are being weaned onto good quality, formulated diets and a variety of nutritional foodstuffs. Unfortunately, many of these birds will be switched by the new owners to a seed-based diet, which induces obvious clinical signs of malnutrition over several years.

Are other pets or family members ill? If other pets or family members are ill, the clinician should consider a common etiologic agent (infectious disease or exposure to an environmental toxin). A client should always be advised to seek medical attention if any family members are ill. It should be noted that companion birds may learn to mimic the sneeze or cough of a family member, which should not be interpreted as an abnormality.

Is the bird restricted to an indoor environment? Frequent exposure to fresh air and sunlight is important for a bird's overall health. Medical problems are more common in birds that are restricted to indoor environments. Drafts have no effect on healthy birds that are acclimated to normal temperature fluctuations.

Is the bird exposed to toxic compounds, particularly aerosols? Determining if the indoor environment is contaminated with toxins can help with an immediate diagnosis and guide suggested changes to prevent future problems. Birds have an efficient respiratory system, and brief exposures to toxins can be life-threatening. Commonly encountered, but infrequently discussed, toxins that could have a dramatic effect on the health of a bird include cigarette smoke, fumes from disinfectants (eg, Clorox, ammonia, Lysol), furniture polish, floor wax, paint, hair spray, dry cleaning fluid and carpet and furniture cleaners (see Chapter 37).

Have any medications already been administered? Discussion of a bird's previous medical problems, and how they were diagnosed and treated, may provide important information to the clinician. With referral cases, all available records should be carefully reviewed. Some breeders and pet retailers recommend the use of over-the-counter (OTC) medications (usually tetracyclines or erythromycin) for the treatment of sick birds. These OTC preparations usually have little or no therapeutic value and further complicate the disease picture by weakening the immune system and encouraging the proliferation of secondary bacterial or fungal pathogens. Knowing which antibiotics have been administered will influence the interpretation of results obtained from cytology, culture and sensitivity.

Have there been changes in a bird's behavior? Changes in behavior that should be noted include excessive sleeping, resting in a fluffed condition and a decrease in talking, singing or playing. Scratching and excessive preening may indicate a local or systemic abnormality. Personality changes, including increased aggression, screaming, intolerance of strangers or biting the enclosure or toys also may indicate problems.

What is the bird's reproductive status? Seeking seclusion (eg, hiding under furniture, in drawers,
behind book cases, under papers) tearing up paper, a crouched copulatory stance and masturbatory actions with certain family members, toys, mirrors, other animals or inanimate objects are suggestive of breeding behavior. Reproductively active Amazon parrots may fan the wings and lean forward with the iris dilating and contracting, while making a low “purring” type sound. Reproductively active cockatoos, especially Umbrella Cockatoos, may pant rapidly while being stroked. Some birds, especially the larger macaws, may incubate balls or other round objects and will defend stuffed toys as if they were chicks. Single cockatiel hens can lay 20 to 40 eggs a year for several years then gradually reduce, and finally stop egg laying. These birds may continue to go through the behavioral motions of egg laying and develop egg-related peritonitis (eg, depression, anorexia, swollen abdomen) weeks to months after ceasing oviposition.

**Physical Examination**

The physical examination can be viewed as a three-part process: observing a bird’s response to its environment, examining the bird’s environment and systematically examining the patient.

A mental picture of a free-ranging bird (slick, solidly colored feathers; clear, dry skin; bright inquisitive attitude) should serve as a comparative model for evaluating the condition of avian patients (Color 8.1). By carefully performing the same thorough physical examination on each patient, the practitioner can develop an image for the average and a perspective of what should be considered clinically normal. The quest of the physical examination should be to proclaim that a patient is clinically normal, a condition that rarely exists (Color 8.2).

**Evaluating the Bird in its Environment**

Birds that are stressed will frequently alter their behavior in an attempt to hide signs of disease. This is particularly true while a patient is in the examination room, and it is a challenge for the clinician to distinguish between stress-related behavior, normal behavior and a disease process. A bird that the client describes as listless at home may appear bright, alert and responsive when subjected to the stress of the hospital environment. To overcome this problem, the examination room should be free of extraneous noises and interruptions, and a bird should be acclimated to the examination room for five to ten minutes before beginning the evaluation process.

The general appearance, attitude, posture and activity level of the bird should be determined while it remains securely within its enclosure. Birds being observed at a distance are more likely to feel unthreatened and exhibit changes associated with lethargy and depression (Color 8.7). In an aviary setting, birds can best be initially viewed from a distance with the aid of binoculars.

Observational clues that a patient is seriously ill include ruffling of feathers, partially closed eyes, frequent blinking, tucking the head under a wing, labored breathing, sitting on the bottom of the enclosure, a hunched stance, straining to empty the cloaca, cloacal winking and loss of balance (Color 8.15). Birds that are stressed may shiver, causing a rapid movement of the body feathers. A bird that is depressed and lethargic will respond poorly to external stimuli when disturbed and then return to a calm, detached state (Color 8.6).

Abnormalities in body function may include lameness, wing droop, standing on one leg, shifting weight from one leg to another, resting on the sternum or standing on the metatarsus rather than the foot. A bird’s wings should be held tightly to the body with the carpi symmetrical. A bird that is hot or excited may hold the wings out from the body, yet still in a symmetrical position. One drooping wing is an indication of an abnormality (eg, fracture, arthritis, tendon or ligament damage, nerve damage, bruising, mass) (see Figure 28.8).

Normal respiratory effort in the bird should not be noticeable, and the mouth should remain closed. Open-mouthed breathing is an indication of severe dyspnea. Resting respiratory rates vary from 6 to over 30 cycles per minute, depending on the size of the bird (Table 8.1). Small birds have higher respiratory rates; large birds have lower respiratory rates. Some avian species (notably Amazon parrots and *Pionus* spp.) may pant when stressed. This normal physiologic response should not be misinterpreted as disease-induced dyspnea.

Respiratory disease is common in birds, and subtle signs are best detected while the bird is in its enclosure. Excessive chest movement, excessive tail motion when breathing (tail-bobbing), open-mouthed
breathing, neck stretching, yawning, extending the wings away from the body, and forward movement of the head (bobbing) on inspiration or expiration are all indications of respiratory system compromise. Dyspnea associated with the upper respiratory tract or lungs is frequently accompanied by open-mouthed breathing. Lung and lower respiratory tract problems are usually associated with a rhythmic jerking of the tail (tail-bob). Respiratory problems associated with excessive fluid production may cause gurgling sounds that are audible on inspiration and expiration. Dyspnea induced by protracted respiratory disease is usually associated with other clinical signs including weight loss, depression, ocular or nasal discharge, sneezing or wheezing. Acute dyspnea in an apparently healthy bird usually results from exposure to aerosolized toxins, dislocation and movement of tracheal plaques (from malnutrition or infectious agents) or aspiration of foreign bodies (particularly seed husks or enclosure substrates).

**Gender Determination and Aging**

During the physical examination, feather color, patterns and markings can be used in some species to differentiate between various hybrid varieties. Male cockatiels in general have a dark-yellow crown and a dark-orange cheek patch. They may whistle a melody or sing. Females tend to have a light-yellow crown with a blotchy orange cheek patch. They chirp, bite more often and seldom talk or sing melodies. A wild-type immature cockatiel has a gray body, white primary horizontal bars on the underside of the wings, a light-yellow head and orange cheek patches (Color 8.12). Except in pied and pearl mutations, males over one year of age lose these horizontal bars, while females do not. In pieds, some or all of the gray feathers are white. Pearls will have a splotched, repeated pattern of interspaced grey and white feathers. This pearl pattern is retained in the adult female and lost in the adult male. A lutino is characterized by the replacement of gray feathers with white feathers that contain various shades of yellow. Hepatitis, chlamydiosis or heredity should be considered in cockatiels that are dark yellow (Color 8.8). A young pied has stripes in the central tail feathers, which are retained in the mature female but replaced with solid-colored central tail feathers in the mature male. Heavier pieds are difficult to sex by feather color.

With continued inbreeding to create color mutations, it has become increasingly difficult to accurately determine gender based on feather color. This is particularly true with albino (colorless with pink eyes) and cinnamon cockatiels. In these birds, endoscopic or genetic testing for gender is required.

Immature male and female wild-type budgerigars are green and appear similar. The male tends to have a “halo” or lighter colored ring around the nares. As the male matures, the cere turns from light pink to blue. Sexually maturing females develop a brown cere. Males tend to be brighter colored, bite less and sing and talk more than females. The color varieties are more difficult to visually sex. For example, with some line-bred budgerigars, as many as 50% of the birds with light blue ceres can be hens. Behavior can indicate gender in some species. For example, male finches tend to sing and perform a mating ritual dance when stimulated by a receptive hen.

Important genetic information can be obtained by determining the phenotype of a bird. For example, a blue budgerigar (or any color other than wild-type green) would clinically be expected to have a substantially reduced life expectancy (six years versus >15 years). Wild-type cockatiels have the potential to live over 20 years, but most color mutations usually die before they are ten years old. Table 8.2 lists some physical changes observed in long-term captive macaws.

**Examining the Bird’s Environment**

If the bird is transported to the hospital in its regular enclosure (which the client should have been instructed not to clean before the bird’s appointment),

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**TABLE 8.1 Normal Heart and Respiratory Rates of Birds (per min)**

<table>
<thead>
<tr>
<th>Weight</th>
<th>Heart Rate (Rest)</th>
<th>Heart Rate (Restraint)</th>
<th>Resp. Rate (Rest)</th>
<th>Resp. Rate (Restraint)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 g</td>
<td>274</td>
<td>400-600</td>
<td>60-70</td>
<td>80-120</td>
</tr>
<tr>
<td>100 g</td>
<td>206</td>
<td>500-600</td>
<td>40-52</td>
<td>60-80</td>
</tr>
<tr>
<td>200 g</td>
<td>178</td>
<td>300-500</td>
<td>35-50</td>
<td>55-65</td>
</tr>
<tr>
<td>300 g</td>
<td>163</td>
<td>250-400</td>
<td>30-45</td>
<td>50-60</td>
</tr>
<tr>
<td>400 g</td>
<td>154</td>
<td>200-350</td>
<td>25-30</td>
<td>40-60</td>
</tr>
<tr>
<td>500 g</td>
<td>147</td>
<td>160-300</td>
<td>20-30</td>
<td>30-50</td>
</tr>
<tr>
<td>1000 g</td>
<td>127</td>
<td>150-350</td>
<td>15-20</td>
<td>25-40</td>
</tr>
<tr>
<td>1500 g</td>
<td>117</td>
<td>120-200</td>
<td>20-32</td>
<td>25-30</td>
</tr>
<tr>
<td>2000 g</td>
<td>110</td>
<td>110-175</td>
<td>19-28</td>
<td>20-30</td>
</tr>
<tr>
<td>5000 g</td>
<td>91</td>
<td>105-160</td>
<td>18-25</td>
<td>20-30</td>
</tr>
<tr>
<td>10 kg</td>
<td>79</td>
<td>100-150</td>
<td>17-25</td>
<td>20-30</td>
</tr>
<tr>
<td>100 kg</td>
<td>49</td>
<td>90-120</td>
<td>15-20</td>
<td>15-30</td>
</tr>
<tr>
<td>150 kg</td>
<td>45</td>
<td>60-80</td>
<td>6-10</td>
<td>15-35</td>
</tr>
</tbody>
</table>

*The resting or flying heart rate of any sized bird can be estimated with the formulas: Resting HR in beats/sec = 12 x (4 x Wg)^0.209. Flying HR beats/sec = 25 x (1 x Wg)^0.357. Multiply results of either by 60 for beats per minute. From King AS, McLelland J: Form and Function in Birds Vol. 2. London, Academic Press, 1981 (see Chapter 27).
the clinician can examine the enclosure and determine what types of foods are offered and which of these foods are actually consumed. Fruits, vegetables and other moist foods can spoil rapidly, promoting the growth of bacteria (particularly *Pseudomonas* spp. and *E. coli*) and fungi. A cuttlebone should be examined for beak marks to determine if it is being consumed by the bird.

Excrement that is allowed to accumulate in the bottom of the enclosure, and perches that are dirty or positioned over the food or water containers are hygienically undesirable (see Chapter 1).

Birds should always have a supply of clean, fresh water with no additives. Vitamins added to the water oxidize quickly (become inactive) and provide an excellent growth media for bacteria and fungi (see Chapter 3).

### Excrement

Examining the color, texture, consistency and volume of the feces, urates and urine will provide information about a bird’s appetite, behavioral patterns and gastrointestinal, renal and hepatic functions (Color 8.34 to 8.58). Droppings should be visually evaluated by the client on a daily basis. The amount and character of feces is a more accurate reflection of a bird’s condition than the owner’s impression of the body weight and food consumed.

The frequency of defecation and the volume of excrement varies with the species of bird. In general, smaller birds with more rapid metabolic rates will defecate more frequently than larger birds with a slower metabolic rate. A normal budgerigar may produce from 25 to 50 stools per day, while a Blue and Gold Macaw may defecate 8 to 15 times a day (Color 8.39). A reduced quantity of excrement can be an indication of decreased food intake, a decreased gastrointestinal transit time or a blockage (Color 8.42). Dry, scant droppings may indicate dysphagia or food and water deprivation. Birds may have scant droppings for a few days if a change in diet has caused them to consume less food (e.g., medicated diets).

The normal excrement should consist of a fecal component, urates and liquid urine (Color 8.34). Normal feces may be green, light- to dark-brown and be slightly loose-to-firm in consistency. Normal urates should be white and the urine should be clear. The physical characteristics of feces can be influenced by the species and age of the bird, the time of day, type of diet consumed, quantity of food and water available, reproductive status, medication administered, renal disease, liver disease and the presence of parasitic, bacterial, chlamydial, fungal or viral pathogens.

It is common for a bird in the exam room to have a stress-induced polyuria or diarrhea. Over-consumption of fruits, vegetables or a recent change in the diet can alter the color and consistency of the feces. Birds that consume heavily pigmented foods (e.g., blackberries, blueberries, sweet potatoes, raspberries, beets, some highly colored crackers) can produce oddly colored feces. The reddish-to-black discoloration that is common with the consumption of blackberries and raspberries should not be confused with melena (Color 8.44). Dark-colored feces (not caused by fruit consumption) is indicative of melena. This is a common finding in budgerigars on an all-seed diet, but may be abnormal considering that the melena stops when birds are placed on a formulated diet. Blood in the excrement may be associated with coagulopathies, liver disease, cloacal pathology, pre- or post-oviposition, malnutrition or enteritis (Color 8.49). Bright-green, loose feces and yellow, green or brown urates may indicate hemolysis or hepatitis and are common with malnutritional, toxic, chlamydial, bacterial or viral hepatitis (Color 8.36). Clay-colored feces are indicative of maldigestion or malabsorption (Color 8.35).

Birds consuming some formulated diets or large quantities of fruits and vegetables will produce a loose voluminous feces and more urine than birds on a principally seed diet. Monkey biscuit and some other formulated diets cause the production of brown feces, while parrots consuming seeds generally have green feces. Neonates fed most standard formulas have soft, semiformed voluminous feces, as do hens

<table>
<thead>
<tr>
<th>TABLE 8.2 Effects of Aging in Macaws</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle wasting &gt; 40 years old</td>
</tr>
<tr>
<td>Joint stiffness suggestive of arthritis</td>
</tr>
<tr>
<td>Loss of skin tone and elasticity</td>
</tr>
<tr>
<td>Neurologic disease</td>
</tr>
<tr>
<td>Decreased feather production &gt; 40 years old</td>
</tr>
<tr>
<td>Twisting deformities of the carpi &gt; 40 years old</td>
</tr>
<tr>
<td>Pigment spots, polyps, wart-like blemishes, cysts, wrinkling facial skin</td>
</tr>
<tr>
<td>Thinning of the skin on the face and feet &gt; 40 years old</td>
</tr>
<tr>
<td>Cataracts &gt; 35 years</td>
</tr>
</tbody>
</table>

in the pre- and post-ovulatory period (Color 8.53). Voluminous droppings may also indicate malabsorption (eg, gastrointestinal disease, pancreatitis, peritonitis or parasites), diabetes or renal tumors (Color 8.52). For some birds, especially house-trained birds, a voluminous feces is a normal morning dropping.

Normal feces are smooth, and some high-fiber formulated diets will cause them to cling together in a tight, gelled cylinder. A granular or rough stool can indicate abnormal digestion. The presence of undigested food in the feces is not normal and must be differentiated from food that has fallen into the feces. Excreting poorly digested food can be an indication of maldigestion, malabsorption or hypermotility caused by parasites, pancreatitis, proventriculitis, ventriculitis or intestinal disease (Color 8.57).

Diarrhea is rare in companion birds. Loose, watery feces are normal in lorikeets and birds that consume liquid or nectar diets. The normal feces of Anseriformes also contain a high water content. In psittacine birds, most cases of diarrhea reported by clients are actually polyuria in which the feces are dispersed in an increased volume of urine. Finding bubbles (gas) in the feces is common in birds with true diarrhea (Color 8.51). Diarrhea can occur with various parasitic, fungal, chlamydial, viral and bacterial infections, systemic diseases and following the administration of some medications.

Direct examination of the feces should include a Gram's stain (to detect fungi, bacteria and inflammatory cells), fecal flotation (for helminths), direct wet mount examination for protozoa and determination of pH. The normal pH of the cloaca is 6.5 to 7. A basic pH (>7.5) favors the growth of yeast and Enterobacteriaceae.

### Urine and Urates

The kidneys excrete a pasty white-to-yellow urate (produced in the liver) and a sparse, clear, colorless watery urine that can be separated from the urates for analysis. The stress of being transported to the clinic will cause most birds to be polyuric when they are examined by the attending clinician. The presence of hematuria in any form is abnormal. Blood that is in the urine may originate from the GI tract, oviduct, kidneys, testicles or cloaca (Color 8.48).

Yellow-green urates are indicative of hemolysis or liver disease (Color 8.41). Idiopathic, reddish-brown urates have been described in some hand-fed babies that seem to be otherwise healthy with normal growth patterns (Color 8.36). This phenomenon is more common in birds that are receiving an animal protein-based diet, and some cases will resolve when a neonate is switched to a plant protein-based formula.

Urine for detailed analysis should be collected from an impervious surface as soon as possible after it is excreted (see Chapter 11). The avian urinalysis should include cytology and determination of the pH, glucose, sediment, color and specific gravity. Glucose should be completely absorbed and is not normally detected in the urine. The presence of ketones is abnormal and may suggest diabetes mellitus. The presence of casts is an indication of renal disease. Uric acid crystals can be dissolved by adding several drops of sodium hydroxide to a urine smear. This will facilitate the identification of casts, bacteria and cellular debris.

Urine may be excreted without urates when birds are nervous, polydipsic or consuming fruits and vegetables with a high-water content. Polyuria may be noted in birds that are egg laying, feeding chicks or holding their droppings overnight. It is also common in hand-fed babies and birds that are excited or housed in hot environments (Color 8.53). Pathologic causes of polyuria include diabetes, renal disease, wasting disease, certain medications (eg, aminoglycosides, steroids, medroxyprogesterone) and exposure to various toxins (Color 8.37).

### Vomiting vs Regurgitation

Detecting foamy, sticky, partially digested food on the walls or floor of the enclosure or attached to the feathers or the bird’s head and face is suggestive of regurgitation or vomiting. The distinction between regurgitation and vomiting is not as easily made in birds as in mammals. The expulsion of ingesta from the crop is considered regurgitation. The pH of material regurgitated from the crop is generally neutral to slightly alkaline. The normal pH of the crop is 7 to 7.5. Regurgitation can occur as part of the normal mating activity. If regurgitation is part of courtship activities, the patient will be of normal weight and will have no other clinical signs of disease.

Vomiting is considered the expulsion of ingesta from the proventriculus (see Chapter 19). Vomitus is usually acidic, may be bile-tinged and generally contains partially digested food (Color 8.58). An acute onset of vomiting caused by a pathologic process is often accompanied by depression, severe dehydration and shock.

Regurgitation, and in some cases vomiting, is common in hand-fed babies, if the formula is excessively
thin, if gastrointestinal disease is present, if they are fed excessive amounts of food or if they are being weaned.

**Odors**

Varying species of birds, and individuals within the same species, can omit distinct odors that originate from the food consumed, the feces and urine, the uropygial gland oil, the breath, the skin or the feathers.

Normal fresh excrement from companion birds is basically odorless. Birds that consume animal protein (e.g., raptors) usually have a distinct odoriferous stool. Foul breath is rare in birds and, when present, indicates an abnormality that might include candidiasis, oral or upper gastrointestinal tract ulcerations, oral or upper GI abscesses or gastroenteritis (Color 8.22). Unpleasant skin and feather odors are usually associated with necrotic tissue secondary to cysts, abscesses or neoplasias. Pasty droppings that adhere to the vent and produce a metallic, offensive odor are frequently noted in cockatoos. These birds generally have abnormally acidic (pH 4 to 6) feces of unknown etiology. Birds consuming high animal fat diets (e.g., ribs, chicken marrow bones, fried foods) may have a rancid oil odor that can persist for several weeks after a diet change.

**Gram’s Stain**

Gram’s stains of samples from the feces, cloaca, choanal slit and crop can be used to evaluate a bird’s overall health by estimating microbial populations (Figure 8.2). In contrast to cultures, which limit the growth of some organisms, cytologic evaluation of a sample will provide information about the type and relative number of each microbial organism present, including difficult-to-culture anaerobic or fastidious organisms. Fresh feces appear to be the most useful sample to evaluate.

In general, the digestive tract of grain- and fruit-eating Psittaciformes contains a gram-positive bacterial flora with a few yeast (Color 8.59). A normal fecal Gram’s stain should contain 100 to 200 bacteria per high-power field with 60 to 80% gram-positive rods and 20 to 40% gram-positive cocci. A few yeast or gram-negative bacteria per high-power field could be considered normal but should alert the clinician to carefully evaluate the patient for subtle abnormalities. The normal microbial flora of birds maintained indoors may be slightly different than the flora of birds residing in a flight outdoors.

Gram-negative bacteria are common in the oral cavity and in feces of clinically normal carnivorous or insectivorous Passeriformes, raptors, Galliformes and Anseriformes. The feces of canaries and finches normally have a reduced population of bacteria and often show various types of yeast one-fourth to one-half the size of candida.

In most psittacine birds, an absence or decrease in the number of bacteria, the detection of WBCs, a shift from a gram-positive to a gram-negative bacterial population or the presence of a high number of yeast (> 5/HPF) in samples from the choana, cloaca or feces may indicate a primary microbial infection or that immunosuppression with colonization by secondary pathogens has occurred (Table 8.3) (Color 8.61). Occasionally, gram-negative bacteria and yeast can be transiently present in the choana or cloaca of clinically normal birds. Some formulated diets and most breads contain brewer’s yeast, which can be passed in the feces and morphologically resembles *Candida* spp. In general, yeast of clinical concern will be budding, while brewer’s yeast will not (Color 8.63).

The avian clinician must interpret the results of a fecal Gram’s stain with respect to the patient’s environment, diet, general condition and clinical signs.

**TABLE 8.3 Abnormal Fecal Gram’s Stain Findings**

- Low bacterial count
- Reduced numbers and percentage of G + cocci
- Reduced numbers and increased percentage of G+ rods
- Increased numbers and percentage of G - rods
- Increased numbers and percentage of budding yeast
Making Distinctions in the Physical Examination

Color 8.1
Normal Hyacinth Macaw. Note the normal yellow color of the skin around the eye and lower beak. This coloration should not be misinterpreted as hyperbilirubinemia (courtesy of Apalachee River Aviary).

Color 8.2
Normal Blue and Gold Macaw exhibiting a defensive behavior (wings extended) in response to being approached. Note the sharp, distinct coloration of the feathers, the bright alert eyes, dry nostrils, smooth black beak and blemish-free facial skin. The nares of Blue and Gold Macaws are clearly visible, while those of other macaws can be covered with feathers.

Color 8.3
Birds will be at their peak of condition and health when provided a formulated diet supplemented with fresh fruits and vegetables and frequent exposure to fresh air and sunlight. Close observation of this Green-winged Macaw shows black discoloration of the blue remiges on the left wing, frequently seen with nutrient oversupplementation and microhepatia.

Color 8.4
A resting Major Mitchell’s Cockatoo. Normal sleeping behavior must be differentiated from lethargy or depression (Color 8.6). Note that the feathers of this clinically normal bird are clean, have a reflective quality and are evenly colored.

Color 8.5
Companion grooming behavior indicative of an effective pair-bond in normal Military Macaws. Note the smooth, evenly colored feathers, bright eyes and clean, dry perinasal area. The blushing noted on the hen’s cheek area is common when birds are stressed or excited and should not be misinterpreted as pathology.

Color 8.6
Birds frequently sleep with their beaks tucked into the shoulder area. A bird that exhibits this behavior in a stressful situation (eg, examination room) would be considered severely depressed. Note the partially closed eyelids in this Yellow-naped Amazon Parrot.

Color 8.7
Birds should always be observed from a distance to detect any subtle behavioral abnormalities. This Crested Cardinal would start singing and hop from limb to limb when approached; however, when viewed from a distance, the bird appeared depressed, and the feathers were held away from the body (“fluffed up”), suggesting difficulties in maintaining normal body temperature.
Making Distinctions in the Physical Examination

**Color 8.8**
Yellow discoloration of the feathers in lutino cockatiels is frequently associated with active hepatitis.

**Color 8.9**
Loss of the papillae and hyperkeratosis of the plantar surface of the feet are common in malnourished birds. Hypovitaminosis A is frequently implicated. If unresolved, these lesions can become infected (eg, bumblefoot), causing crippling or life-threatening changes.

**Color 8.10**
Normal (left) and abnormal Yellow-naped Amazon Parrots. The bird on the right was fed an all-seed diet, was overweight and had elevated liver enzymes. Note the thin, discolored feathers and the rotund nature of the proventer (breast) region in the abnormal bird. This bird’s overall health improved when it was changed to a formulated diet supplemented with limited fresh fruits and vegetables and was given frequent exposure to sunlight.

**Color 8.11**
Stick-tight flea on the lore region of a cockatiel.

**Color 8.12**
Distinct yellow crossbars on the ventral surface of the flight feathers in a female lutino cockatiel.

**Color 8.13**
A near comatose Severe Macaw with neuropathic gastric dilatation. Note the glazed, sunken eye (dehydration) and partially closed eyelids. This bird would exhibit intermittent periods of vocalization and wing-flapping, and would then slip back into a comatose state.

**Color 8.14**
a) Bacterial otitis externa in a Mitred Conure. Note the hyperemia and swelling of the tissues associated with the auditory meatus. b) Normal auditory meatus for comparison.

**Color 8.15**
Severely depressed Gouldian Finch. Note the yellowish discoloration of the urates (suggestive of liver disease) and the absence of feces. Because of their rapid metabolism, small birds can die within a few hours if they do not consume adequate levels of energy-rich foods.
Identifying an organism in a sample does not mean it is associated with a disease process. Different strains of a particular bacteria may appear morphologically similar, but may vary widely in pathogenicity. Distinguishing between pathogenic and non-pathogenic strains of the same genera of bacteria or fungi requires detailed biochemical analysis.

Properly interpreting a Gram’s stain requires that the clinician determine if the organism detected is pathologically colonizing a mucosal surface. A clinically normal bird with an abnormal Gram’s stain should be observed for changes that could indicate a problem. The management practices associated with the bird should be carefully evaluated to identify problems that could increase a bird’s exposure to pathogenic bacteria or that could be weakening the immune system. A shift from an abnormal to a normal Gram’s stain over a three- to six-week period is common in birds that are changed from an all-seed to a formulated diet.

An improperly evaluated Gram’s stain can result in unnecessary antibiotic therapy that is detrimental to an individual bird or to an aviary as a whole. Damage to the normal flora caused by the indiscriminate use of antibiotics or contact with disinfectants precipitates the colonization of opportunistic pathogens.

### Examination of the Patient

Once a bird’s enclosure has been evaluated for clues that may indicate abnormalities and the bird has been carefully observed in its environment, it is time to perform a hands-on physical examination. The initial consideration in performing a physical examination is in handling the patient in a safe and efficient manner. Even the simplest procedure can become life-threatening if improperly performed. A client should be informed that handling a critically ill bird can destabilize the patient to a point where it can no longer compensate.

The examination room used for birds should be secluded, sealable, easily cleaned, contain minimal furniture, have dimmable lights and should not have ceiling fans or uncovered windows. With smaller, easily stressed species (e.g., finches, canaries), performing the physical examination in a dimly lighted room will help calm the patient.

Any equipment or supplies that may be needed should be prepared before a bird is removed from its enclosure. This will expedite the physical examination and decrease restraint-induced stress. The clinician should wear ear protectors to prevent hearing loss when handling large screaming psittacine birds. The use of a magnifying loop, operating microscope or slit lamp will help in discerning subtle changes associated with the skin, feathers, head, cloaca, oral cavity, eye and limbs (Figure 8.3). The ear canal of birds can be examined using a small otoscope cone. An otoscope may also be useful in evaluating the oral cavity, cloacal mucosa and pharyngeal area. The physical examination process should be performed quickly and efficiently. With practice, a thorough examination can be performed on a critically ill patient in less than three minutes.

The physical examination should involve the clinician’s use of vision, sound, smell and touch to identify the areas of the body that are unusual. It is a clinical judgement to determine if something is normal for the individual patient yet abnormal for the species as a whole. While a physical examination can be performed using different regional or anatomic approaches, the key to detecting subtle abnormalities is to consistently use the same approach (using a physical examination form may be helpful).

Initial restraint of flighted birds can be accomplished with a net. A small bird can easily be removed from its enclosure by turning out the lights and gently removing the bird from its perch. A paper or cloth towel can be used for removing larger patients from their enclosures. Paper towels are best for handling birds because they can be discarded after use. If cloth towels are used, they should be laundered and autoclaved between each bird to prevent nosocomial infections.

With practice, the most refractory psittacine birds can be easily restrained using a towel. Gloves should never be used to restrain psittacine or passerine birds. Tame birds may associate the shape of the glove with discomfort and may equate the hand with danger. Removing the top or bottom of an enclosure may be easier than attempting to remove the bird through the enclosure door. The towel can be used to position the bird so that it is facing the side of the enclosure in order to have free access to the back of its head. The best time to grab the bird is when it bites the side of the enclosure.

Small birds can be restrained with one hand by placing the bird’s head between the second and third fingers (Figure 8.4). Larger birds can be initially removed from the enclosure with a towel or net and
then restrained by placing the thumb and index finger on either side of the mandibles. A bird must be able to move the sternum in order to breathe, and excessive force on the chest can result in asphyxiation. The bird should be held upright or parallel to the floor. Holding a sick bird upside down can compromise respiratory effort.

The towel used to initially remove a bird from its enclosure can remain around the bird at a level even with the upper eyelid and just below the nares. This gives the bird something to chew on, as well as reduces its vision to help keep it calm. A large bird can be cradled on its back between the clinician’s body and arm. The lower forearm can be used to press the wings gently against the body (Figure 8.5). Using this method of restraint, both hands are free to palpate body surfaces and to manipulate the feet and wings, improving the access of all body surfaces for examination. For some clinicians, a complete physical examination requires that the patient be anesthetized with isoflurane, especially large and aggressive birds.

**The Dermis and its Unique Adaptations**

The feather condition of a bird is an excellent indication of its overall health. The feathers and skin should be evenly colored, sleek, clean and dry (Color 8.4). A bird normally has feathered areas (pterylae) and non-feathered areas (apteria) of the body. Normal anatomic areas that may be featherless in some species include the eye ring, top of the head, mid-proventer and axillary regions. Genetically induced baldness has been described in cockatiels. Some incubating hens will develop a featherless area on the abdomen called a brood patch. Most other areas of baldness should be considered abnormal.

The normal feather brilliance or “sheen” is derived from a combination of physical color, structural reflection of light (structural color), the presence or absence of powder from the powder down feathers (if present) and oil from the preen gland (if present). A bird loses its sheen if abnormalities occur in any of the factors that contribute to the reflectivity of the feathers (Color 8.13). Affected feathers appear dull and dirty (see Chapter 24).

The primary flight feathers have clean, uniformly smooth edges, and the color pattern changes slowly and evenly from one portion of the feather to another.
A disparity in any of these lines should be noted. The feather shaft (rachis) is smooth and gradually changes from thin at the tip to thick at the base (calamus). Feathers are usually darker toward the tip and lighter toward the base. The contour feathers that cover the body should blend with each other, giving the bird a smooth, compact appearance (Color 8.10). Feathers should be complete and intact throughout their length and width. Bent, malformed, broken or frayed feather edges are indications of a problem (see Color 24).

Malnutrition in general may cause these kinds of feather problems. Such birds appear sparsely feathered, not because the feathers are reduced in number but because the feathers that are present are abnormal.

The skin over most of a bird’s body is thin, soft, dry and relatively translucent (Figure 8.6). Small portions of discarded feather sheaths are normally found on the skin and should not be confused with dry, flaky skin. Uric acid deposits may be noted under the skin in cases of gout. Examination of subcutaneous tissues can be enhanced by wetting the overlying feathers with warm water or alcohol (Figure 8.7).

Balding, thinning, swelling, peeling or ulcerations of the skin or scales of the feet and legs are indications of abnormalities. The skin and feathers of birds consuming an all-seed diet are rarely normal. Changing a bird from a seed-based to a formulated diet, supplemented with fresh fruits and vegetables, will generally cause a dramatic difference in the skin and feather condition. The improvement in the feather quality will be most noticeable with the first molt following the diet change.

Feathers should be evaluated on a region by region basis. When a bird is relaxed, the feathers lie flat and follow the natural contour of the body. Feathers that are out of place may indicate abnormalities. Body swellings may push feathers away from the body, and feathers from a damaged follicle may twist or grow in an abnormal direction (see Color 24). Localized feather abnormalities should alert the clinician to carefully evaluate certain areas of the body. Wet, sticky or stained feathers around the nares are indications of rhinitis. Generalized feather abnormalities indicate systemic abnormalities that should be evaluated.

One of the many functions of feathers is to retain body heat. If chilled, a bird increases its insulation capacity by increasing the distance between the feathers and the skin (fluffing up), therefore creating an air space between each feather. Some fluffing can be considered normal in birds that are restricted to an indoor environment. A bird that is diseased may be “fluffed” because it is chilled or because it is consuming insufficient energy to maintain a proper metabolic rate and compensate for normal heat loss. Birds may also fluff their feathers when they are...
content or when they wish to be preened or as a part of the mating ritual. A bird that is fluffing due to illness will show other signs of disease (Color 8.15).

Feather problems should be divided into those that occur before, during or after development. Lesions occurring before development are caused by damage in the follicle, and the feathers do not emerge properly, if at all. These problems are often characterized by discharges from or enlargement of the feather follicles (see Color 24). Damage that occurs to a feather during development is characterized by an abnormal feather structure or color that is evident as the sheath is removed from the differentiated feather. Dark lines located transversely across several feathers (stress lines) indicate that an adrenocortical surge occurred while the affected feather was developing. Post-developmental feather problems are characterized by an abnormal rachis, barb or barbules but a normal follicle and calamus.

The molting process varies with the individual bird. Some birds (e.g., canaries, raptors, pheasants) molt seasonally (typically after breeding season) while other birds molt continuously (budgerigars and cockatoos). The normal molt should be orderly and uneventful with an old feather being forced out by a newly developing feather (see Chapter 24). Birds should lose the feather sheath from the differentiated portion of a feather within days. Retention of the feather sheath is not normal, and may indicate malnutrition, pansystemic disease or an infectious agent. Birds will normally preen the head, neck and facial feathers of a companion.

Damaged pin feathers cut or broken off at the surface may be black and mistaken for mites. These damaged feathers may cause pruritus and excessive preening. Head feathers may appear abnormal in canaries that are malnourished, especially in reproductively active hens. The skin of the neck is frequently hyperkeratotic in these cases (Color 8.24). The powder down feathers of the prolateral region should be examined for the presence of powder formation or feather deformities. Moist lacerations or ulcerations may be noted in the axillary region in some birds with dermatitis (see Color 24).

Birds that are fed a marginal diet, that are not exposed to fresh air and sunlight and that are not allowed to bathe regularly have feathers that appear worn and tattered. The feathers that are replaced may have retained sheaths that give the bird the appearance of having an excessive number of pin feathers. The beak, skin and nails in these birds will frequently contain accumulations of keratinized epithelium (see Figure 8.1). Birds that are provided an inadequate diet may enter a molt cycle when their nutritional requirements are satisfied. Following a

**FIG 8.6** The skin over most of a bird’s body is thin, soft, dry and relatively translucent. The fact that avian skin is translucent allows direct visualization of many subcutaneous structures including vessels, the crop, tendons, ligaments, body musculature, bone and, in small birds, abdominal structures.

**FIG 8.7** Examination of subcutaneous tissues can be enhanced by wetting the overlying feathers with warm water or alcohol. Ethanol should be cautiously applied to open wounds because the systemic uptake of this product can cause intoxication.
diet change, these birds may go through a period when they seem to scratch and preen excessively.

**Head**

The head should be symmetrical with respect to the eyes, periorbital areas, cere, beak and nostrils. The eyes of a normal bird are clear, bright and centered in the socket (see Color 26). The blink response can be evaluated by lightly touching the canthus. Normal eyelid margins should be symmetrical and smooth. Scabs, scars or active pustules on the lid margins may be indicative of poxvirus (particularly in Amazon parrots) (see Color 26).

Periophthalmic swelling, epiphora or conjunctivitis all indicate ocular or sinus abnormalities. Conjunctivitis is most common in cockatiels, lovebirds and Amazon parrots. In cockatiels and lovebirds, bacterial, mycoplasmal, chlamydial or viral conjunctivitis may damage the lids resulting in dry eye (see Color 26). Malnutrition, primary or secondary to giardiasis, may also cause conjunctival damage. A common problem in cockatiels is partial lid paralysis, with ectropion and conjunctivitis (see Chapter 41).

**Cere**

The color of the cere varies with the species. An immature budgerigar will have a flesh-colored cere that normally turns dark blue (male) or stays light blue or pink (female) as the bird matures. Some browning of the cere is normal in reproductively active budgerigar hens. An abnormal accumulation of keratinized tissue on the cere (brown hypertrophy of the cere) can occur in some budgerigars with endocrine abnormalities (see Color 24). Estrogen-producing tumors may cause a male budgerigar’s cere to change from blue to brown. Hyperkeratotic swelling and hypertrophy of the cere that causes occlusion of the nares may be noted in some Umbrella and Moluccan Cockatoos. A crusty cere and beak may be indicative of *Knemidokoptes* spp. mites (see Color 24).

**Nares**

The nares and operculum (keratinized plate inside the nostril) should be smooth, relatively dry, symmetrical and evenly sized and colored. In some species (ducks), the nares are located within the beak, while in other species (Psittaciformes) the nares are at the margin of the beak and edge of the facial skin (Figure 8.8). The feather configuration around the nares varies among species. Cockatoos have dense feathers that completely surround the nares. By comparison, Amazon parrots have sparse bristle-type feathers around the nares. In cockatiels, Amazon parrots and lories, the nares are round, while in cockatoos the opening forms a slit. Any degree of moisture around the nares should be considered abnormal.

Nasal discharges may be unilateral or bilateral and may appear clinically as dirty, malpositioned or moist feathers around the nares. Mild cases of rhinitis may be accompanied by severe cases of air sacculitis, sinusitis and caseous accumulations in the nares or sinuses. Periorbital swelling usually indicates a sinus infection. Signs of previous respiratory disorders may include grooves in the beak or loss of feathers associated with the nares (see Chapter 22).

The operculum should be well defined in the nasal cavity. The abnormal accumulation of desquamated cells adjacent to the operculum can create a mass that can become secondarily infected with bacteria or fungus, resulting in a unilateral rhinitis accompanied by severe tissue necrosis (see Chapters 22 and 41).

Pathology in the sinus or nasal cavities may alter the normal flow of air, causing the skin over the infraorbital sinus to move in and out as a bird breathes. This abnormality may be subtle and the bird may otherwise appear normal. Mild blockages that are not corrected can progress and cause severe sinusitis and conjunctivitis (cockatiels) or atrophic rhinitis (African Grey Parrots) with structural damage to the rhinal cavity and surrounding bony structures (sunken sinus syndrome in macaws) (see Color 22). In some species, transillumination of the sinus areas may help identify pockets of debris.

The feathers on the head should be smooth and uniform. The ear canals can be evaluated for discharge or the abnormal accumulation of desquamated hyperkeratotic skin by parting the feathers on the side of the head (Figure 8.9). The glistening, translucent ear drum can be visualized and will move slightly with respiration (see Color 13). Ear problems are infrequently seen in birds (Color 8.14). Those that do occur are generally caused by granulomas or neoplasms, and early detection and surgical correction are necessary to insure a favorable prognosis. The ear canal may be hyperemic in birds with sinusitis.

The beak color and shape varies dramatically among species; however, the surface of the beak should be smooth, shiny and uniform regardless of the species. The occlusal surface of the upper and lower beak should meet at midline and be even throughout the margins. The beak of a psittacine bird should grow...
about 0.25 inches per month, yet maintain a consistent length. In free-ranging birds, the beak is maintained in good condition through exposure to moisture followed by drying from exposure to sunlight. As the bird eats and chews on woody plants, the dry outer edge of the beak is removed, which maintains its proper shape and length.

Dry, flaky layers on the beak and skin around the cere are abnormal and may signal poor management or systemic disease (Figure 8.10). Birds that frequently bathe, are fed formulated diets and have regular exposure to fresh air and sunlight have fewer beak problems than birds that are fed a seed diet and restricted to an indoor environment. Grooves in the beak originating from the area of the nostril may indicate a previous or ongoing sinus infection (see Chapter 22). Physical damage (bite wounds) to the epithelial growth centers of the beak can cause similar lesions. Proliferative growths associated with the beak are common with *Knemidokoptes* sp. infections (see Color 24).

**Oral Cavity**

Evaluation of the oral cavity can be augmented using a speculum or gauze strips to open the mouth (Figure 8.11). A detailed examination of the oral or pharyngeal mucosa may require isoflurane anesthesia.

The oral cavity should be relatively smooth, glisten-
Making Distinctions in the Physical Examination

Color 8.16
Normal choanal area in a Sun Conure. Note the smooth, even color of the oral mucosa and the well defined choanal papillae (arrows).

Color 8.17
White-to-yellow, proliferative, diphtheritic mass on the sublingual mucosa of a pheasant. These lesions can be caused by poxvirus, bacteria, trichomonas, candida or hypovitaminosis A.

Color 8.18
Severe, diphtheritic inflammation of the buccal and pharyngeal mucosa in an Umbrella Cockatoo that was DNA probe-positive for PBFD virus. Cytologic evaluation of samples collected from the lesions revealed high numbers of gram-negative bacteria and yeast.

Color 8.19
Blunting of the choanal papillae and accumulation of mucopurulent discharge in the palatine area of a conure with hypovitaminosis A and bacterial sinusitis and tracheitis.

Color 8.20
a) Swollen, edematous, ulcerated masses associated with the buccal and pharyngeal salivary glands secondary to hypovitaminosis A. The largest mass occluded the glottis and caused asphyxiation. b) normal tongue (t), laryngeal mound (l) and trachea (tr).

Color 8.21
Proliferative, white-to-brown, cheesy masses on the pharyngeal mucosa of a Red-tailed Hawk. Trichomoniasis was diagnosed cytologically.

Color 8.22
a) Ulcerative lesion on the palate of a bird with choanal atresia. In addition to the deformity in the choana, this bird did not have an infundibular cleft and b) the lacrimal ducts were not patent (courtesy Cheryl Greenacre).

Color 8.23
An adult Green-winged Macaw was presented with a severe upper respiratory tract disease two weeks after being purchased from a traveling bird dealer. In addition to rhinitis, the bird also had diarrhea and mild tremors. A tenacious, mucopurulent discharge was noted in the pharyngeal area bulging from the choanal slit (arrow). The bird did not respond to supportive care. Histology indicated pneumonia, enteritis and lymphocytic perivascular cuffing in the brain.
Making Distinctions in the Physical Examination

Color 8.24
a, b) Hyperkeratosis and feather loss in a malnourished canary. The bird’s feathers, skin and overall health improved when it was changed from an all-seed to a formulated diet.

Color 8.25
Bruising, ulceration and necrosis of the cranial edge of the sternum secondary to a traumatic injury. Because the bird’s wings had been improperly trimmed, the bird landed hard on its sternum on a concrete floor during attempts to fly. The trimmed flight feathers were removed to enable them to regrow. After feather regrowth, surgical debridement of the wound and removal of the necrotic portion of the sternum were necessary to correct the lesion.

Color 8.26
Chronic ulcerative dermatitis on the back of a lovebird. Note the dry, hyperkeratotic skin at the periphery of the open, bleeding lesions.

Color 8.27
Severe obesity in a Screech Owl that was fed obese rodents and provided no room for exercise. Note that the keel is not visible, and accumulated fat is bulging into the thoracic inlet area.

Color 8.28
Tattoo ink is frequently injected into the propatagium to indicate the gender of a bird following endoscopic evaluation of the gonads. Traditionally, tattoo ink is injected into the right propatagium of males and the left propatagium of females.

Color 8.29
Defect in the comb, wattle and beak secondary to debeaking and a Trichophyton sp. (favus) infection. A correctly healed bird’s beak (left) is shown for comparison (courtesy R. Korbel).

Color 8.30
Proliferative mass on the head of a canary characteristic of the dry form of poxvirus. Note the ulcerations and scab formation (courtesy of Patricia Macwhirter).

Color 8.31
A mature Amazon parrot hen was presented with a two-day history of depression and blood-tinged feces. Veterinary assistance was requested when frank hemorrhage was noted in the feces. The cloacal wall was edematous and prolapsed secondary to tenesmus caused by hemorrhagic enteritis.

Color 8.32
a) Caudocranial view of the left pelvic limb of a duckling, demonstrating medial luxation of the Achilles tendon. The trochlear groove (arrow) is visible through the skin.

b) Normal (left) hock joint and soft tissue damage (right) associated with medial luxation of the Achilles tendon (courtesy of John H. Olsen).

Color 8.33
Proliferative, ulcerative lesion (bumble-foot) on the plantar foot surface of a swan (courtesy of John H. Olsen).
ing and evenly colored (white to black depending on the species) (see Color 13). Some birds (particularly Passeriformes) may have brightly colored spots in the mouth that play a role in brooding activities. The tongue has a dry sheen while the choanal slit and pharyngeal and laryngeal mucosa are slightly moist (see Color 13). Choanal papilla are well formed in some species (Amazon parrots and macaws) and less distinct or absent in other species (Color 8.16). Excessive moisture in the mouth may indicate inflammation in the oral cavity, choanal slit, sinuses or pharyngeal and laryngeal areas.

Accumulations of debris or food, abnormal coloration, erosions or ulcerations, sticky white mucus or perichoanal, pharyngeal or sublingual swellings are abnormal. White plaques that are easily removed and blunting or swelling of the choanal papillae are common with hypovitaminosis A (Color 8.20). Shallow yellow or white plaques that are attached and difficult to remove are common with pox or bacterial ulcerations (Color 8.17). White or brown cheesy lesions are suggestive of candidiasis or trichomoniasis (Color 8.21). Accumulations of desquamated hyperkeratotic epithelium, recognized clinically as small white bumps on the dorsal surface of the tongue base are common in cockatiels. Birds with these lesions are frequently infected with Candida sp.

A decreased jaw tone may indicate a systemic weakness. Vitamin E or selenium deficiency and giardia have been suggested as causes of this problem in cockatiels. These birds may not be able to crack seeds and frequently have poor tongue control resulting in food accumulation in the oral cavity.

Respiratory Tract
For examination purposes, it is easiest to divide the respiratory system into the upper respiratory tract (sinuses and trachea), lungs and lower respiratory tract (thoracic and abdominal air sacs). A bird that is in severe respiratory distress may require oxygen before it can tolerate the stress of a physical examination.

The respiratory rate should be determined before and during the hands-on physical examination (see Table 8.1). If the bird is calm and does not struggle during the physical examination, the respiratory rate will generally remain constant. In these birds, the respiratory rate should be increased by gently holding the feet and moving the hand in a downward motion. This will stimulate wing flapping and should increase the respiratory rate. In a normal bird, the respiratory rate should return to its pre-exercise rate within two minutes of ceasing the exercise. A sustained tachypnea can indicate respiratory disease, cardiovascular disease or a mass that is blocking air flow in and out of the caudal air sacs.

Auscultation
A pediatric stethoscope is ideal for auscultating the avian lungs, heart and air sacs (Figure 8.12). Some sounds can be detected by placing the bird's body
directly to the ear. The heart rate will vary from 45 to 600 beats per minute depending on the species and level of excitement (see Table 8.1).

Hearing a slight rush of air is normal. The sounds associated with inspiration are noted first and are typically louder and shorter in duration than those associated with expiration. The avian lungs move minimally during respiration, and detection of the respiratory clicks that are common with fluid increases in mammalian lungs is rare in birds. Detected cracks, pops, wheezes or whistling sounds are indications of severe respiratory tract abnormalities. Most abnormal respiratory sounds in birds are associated with rhinoliths, infraorbital sinusitis, tracheal stenosis or air sac disease. There may be a decrease in inspiratory sounds if a lung or air sac is consolidated. Sharp clicking sounds are occasionally noted in an apparently healthy bird that is being restrained. These sounds are thought to be caused by a subluxating joint.

**Body Examination and Palpation**

The submandibular and neck areas should be palpated, with particular attention to the esophagus and crop. The esophagus as it extends down the right side of the neck can be palpated for swellings. Large food items (eg, grapes, vegetable chunks) may be swallowed intact and can be palpated as soft fluctuating masses. The crop is normally the largest palpable structure in the thoracic inlet. In Psittaciformes, the majority of the pendulous sac of the crop lies on or to the right of midline (see Anatomy Overlay). If distended with food, the crop can be quite large, and care should be exercised when handling the bird (particularly a neonate) to prevent regurgitation, which may lead to aspiration pneumonia. If empty, the crop and esophagus can be palpated. The crop should feel thin and striated longitudinally (see Colors 13, 19). In adult pigeons, the crop mucosa will be thickened for several weeks after a clutch hatches; this normal physiologic change should not be confused with pathology. Peristalsis of the crop is easy to observe (one to three per minute), particularly in neonates.

The crop and esophagus can be visually examined by wetting the feathers around the thoracic inlet and placing a small, high-powered light (eg, endoscope light) on one side of the crop. Using this transillumination technique, the relative thickness of the crop mucosa and its vascularity can be determined (see Color 19). If empty, expanding the crop with air and holding it in place by digital pressure on the esophagus allows improved transillumination. Thickening or increased vascularization of the crop or esophagus are indications of inflammation.
The patient's general condition can be subjectively evaluated by palpating the pectoral muscles to determine the ratio of muscle mass to sternum (Figure 8.13). If a slight depression is not palpable, the bird is probably overweight. The sternum should be straight, and deviations suggest malnutrition during development or a previous traumatic injury.

A bird's weight in grams should be determined with each visit. A scale that has been fitted with a perch can be used for tame birds (Figure 8.14). Most digital gram scales have a tare feature that allows a bird to be weighed in different containers. The actual weight should be compared to the estimated condition of the bird based on palpating the pectoral musculature. This will provide a clinical perspective of the ideal weight of a particular bird (see Table 30.5). For example, the weight range of Umbrella Cockatoos is 450 to 750 grams. Finding an individual bird that weighs 500 grams but is severely emaciated would indicate that this bird is abnormal even though it falls within a normal weight range. Some hens may have a thirty percent seasonal fluctuation in body weight (usually heaviest in the spring); however, these birds should never be emaciated or have clinical signs of disease. The feathers over the sternum and abdomen should be moistened with alcohol to visually determine the amount of subcutaneous fat deposits. The abdomen should be slightly concave or flat. A convex bulging of the abdominal wall is indicative of a space-occupying mass (eg, egg, neoplasm, ascites, enlarged organ).

Abdominal organs are difficult to palpate in birds, particularly in small species; however, the ability to palpate unusual structures in the abdomen can provide important information. Normally, the abdomen should be flat, tight and slightly concave in the center. With liver enlargement, ascites, proventricular or ventricular distension or displacement, egg development, egg-related peritonitis or mass formation, the abdomen may appear distended, doughy and convex. The right liver lobe extends farther caudally than the left and can be detected most easily if enlarged (see Color 20). Gentle palpation under the caudal edge of the sternum should not be painful, and if a bird responds to this procedure it could indicate hepatitis. Palpation on a bird with a swollen abdomen should be performed gently. If fluid is present in the peritoneal space and an air sac is ruptured by excessive digital pressure, fluid can rush into the lungs causing asphyxiation. Extra-abdominal wall swellings caused by hernias or lipomas may be visualized and palpated.

In a well muscled, low-body-fat canary or finch the abdominal musculature is almost transparent, and portions of the gastrointestinal tract and liver (especially with hepatomegaly) can be visualized.

**Cloacal Area**

A percloacal accumulation of excrement may indicate enteritis or polyuria or can be associated with cloacal dysfunction (Figure 8.15). If the dried excrement and associated feathers have formed a solid mass that is partially or totally preventing defecation, a bird may produce a voluminous, malodorous stool when the dried excrement is removed. The percloacal feathers of a bird with chronic biliverdinuria are often stained greenish or greenish-yellow (see Color 20).

Inspection of the cloacal mucosa can be accomplished using a moistened cotton-tipped applicator. The applicator is gently inserted into the cloaca and slowly withdrawn while pushing the tip to one side. As the applicator is withdrawn, the cloacal mucosa will protrude through the vent. Alternatively, the cloaca may be examined by bending the bird's tail over its back.
and gently pinching the sides of the cloaca to expose the mucosa (Figure 8.16).

The cloacal mucosa should be carefully checked for papillomatous growths. Five percent acetic acid (apple cider vinegar) will cause papillomatous tissue to turn white and can facilitate visualization of subtle lesions. In most species, tissue should not protrude from the cloaca. The cloaca may be distended and partially everted if the bird has a developing egg, cloacal mass (e.g., papilloma, fecalith), tenesmus or is constipated. Protruding tissue can be colon, uterus, ureter or cloacal wall (Color 8.31). The cloaca normally everts in reproductively active Vasa Parrots.

The openings of the urinary, gastrointestinal and genital tracts can be examined using an otoscope cone, vaginal speculum, human nasal speculum or endoscope. This procedure induces some level of discomfort and is best performed in an anesthetized bird. In sexually mature hens, the cervix may be observed in the left lateral wall of the urodeum (see Anatomy Overlay).

The uropygial gland, located dorsal to the cloaca at the end of the pygostyle, is well developed in some species (canaries) and absent in other species (Amazon parrots). If present, the gland should be smooth, evenly colored and contain a small amount of yellow, creamy material (see Figure 24.7). A change in the surface structure of the gland, a loss of feathers or a discolored discharge should all be considered abnormal. Infections and neoplasia are the two most common causes of abnormalities. Malnourished birds may have excessively dry, brittle feathers and skin that can spontaneously rupture, particularly in the postventer region (see Figure 24.20).

The internal temperature of a bird can vary from 107 to 112°F and temperatures often elevate rapidly during periods of stress. The temperature of a bird is not routinely determined during the physical examination because the procedure provides little valuable information and danger is associated with forcibly passing a thermometer through the cloacal wall. Tympanic thermometers are being clinically evaluated.

**Wings, Legs and Feet**

The bones and some of the musculature of the wing can be directly visualized for signs of bruising, swelling or fractures by wetting the surface of appendages with alcohol. Green discoloration (bruising) of subcutaneous tissues usually represents the breakdown of extravascular hemoglobin. In general, it takes about
two days after a traumatic event for this green color to appear, providing the clinician with an indication of the chronicity of an injury.

Hemorrhagic, necrotic dystrophic feather shafts are an indication of damage to the developing feather that can be caused by a number of infectious or metabolic problems (see Color 24). Mites may be observed moving on the underside of the wing or the nits may be attached to the feather vanes (see Color 48). Increased translucency, color alterations or structural changes in the flight feathers can be an indication of malnutrition or mismanagement. The ventral surface of the wing and prolateral region are common locations for feather picking in cockatiels, African Grey Parrots, cockatoos, Grey-cheeked Para-keets and Quaker Parrots (see Color 24). The presence of splintered or damaged feather shafts may indicate that a bird is preening excessively or feather picking (see Chapter 24).

Ulnar vein turgidity and skin consistency on the neck, abdomen and dorsal surface of the digits can be used to evaluate the hydration status of the bird. Flat veins that do not immediately refill when depressed may indicate hypoproteinemia, anemia, dehydration or shock.

The feet and legs should be uniform in texture and color. The feet should have prominent scale patterns on both the dorsal and plantar surfaces (Figure 8.17). Changes that result in smoothing of the plantar foot surface can instigate chronic and severe foot and leg problems (Color 8.9). Common etiologies of foot abnormalities include hypovitaminosis A, a lack of sunlight, contact with nicotine sulfate (from the hands of cigarette smokers) and improper perches (eg, size,
texture or firmness). Any ulcerative lesion or swelling of the feet should be addressed immediately. Ulcerative lesions can rapidly become infected (bumblefoot) and can be life-threatening if infectious agents invade associated tendon sheaths and bones (Color 8.33). Bacteremia is common in many birds with ulcerative lesions on the feet. The accumulation of exfoliated, dried hyperkeratotic scales is common in malnourished Passeriformes (see Chapter 24). Proliferative lesions on the feet of canaries (tasselfoot) are common with knemidokoptes infections (see Color 24).

The length of a bird’s nails should be evaluated and the client should be instructed to carefully monitor the nail growth at home. Overgrown nails are common in birds with hepatopathies and can result in trauma to the fat pads (inducing bumblefoot) or entanglement in enclosures or toys. Hemorrhage in unpigmented nails is an indication of trauma or liver disease.

A weak grip can indicate systemic weakness or specific neuromuscular disease of the feet or legs (see Chapter 28). Leg paresis, ataxia and muscle atrophy may occur in birds with abdominal tumors. This lameness is typically the result of tumors that place pressure on the ischiatic nerve. Unilateral lameness is most common, but bilateral lameness may also occur. Bilateral lameness can also be a direct result of primary neural lesions (eg, aspergillosis, Marek’s disease virus, lymphoid leukosis, spinal injuries, vitamin E or selenium deficiencies and B vitamin deficiencies).

Once the physical exam is completed, the minimum database can be collected. The decision of which test to perform is based on the condition of the patient. For the most accurate results, blood samples for CBC and biochemistries should be drawn when a bird is not stressed. Leaving a bird in a dark clinic overnight so that blood may be drawn the first thing in the morning may be the best solution (Table 8.4).

### TABLE 8.4  Suggested Ideal Examination Database for Medium and Large Psittacines

<table>
<thead>
<tr>
<th>Physical examination</th>
<th>Radiographs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight</td>
<td>Fecal Gram’s stain</td>
</tr>
<tr>
<td>CBC</td>
<td>Chlamydia testing</td>
</tr>
<tr>
<td>Biochemistries - TP, Glucose, CA, AST, LDH, CPK, UA, Bile Acids</td>
<td>DNA probe testing for PBFD virus, polyomavirus</td>
</tr>
</tbody>
</table>
Making Distinctions in the Physical Examination

Color 8.34
Normal excrement from a conure. Note the green fecal component, white urate component and clear, liquid urine component, typical of a bird on a formulated diet with limited fruits and vegetables.

Color 8.35
Clay-colored, voluminous feces in an Amazon parrot with maldigestion/malabsorption syndrome.

Color 8.36
Yellow discoloration of the urates is suggestive of hepatitis. The consumption of some yellow-pigmented vegetables and administration of parenteral B vitamins can cause a similar discoloration of the urates. In this case, biliverdinuria was present secondary to Pacheco’s disease virus-induced hepatocellular necrosis. The volume of urates and lack of feces are indicative of anorectic disorders.

Color 8.37
Polyurates and polyuria in a bird with pancreatic or bile-related renal disease.

Color 8.38
Biliverdinuria and liquid diarrhea in an African Grey Parrot with chlamydiosis.

Color 8.39
Variation in the color, quantity and consistency of the excrement passed by a normal Amazon parrot in a six-hour period. These illustrate the effects of stress on the nature of the excrement.

Color 8.40
Variance in the color, form and consistency of excrement from a normal King Pigeon.

Color 8.41
Biliverdinuria and polyuria in a cockatoo with bacterial septicemia and hepatitis.

Color 8.42
A five-square-inch area of the bottom of an Amazon parrot’s enclosure. The enclosure substrate had been changed 24 hours earlier. The grouping of the excrement indicates that the bird had remained in the same location. A scant quantity of feces is present in the oldest droppings, but the more recent droppings (consisting exclusively of urates) suggest that the bird has been anorectic for at least 24 hours.

Color 8.43
A mature Yellow-collared Macaw was presented as an emergency for an acute onset of bloody diarrhea. The bird was bright, alert and responsive. The suspected “hemorrhage” was caused by red dyes on the underside of the newsprint “bleeding” through.

Color 8.44
A cockatiel was presented for emergency evaluation of what the client described as bloody diarrhea. The bird was bright, alert and responsive. The bird had consumed a substantial quantity of fresh blackberries approximately two hours before presentation, and the abnormal color of the excrement was caused by pigments in the blackberries.

Color 8.45
Frank hemorrhage in an Amazon parrot hen with ovarian adenocarcinoma, hepatitis and bacterial enteritis.

Color 8.46
Bluish discoloration of the excrement secondary to blueberry ingestion.

Color 8.47
Discoloration of the feces and polyuria in a Blue and Gold Macaw that consumed several large slices of sweet potato.

Color 8.48
A four-year-old Yellow-naped Amazon Parrot was presented for anorexia, depression and straining to defecate. A fecal occult blood test was positive. A Gram’s stain of the feces and results of a glucose test and clotting time were normal. Hematology indicated a decreased WBC with a mild left shift. Radiographs indicated metallic densities in the ventriculus, and the bird responded to treatment with CaEDTA.

Color 8.49
Severe hematochezia in a mynah bird with bacterial enteritis. Abnormal clinicopathologic findings included TP=3.2, PCV=12.

Color 8.50
A 23-year-old obese Amazon parrot was presented with a one-day history of passing undotted blood. Radiographs indicated a soft tissue density that originated near the cranial division of the kidney and extended ventrally into the abdomen. Polyostotic hyperostosis was also evident. The bird did not respond to supportive care. Histopathology indicated severe fatty liver degeneration, bacterial septicemia and ovarian cysts.

Color 8.51
Air bubbles are frequently present in the feces of birds with diarrhea.

Color 8.52
“Slug-like” excrement in a caique with pancreatic exocrine insufficiency.

Color 8.53
Polyuria in a Blue and Gold Macaw chick being fed a standard monkey biscuit-based formula. Polyuria is common in birds fed diets containing a high moisture content.

Color 8.54
Polyuria and discolored excrement in a bird with mucoid enteritis.

Color 8.55
Diarrhea, biliverdinuria and polyuria in an Amazon parrot with Pacheco’s disease virus-induced hepatitis.

Color 8.56
Normal excrement in a stressed Umbrella Cockatoo hen. The excrement was one of several with greenish discoloration of the urates caused by bile pigments passing in the urine due to increased heart rate and kidney overload.

Color 8.57
Undigested seeds that are a component of the feces (right) must be differentiated from seeds that have fallen onto the feces. This cockatiel had neuropathic gastric dilatation.

Color 8.58
Vomitus from a Severe Macaw with neuropathic gastric dilatation. Note the frothy nature of the material and the chunks of undigested seeds. The pH of the material was 2.6, confirming that it had originated from the proventriculus.
Making Distinctions in the Physical Examination

Color 8.59
Gram’s stain of samples collected from the a) crop and b) feces of a normal Umbrella Cockatoo. Note that the bacterial population consists primarily of gram-positive rods and cocci; no gram-negative bacteria or yeast are present. The red material represents normal undigested dietary components.

Color 8.60
Gram-positive and gram-negative bacteria and epithelial cells collected from the choanal slit of a clinically asymptomatic Amazon parrot. Although the choanal slit is normally free of gram-negative bacteria, transitory gram-negative rods in the pharynx are common. A repeat Gram’s stain should be performed several days after potential sources of gram-negative bacteria have been removed from the diet.

Color 8.61
Gram’s stain of the a) crop and b) feces of an Amazon parrot with depression, vomiting and diarrhea. Note the predominance of gram-negative rods suggestive of a bacterial enteritis. If a Gram’s stain is improperly performed, gram-positive rods can appear as though they are gram-negative. To avoid the misinterpretation of an improperly stained sample, it is important to scan the entire slide and make certain that both gram-positive and gram-negative organisms can be identified. A Gram’s stain checking system (Gram Q-Chek, Fisher Scientific) is available for quality control of the stains and procedure.

Color 8.62
Wright’s stain of feces from a budgerigar with severe weight loss. Note the large rod-shaped organisms suggestive of megabacteria. Nucleated RBC’s are also present.

Color 8.63
a) Gram’s stain of feces from a clinically normal Blue and Gold Macaw chick. The blue-staining masses are characteristic of yeast. Note that the yeast are not budding. This bird was being fed a diet containing brewer’s yeast. These nonpathogenic yeast are frequently passed in the feces and should not be misinterpreted as a fungal enteritis. b) Gram’s stain of the crop in a Molucan Cockatoo chick presented for regurgitation and weight loss. Note the budding yeast suggestive of an active Candida sp. infection. Detecting an abnormally high number of yeast in the crop or feces is an indication that a bird is immunosuppressed. c) Yeast should stain gram-positive. Finding gram-negative staining yeast is an indication that the staining process was improperly performed. Non-viable yeast that have been killed with antifungal therapy will appear as clear halos against the stained background.

Color 8.64
a) Carbofuschin or b) iodine stains can be used to detect Giardia sp. trophozoites in the feces (courtesy of Bob Dahlhausen).

Color 8.65
Gram-negative bacterial rods (magnified) from a conure with hemorrhagic enteritis.

Color 8.66
Sperm from a budgerigar detected during a routine Gram’s stain evaluation of the excrement.

Color 8.67
Urate crystals are frequently found during microscopic examination of the feces.

Color 8.68
Stain precipitates and strands of cotton from a swab will appear as large, amorphous, gram-positive masses.