

CHAPTER

1

THE AVIAN PATIENT

Ross A. Perry

Veterinary medical decisions are often made by comparing the similarities and differences that occur between individual patients and an established animal model.

This comparison concept is functional because of the relative similarity between a collie and a poodle, or a Persian and a Siamese, or a holstein and an angus. Any respective difference in anatomy or physiology or in an animal's response to a drug or infectious agent is easy to qualify when compared to a generic species model.

Not so, with the avian patient. In a single day, an avian practitioner may be presented with patients that belong to five different orders. Each of these orders is unique, having evolved specific anatomic, physiologic and behavioral characteristics that allow effective competition in a specific ecological niche. Which of the numerous avian genera will serve as an appropriate comparative model (ie, generic bird patient)?

The avian clinician can be most effective by disposing of the philosophical handicap of basing medical decisions on a generic companion bird. Instead, the veterinarian must look for the natural differences that exist in patients from such diverse geographic locations as a rain forest and an African savannah.

There is not a wealth of scientifically derived information available, particularly with respect to variances in avian dietary adaptations, behavioral characteristics and response to drug preparations and infectious agents. The clinician must compensate by applying a broad medical checks-and-balances system based on the use of numerous diagnostic and therapeutic tools. Medical management decisions for a particular genera within an order must be based on the interpretation of several changes that indicate that an abnormality is truly an abnormality. For now avian veterinarians will continue to be required to diagnose and treat many medical problems subjectively until results from avian research efforts begin to satisfy the demand for information.

In developing a health plan, clients and veterinarians must strive to view the world from the bird's perspective, and, in so doing, caretakers will have greater empathy for the emotional as well as the medical needs of the bird. If the complete needs of a bird are not met (nutritional, environmental and psychologic), disease will inevitably follow. The veterinarian must prescribe health, not drugs. By being familiar with the behavioral attributes and species-specific medical problems that may occur, a veterinarian is more likely to recognize early signs of disease in an individual bird of a given species.



Selection of Companion Birds

Birds are remarkable life forms with individual behavioral and personality characteristics. These characteristics are the result of a complex and often changing interaction of environmental influences that include food availability, seasonal weather conditions and flock dynamics. From a companion bird's perspective, flock dynamics involve the interaction of family members with each other and with the bird.

In providing exceptional care and management advice, the veterinarian can become a model for responsible companion bird ownership. Unfortunately, many individuals obtain a bird for the wrong reasons (Table 1.1), instead of for the purpose of adding an intelligent, sensitive being to the family.

TABLE 1.1 Misguided Reasons for Choosing Birds as Pets

- Entertainment
- Amusement
- Admiration
- Material acquisitions
- Self-admiration ("He says my name!")
- Toys for adults
- Toys for the children
- Didn't want to see it suffer in the pet shop.

Some clients rarely handle their birds, even if they do not bite. To highly social birds, this forced isolation must be a fate worse than death. Most clients are very appreciative of some supervised training from their veterinarian on how to handle their bird, but may be reluctant to ask for guidance (see Chapter 4).

Bird Attributes

Individual clients are likely to differ as to which attributes of companion birds are desirable and which are undesirable. Before choosing a companion bird, a client may want to give careful consideration to the following questions:

- Is it possible to tame and touch this bird?
- How big does its enclosure need to be?
- How much exercise does it need? Can it take care of all of its exercise needs within the enclosure?
- Does this species bond to one person and resent others, or is it likely to allow and enjoy companionship from several people?
- What are its dietary requirements and what is involved in daily maintenance?
- Are its eating habits and droppings messy?
- What is its expected life-span? 3-5 years? 5-10 years? Over 20 years?
- Does this species have a tendency to pick its feathers?
- How susceptible is this species to disease?
- Does this bird have singing ability?
- What is the potential of this species for screeching, screaming or chewing?
- Is this species known for its talking (mimicking) ability? (Table 1.2)
- Does this individual fulfill expectations for physical beauty in a bird?
- Will this bird be a source of disease for family?
- How expensive is the bird to buy and maintain?
- How much time does the bird require?

TABLE 1.2 Species With Potential Mimicking Ability

- African Grey Parrots - male, individual variability
- Mynah bird
- Double Yellow-headed Amazon
- Yellow-naped Amazon
- Blue-fronted Amazon
- Macaws - genus Ara
- Eclectus Parrot
- Budgerigar

By learning more about the characteristics of individual species, the client is able to make a more informed decision. Avian veterinarians and aviculturists should also strive to match the correct personality of a bird with the personality of an owner. For example, Table 1.3 presents a brief reference guide to some well known characteristics of popular companion bird species. Bird clients who understand

the “uniqueness” of avian species are usually happy with their birds’ qualities (Figure 1.1).

Wild-trapped and Imported Birds

It is the belief of the author and editors that to be effective messengers for conservation and responsible stewardship, every avian veterinarian and aviculturist must strive to understand the damage induced by the harvesting of wild-caught birds, and to take every perceivable opportunity to stop these activities. If companion birds are to be relinquished to flightlessness, they should be individuals that were produced in captivity as companion birds and have never understood flight. Additionally, the trappers, brokers, dealers and consumers that trade (illegally, in most instances) in rare and endangered animal life (frequently under the guise of avian conservation) should be viewed by the community with great disdain. Protecting dwindling habitat should be the focus of individuals truly concerned with avian conservation.

Additionally, the international movement of wild-caught birds undoubtedly results in the spread of infectious agents that could have far-reaching and devastating effects on indigenous avifauna. Wild-caught birds that escape into suitable habitats can establish viable populations that irreversibly alter the habitat of native species (eg, European Starlings, Common House Sparrows). Captive breeding programs can more than sufficiently supply consumers with the bird species that make the best companions.

Captive-bred, Hand-raised Birds

Captive-bred, properly hand-raised birds make better pets than their wild-trapped conspecifics; however, malnutrition, candidiasis, stunting and various leg, toe, nail and beak deformities can occur in captive-raised birds. This is especially true if the birds are cared for by novices or in large breeding aviaries where caretakers lose sight of the needs of the individual neonate. Bonding and breeding behavior in captive-bred and hand-raised birds (eg, masturbation, bizarre courting and behavioral rituals, excessive feather plucking and self-mutilation) can occur in improperly socialized birds as they reach sexual maturity. Male birds rubbing their backside and leaving “water” on their owner’s hand is a common and notable example. Some clients will not accept that the bird is masturbating and needs behavioral modification support (see Chapter 4).

Some species such as Rose-breasted Cockatoos, large macaws, conures, Monk Parakeets and Sulphur-



FIG 1.1 Important behavioral characteristics to consider when selecting companion birds are their tolerance for handling, their tendency toward destructive behavior and their likelihood to scream. In general, hand-raised Umbrella Cockatoos tend to seek affection from multiple family members and are relatively quiet. Larger macaws are beautifully colored and playful, but they can be quite loud, tend to be destructive and usually develop a relationship with an individual family member.

TABLE 1.3 Profiles of Common Companion Birds (Some characteristics are rated on a scale from 1 to 10, with 10 being the highest value.)

African Grey Parrots (Africa) Excellent talkers - individual variability (9) Extremely intelligent - high-strung Prolific breeders once initiated Require attention (10) Relatively playful (8) Tend to form individual bonds	Cockatoos (Australia, New Zealand, South Pacific Islands) Require attention (10) Scream if neglected Crave physical contact (10) Hand-raised Umbrella Cockatoos are extremely gentle (9) Intelligent, easily house-trained Produce abundant powder (10) Can be noisy; destructive; must be socialized Mate aggression is common, particularly in Sulphur-crested group	Lovebirds (Africa) Relatively nondestructive, quiet Hand-raised birds are calm Parent-raised birds are difficult to tame
Amazon parrots (Mexico to South America) Few enjoy "petting" Excellent talkers (9) species-dependent Extroverted personalities Aggressive during breeding season Tend to form individual bonds Require attention (9)	Conures (Mexico to South America) Species variability Smaller species are gregarious and playful (9) Enjoy and seek attention (9) Noisy and destructive (7) Generally poor talkers	Macaws (Mexico to South America) Extremely intelligent Require attention (10) Can be destructive Require large living space Tend to be noisy (10) Aggressive during the breeding season Blue and Gold most family-oriented Hyacinth - least noisy and most mellow
Budgerigars (Australia) Gregarious - easily tamed (10) Good talkers but require work (7) Quiet and nondestructive Wild-type are most disease-resistant Relatively gentle (7)	Eclectus Parrots (Australia and South Pacific Islands) Generally lethargic and unplayful Dimorphic (males=green, females=red) Males are more gentle than females Tend to form individual pair bonds	Mynahs (India) Prefer not to be handled Good talkers (7) Loose, messy droppings Nondestructive
Canaries (Australia and Africa) Color mutations are genetically weak Breed prolifically in captivity Males are vocal singers Tidy and easy to care for Do not like to be handled	Finches (Australia and Africa) Melodious songs Short-lived	Pionus parrots (Mexico to South America) Small and quiet May hyperventilate when disturbed Highly stressed High altitude species cannot tolerate heat and humidity
Cockatiels (Australia) Excellent companion birds (10) Easily tamed and gentle (9) Quiet and nondestructive (8) Good whistlers - limited talkers Mutations - weak	Lories, lorikeets (Australia, South Pacific Islands) Colorful, playful, active Noisy and limited talking ability High-carbohydrate liquid diet; messy Frequently bathe	Toucans (South America) Quiet and antic Prefer some live food (rodents) Highly territorial Messy, loose droppings

crested Cockatoos are particularly prone to excessive bonding and self-mutilation secondary to separation anxiety. Other species may become suddenly aggressive toward a family member. Excessively bonded Bare-eyed Cockatoos (Little Corellas) can become quite "spiteful." These pets are less appropriate in families where the bird will remain alone for long periods. The "mini" macaws, smaller Amazon parrots, Pionus parrots, *Poicephalus* species and Umbrella Cockatoos are less likely to develop these traits. These problems can be prevented in most birds by an effective socialization program when the bird is young. Repeated generations of captive birds become increasingly docile and more adaptive to captivity.

Taming Companion Birds

Young, hand-raised Psittaciformes adapt readily to new surroundings and handling procedures. They should be exposed early in life to novel situations (eg, car travel, hospital visits, multiple visitors in the household, other household pets) so that they are well adjusted to these events. Older birds, especially wild-caught adults, are usually very difficult to tame.

Patience, self-discipline, a sense of ritual, food bribery and reward are necessary to tame some adult birds (see Chapter 4). Even then, they are rarely trustworthy and may bite without provocation.

Genetic Factors

The physical and psychological characteristics of a bird are influenced by genetic factors interacting with aspects of management and disease. Some attributes are common to most individuals within a species. Others are peculiar to particular strains of birds that have been selectively bred over many generations in captivity.

Determining the physical and behavioral attributes of related birds, especially the parents and siblings, can be of value in selecting a companion bird. It should be noted that large Psittaciformes have the capacity to live as long as humans, and adding a large psittacine bird to the family should be undertaken as a life-long commitment. Knowing the genetic background and characteristics of the relatives of a bird is particularly critical when choosing a pair of breeding birds.

Color Mutations

Color mutations are highly valued by many aviculturists. The specific genetics involved in establishing these color mutations are discussed in a number of avicultural publications. It should be noted that mutations in color are generally the result of continued inbreeding. In selecting for particular color mutations (eg, lutino cockatiels), scant priority is placed on other important attributes, so that decreased disease resistance, disorders, reduced longevity and birth defects often result. In Australia, clinical impressions suggest that there is a higher incidence of PBFD virus in the color mutations of Peach-faced Lovebirds than in wild-type green lovebirds.

Conformation and Size

Conformation of birds is influenced by genetic factors. This is most apparent when comparing the different breeds of canaries and budgerigars. Currently, show budgerigars are approximately twice the mass of their free-ranging conspecifics. Attempts to produce larger birds has also led to numerous undesirable characteristics including feathering that impairs flight, interferes with normal ambulation, accumulates excrement pericloacally and protrudes across and sometimes into the cornea.

Longevity

Longevity, the potential maximum duration of life for a species, has little relevance to exhibition or show bird breeders (who discard imperfect nestlings and older breeding birds) but should be of critical importance to the companion bird client. Some highly bred strains of birds may have life expectancies one-third to one-tenth the duration of "wild-type" or less highly inbred individuals of the same species. For example, it is believed that inbreeding has contributed to the reduction in the life expectancy of cockatiels from a record of 32 years to the present-day average of four to six years. When seeking a healthy companion bird that has the greatest potential of reaching its full life expectancy, clients should avoid highly inbred birds in favor of the wild-type characteristics.

Currently, the available information on the population dynamics of free-ranging birds and those maintained as pets is sparse. It is doubtful that the longevity for many companion bird species is known because of a lack of scientifically derived diets and less-than-ideal management parameters; however, some general working guidelines with respect to longevity are listed in Table 1.4. An increase in longevity data will require that aviculturists and avian veteri-

narians keep and compile information from accurate and long-term records.

TABLE 1.4 Suggested Longevity of Selected Companion Species

Bird	Maximum	Average
Gouldian Finch	unknown	4
Zebra Finch	17	5
Canary	20	8
Mynah	8	3
Toucan	unknown	4
Budgerigar	18	6
<i>Agapornis</i> sp.	12	4
Neophema	10	5
Cockatiel	32	5
Rainbow Lorikeet	15	3
Rosella	15	3
Eclectus Parrot	20	8
Galah	20	5
Bare-eyed Cockatoo	40	15
Sulphur-crested Cockatoo	40	15
African Grey Parrot	50	15
Pionus parrot	15	5
Amazon parrot	80	15
Macaw	50	15
Conure	25	10
Grey-cheeked Parakeet	15	8
Superb Parrot	36	6
Domestic pigeon	26	15

Selected Species Recommendations

The Grey-cheeked Parakeet, Dusky and Maroon-bellied Conures and Monk Parakeets are reputed to be relatively resistant to common diseases and are longer-lived than most cockatiels, budgerigars and lovebirds. Grey-cheeked Parakeets have been described as quiet but playful; the conures are not as quiet, yet they can be tame and affectionate; and the Monk Parakeet is considered docile, quiet and relatively nondestructive (chewing). Other bird species that are considered relatively quiet include the Ring-necked Parakeet, Pionus species, Hawk-headed Parrot, Caique, Dusky-crowned Conure, Senegal Parrot, Jardines Parrot, Cape Parrot, Meyer's Parrot, Red-bellied Parrot and Brown-headed Parrot.

An individual wishing to obtain a companion bird should be patient. Developing a relationship with an aviculturist or pet retailer and checking several references are well worth the effort. Some unscrupulous

pet retailers (particularly traveling dealers) will use dyes and bleaches to make common inexpensive birds look like less-common, more-expensive birds in the same genus. This is a frequent practice with Amazon parrots that enter the United States from Mexico and some South American countries. The consumer should be wary of strange and exotic color mutations.

■ Choosing a Healthy Bird

Parameters that may increase the likelihood of adding a healthy, mentally stable companion bird to the family are:

- Obtaining the bird from a reputable breeder who specializes in the particular species or genus of bird that is desired and has a closed flock.
- Obtaining the bird from a reputable source who works in close liaison with an avian veterinarian.
- Obtaining a young, recently fledged, parent- or hand-raised bird.
- Obtaining a well adapted companion bird from an individual who is no longer able to provide for the pet (due to age, moving, finances).
- Obtaining a bird that has normal-appearing feathers and droppings, a good appetite, appears to be bright, alert and responsive to its environment, and has not been exposed to birds from other sources.

Parameters that increase the likelihood of adding a diseased, unhappy bird to the family are:

- Obtaining a wild-trapped bird.
- Obtaining a recently imported bird.
- Obtaining a bird suspected of being smuggled.
- Obtaining a bird with an asymmetrical beak, excessively scaly legs, twisted digits, missing toes, a blocked nostril, slight swelling around the eyes, deformed eyelids, stained feathers above the nostrils, stained feathers around the vent, tail bobbing, fluffed appearance, soiled vent, poor feather quality, diarrhea, yellow urates, increased urine production, pectoral muscle atrophy, abdominal distention, fault lines and depigmented feathers (eg, black or yellow where normally green plumage occurs).

Identifying an overtly ill bird in a retail outlet should caution the consumer to purchase a bird from another source. Birds that are unusually inexpensive for the species may have a sordid past that can

include specific diseases or exposure to pathogens that may cause problems when the birds are introduced to a home or aviary. Wild-caught birds, particularly those that are likely to be illegal imports (smuggled), should always be avoided.

Health Checks

A veterinarian is well advised to seek legal advice in developing a form to be used as a certificate of examination. The term "health certificate" should be avoided because it is impossible to certify "health." It is possible only to certify that no abnormalities were detected using a particular battery of tests. The expectations of a dealer or client regarding a veterinary examination may be quite different, and requirements and liabilities are likely to vary among countries and states.

Clients should always be offered state-of-the-art diagnostic, medical and surgical services that are available on a national level. It is then the client's choice to determine what level of care they desire for their pet. It is important to note in a patient's medical record what services were offered to a client and which of those services were chosen, in order to prevent accusations of negligence. A state-of-the-art health examination for birds can include a physical examination, CBC, biochemistries, radiographs, endoscopy, Gram's stain of the feces and rostral choanal slit, *Chlamydia* sp. screening and (where available) DNA probing for psittacine beak and feather disease (PBFD) virus and polyomavirus. Because the results of a single diagnostic test are not absolute, the practitioner must combine the values reported by the laboratory with his assessment of a bird's overall condition, diet and environment.

When all the data on a patient is collected and evaluated, the practitioner can state only that in his opinion, there were no detectable abnormalities at the time of testing. Table 1.5 lists some disease conditions that are frequently diagnosed in popular companion bird species.

Transporting the Bird

Clinicians will need to evaluate a bird's excrement for the day or two before an examination; therefore, a bird's enclosure should not be cleaned for the two days before it is taken to the veterinarian. If the bird's enclosure is too large to move (in most situations it should be), then clean butcher's wrap or any non-absorbent paper should be placed on the bottom of the bird's enclosure for 12 to 24 hours before an

TABLE 1.5 Common Diseases in Companion Birds by Species*

African Grey and Timneh Grey Parrots	Coccidiosis Splay leg in juveniles Cere abscesses Hepatopathy Pancreatic insufficiency	Feather picking, barbing and self-mutilation PBFD virus
Feather picking Rhinoliths (bacterial, fungal, secondary to malnutrition) Oral abscesses Hypocalcemia syndrome Hypovitaminosis A Resistant bacterial infections - <i>Klebsiella</i> , <i>Pseudomonas</i> , <i>E. coli</i> , <i>Staphylococcus</i> Aspergillosis Neoplasms (apparent higher incidence than other species) Tapeworm infestation (imported birds) Blood parasites (occasionally imported birds) Reovirus PBFD virus Hematuria syndrome in infants Non-regenerative anemia (neonates) Neuropathic gastric dilatation	Canaries Feather cysts Obesity - lipoma Alopecia syndrome Straw feather syndrome <i>Knemidokoptes</i> sp. mite infection Air sac and tracheal mites Canary pox Dry gangrene of extremities Myeloproliferative disease Egg binding, egg-related peritonitis Dyspnea (acute, inhaled seeds) Yolk emboli Lymphocytosis Eosinophilia with inflammation Cataracts <i>Plasmodium</i> sp. and toxoplasmosis	Major Mitchell's Cockatoos PBFD virus Aspergillosis Sinusitis Metabolic bone disease in juveniles Pododermatitis and leg calluses Feather picking and barbing
Amazon parrots	Cockatiels Giardiasis (in USA) Ascariasis in Australia Mycoplasmosis Spirochetosis Obesity Idiopathic neurologic dysfunctions Diabetes mellitus Egg-binding and egg-related peritonitis Dyspnea (acute, inhaled seed) Yolk emboli Eosinophilia with inflammation Upper respiratory sinusitis, conjunctivitis Paralysis of lower eyelid, weak eye blink Mouth and tongue paralysis (esp. neonates) Yellow feathers in lutinos (hepatopathies) Pancreatitis Liver failure - fatty liver, cirrhosis, neoplasia	Rosellas PBFD virus Feather picking Aggression toward people and other birds Flightiness Pododermatitis (often severe) Motile protozoa (fatal intestinal disease)
Budgerigars	Cockatoos Self-mutilation (feathers, skin) Psychotic behavior Idiopathic liver cirrhosis Tapeworm infestation (wild-caught) Blood parasites (recently imported) Proliferative foot lesions (herpesvirus) Pododermatitis Cere hypertrophy and occluded nares Oral abscesses Trematode infestation (imported birds) Obesity Lipomas (Rose-breasted and Sulphur-crested) Cloacal prolapse (idiopathic) Microhepatia	Conures Black splotches in feathers (malnutrition, hepatopathy) Pacheco's disease virus carriers (probably no more so than other South American species) Polyomavirus Bleeding syndrome (erythemic myelosis) Screaming Feather picking (severe) Cannibalism PBFD virus Megabacteria Heat stress Neuropathic gastric dilatation
Frogmouths, Tawny (Australian captive)	Corella, Short-billed and Long-billed Acute and chronic PBFD virus Malnutrition Upper respiratory tract infections Bumblefoot and leg calluses Anti-social behavior Jealousy and aggression (breeding season)	Eclectus Parrots Lead poisoning, biliverdinuria Female aggressiveness Annular toe deformities Feather picking Cataracts PBFD virus Polyomavirus Hypovitaminosis A
Finches	Gang Gang Cockatoos Malnutrition Metabolic bone disease (juveniles)	Finches Air sac mites - Gouldians Tapeworms Trichomoniasis Bacterial infections (particularly susceptible) Egg binding Lymphocytosis Foreign body constrictive toe necrosis Dry gangrene of extremities
French Moult (acute PBFD or polyomavirus)		Frogmouths, Tawny (Australian captive) Erysipelas Subcutaneous white worms Nutritional deficiencies (vitamin B complex-responsive neurologic signs) Fatal pandemic convulsive syndrome Obesity
Polyfolliculosis		Grey-cheeked Parakeets (<i>Brotogeris</i> sp.) Sarcotiform mange (<i>Metamicrolichus nudus</i>) Chronic active hepatitis (<i>E. coli</i>) Normally high AST values Mycobacteriosis Chlamydiosis Feather picking refractory to therapy Resistance to disease and stress Screaming Nail trimming lameness
Chlamydiosis (usually chronic low grade)		
Giardiasis		
Megabacteria		
Mycoplasmosis		
Salpingitis		
Ovarian cysts		
Stroke (older budgerigars)		

TABLE 1.5 Common Diseases in Companion Birds by Species (continued)

Kakariki <i>Knemidokoptes</i> sp. (new species in feathers) PBFD virus	Self-mutilation "stress dermatitis" axillae, patagium and base of tail	Chronic active hepatitis Combination hepatopathy Heart disease Eye diseases (corneal scratches, keratitis, chronic keratoconjunctivitis) Epilepsy (idiopathic)
Kookaburra Obesity and fatty liver syndrome (excess fat) Vitamin B complex-responsive neurologic disorders Gapeworm	Avian viral serositis Neuropathic gastric dilatation Sensitive to doxycycline, trimethoprim, gas anesthetics Behavioral problems Capillaria and ascarid infestation (imported birds) Feather cysts in Blue and Golds Oral and cloacal papillomatosis Feather picking and mutilation Herpesvirus feet lesions Sunken eye sinusitis Annular toe deformities in young macaws Pancreatic dysfunctions Cataracts Polycythemia in Blue and Golds Sensitive to vitamin D ₃ Uric acid gout in young Blue and Golds Upper respiratory tract infection and sneezing Malcolored feathers (turn black in Blue and Golds and miniature macaws)	Pionus Parrots Obesity Malnutrition Respiratory infections Poxvirus infection
King Parrots (Australia) Acute PBFD virus (juveniles) Chlamydiosis	Polyomavirus Microhepatia Coagulopathies	Toucans Hepatopathies Bacterial infections Giardiasis Coccidioides Beak injuries Diabetes mellitus (Toco Toucans) Iron storage disease
Lorikeets Hepatopathy PBFD virus Fungal infections Coccidioides Ascaridiasis Cestodes Bacterial infections Injuries Necrotic enteritis (possibly clostridial)	Magpies, Australian Soft pliable beaks and bones in juveniles (parathyroid gland dysfunction) Spiruroid throat worms Scaly leg mite (<i>Knemidokoptes</i> -like)	<p>*This list is a guide to the most commonly reported clinical problems. All species discussed are susceptible to malnutrition, bacterial infections, fungal infections and toxicities. All Psittaciformes are susceptible to <i>Chlamydia</i> sp. to varying degrees. Unless a species has a particular propensity or a characteristic presentation, these problems are not mentioned.</p> <p>Diseases mentioned may be common in some localities or bird populations, whereas the same diseases are rarely encountered in other localities or populations.</p>
Lovebirds (<i>Agapornis</i> spp.) Aggression Cannibalism PBFD virus Polyfolliculitis Megabacteria Heat stress Lovebird pox Epilepsy (idiopathic) Viral infections Obstetrical problems (egg binding) Bilateral clenched foot syndrome Capillariasis	Mynahs Hepatopathies Iron storage disease Cirrhosis of liver	

appointment. The paper should then be brought with the bird to the veterinarian.

A clean, padded cardboard box or carrying crate with adequate ventilation is suitable for most short periods of transportation. The bird should be maintained at an ambient temperature of 70° to 80°F and should never be left unattended. Containers that have been previously used to transport birds must be cleaned and sterilized before reuse (see Figure 2.17). Carrying containers constructed of wood should be used only once, because they are impossible to disinfect. Most birds travel quite well in dark, cool enclosures and do not require, nor should they be given, tranquilizers (see Chapter 7).

For safety, the bird should remain in some type of secure enclosure in the veterinarian's waiting room. A bird that flies in the reception area is subject to substantial injuries.



The Home Environment

Quarantine

If a client already has companion birds, any new additions to the household should be isolated (quarantined) for six to eight weeks. The purpose of the quarantine period is to allow sufficient time for newly acquired birds to exhibit clinical signs of disease and to prevent transmission of disease to other birds. During this quarantine period, the bird should be examined by a veterinarian and any identified problems should be corrected. It should be noted that many avian infectious diseases involve a carrier state (eg, PBFD virus, polyomavirus, Pacheco's disease virus) and that quarantine alone is insufficient to ensure that one of these diseases is not introduced to a home. As diagnostic tests become available to detect

subclinically infected birds, they should be integrated into the post-purchase examination procedure (see Chapter 6).

■ Enclosures

Enclosures for birds come in numerous shapes, sizes, styles and materials. Many are designed primarily to appeal aesthetically to the client but fail dismally to address the needs of the bird. The materials or designs of some enclosures may actually create a health hazard for a bird (Table 1.6).

TABLE 1.6 Inappropriate Enclosure Designs

- Bubble-shaped (domed plastic, usually with peat substrate)
- Small rectangular or cuboidal shape
- Short or tall cylindrical shapes of small diameter (< 2 meters)
- Bamboo construction
- Highly convoluted enclosures (ornately designed)
- Multiple crevices and hard to clean areas
- Enclosures that prevent full extension of the wings
- Stacked perches that result in fouling of the lower perch
- Perches placed so the bird fouls its water or food container
- Galvanization (lead/zinc poisoning)
- Metal water containers soldered at the seams (lead poisoning)
- Copper fittings (copper poisoning)
- Internal hooks (trauma), sharp objects or sharp edges
- Fine, easily chewable mesh construction
- Little room to hop (preferably to fly) between two perches
- Overcrowded with toys and food containers (obesity)
- Difficult to clean or service
- Unpolished welds/brass "beads" (foreign body ingestion)
- Difficult access to the bird (small door)
- Insecure door latches.

Enclosures for companion birds should be as spacious as possible, with emphasis on length more than depth or height (Figure 1.2). The minimum size would allow a bird to spread its wings without touching the

sides of the enclosure. The enclosure should be clean and easy to service and should be constructed of a durable, nontoxic material. Enclosures should be used to house the bird when no one is home and at night; therefore, the enclosure should be secure and free of potential traps. Gaps between sections of the enclosure can entrap toes, beaks or wing tips and should be minimal in a well designed enclosure (Figure 1.3). Newspaper, paper towels or paper bags appear to be the best substances for the bottom of the enclosure. They are inexpensive, easy to clean and do not promote the growth of pathogens as do wood chips or ground corn cob. Cedar, redwood and pressure-treated wood chips should not be used for substrate or nesting material in birds. The design of the enclosure should minimize the likelihood and possibility of a bird having access to its own or other birds' droppings.

Position of Enclosure

A bird's enclosure should be positioned so that at least some of the perches allow the bird to be at or above eye level of standing family members. Birds are generally more secure at this level than lower and are less likely to develop dominant or aggressive tendencies than if they are placed at higher levels. The enclosure should be positioned so that it partially receives direct sunlight on a daily basis and offers a shaded area. Because a bird's normal hormonal cycles are influenced by photoperiod, it is best for the enclosure to be placed near natural lighting. The need to avoid drafts is exaggerated. Covering birds is discouraged because fresh air is more important than being exposed to home lights. A bird is best kept in the dark for sleeping.

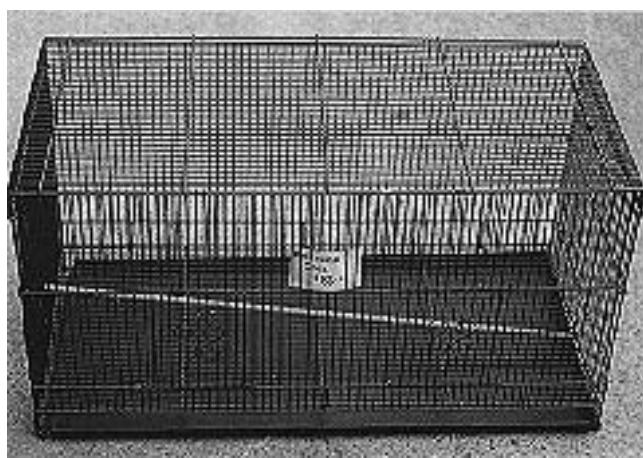


FIG 1.2 Enclosures that are long and provide some room for exercise are preferable to enclosures that are extended in height. The extra height of the enclosure creates no advantage for the bird. Doweling-type perches should be replaced with clean, nontoxic hardwood perches of variable size (courtesy of Ross Perry).

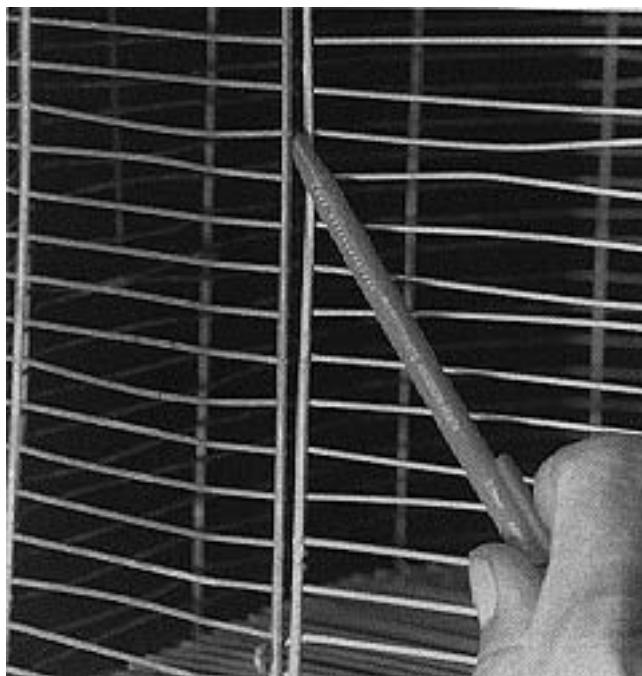


FIG 1.3 Enclosures with gaps (particularly those that have “spring” action) should be avoided. These areas of the enclosure can entrap toes, beaks or wings and result in fractures, concussions or death. Note the damage to the enclosure bars, indicating that this wire was not of sufficient strength for the Amazon parrot it housed.

It is ideal for a companion bird to have a large outdoor enclosure in which it can be placed on a regular basis for exercise and exposure to fresh air and sunlight. An outdoor enclosure for a companion bird should be protected from extremes in weather as well as from predators and rodents. The enclosure should be securely placed on its fittings to prevent movement, and food and water supplies should be protected from contamination by free-ranging birds.

Perches

Perches should be made from selected branches of clean, nontoxic hardwood trees and shrubs that have never been sprayed with pesticides or chemicals and are free from mold and wood rot. Variably sized perches should be provided; those with small diameters allow the toes to almost touch when wrapped around the perch and those with large diameters cause the feet to be flattened. The branches should be irregular in cross section, as opposed to cylindrical, to decrease the pressure placed on any one point of the foot and reduce the potential for bumblefoot. Bumblefoot is believed to be induced primarily by malnutrition but may be aggravated by inappropriate or fouled perches. Providing chew toys may pre-

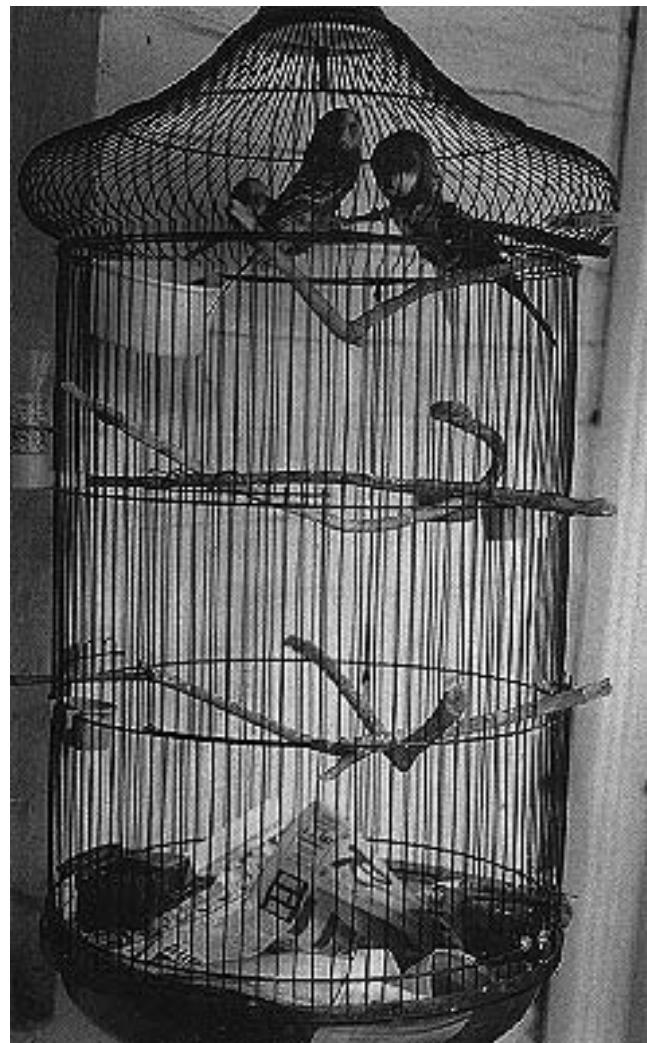


FIG 1.4 Perches should not be positioned over each other or over the food and water containers. Note the excrement contaminating the lowest perches and the water containers. Additionally, this enclosure does not have a grate, allowing birds access to their own excrement (courtesy of Ross Perry).

vent some birds from destroying a perch as quickly. Perches should be replaced frequently, especially if fouled by feces. Perches should not be positioned above each other or above the food and water containers (Figure 1.4). The use of concrete perches in combination with wood perches is becoming increasingly popular and appears to be safe as long as the diet is balanced and natural perching is also available. Sandpaper perches should never be used in a bird's enclosure. They have no effect on nail length and may predispose a bird to foot problems.

Accessories

Overcrowding the enclosure with toys and food containers can be detrimental. Some birds will use and

seem to enjoy a swing but it should be placed so that it does not obscure a flight or jumping path. If there is insufficient room for both proper perching and a swing, the swing should be removed. Food and water containers should be placed in the enclosure to encourage and maximize activity in a healthy bird; the water container should be placed high at one end of the enclosure, and the food container low at the other end of the enclosure. If a bird is ill, food and water containers should be easily accessed with a minimal expenditure of energy.

Toys

Any toys available to a bird must be free of toxic metals, hooks, sharp objects or small, easily consumed components. Various gadgetry can be placed in a psittacine's enclosure to stimulate activity and satisfy its natural tendency to chew. It is best to have a collection of different toys that are changed on a daily basis to keep a bird from becoming bored with any one type of toy. There is no quality control for the avian toy market, and the client must be acutely aware of potentially dangerous toys. Toys designed for small birds should not be used with larger birds. In general, there is not one multiple-part toy that is 100% safe. There are some common toy components that are more dangerous than others. These include snap-type clasps, open chain lengths and bell clappers that can be removed and swallowed. Safer toys have a screw-type clasp with closed chain links (Figure 1.5). Most toys with a thin rope or substantial length of sheet chain should be provided to a bird only while it is under direct supervision. If left in an enclosure, a bird can become easily entangled in these toys and die from asphyxiation (Figure 1.6). The most suitable toys for unsupervised birds include natural foods such as grass runners (eg, kikuyu, buffalo grass), various seed pods (eg, melaleuca, hakea, eucalyptus, callistemon and especially banksia for larger cockatoos), liquid amber, pine cones, vegetables, apple cores, clumps or tufts of grass freshly sprayed with water and short lengths of soft wood with bark attached (especially if live beetle larvae or borers are present). Any natural plant materials provided to birds must not have been sprayed with pesticides, chemicals or fertilizers. Fresh-cut branches from unsprayed fruit trees or vines with the bark intact are favorite treats for birds.

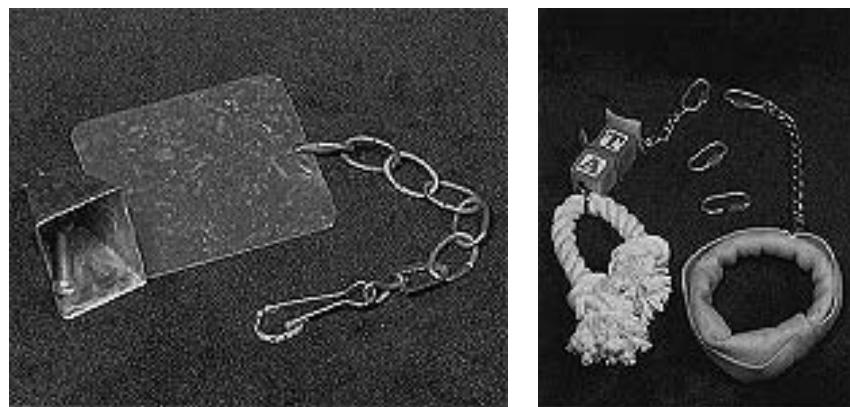


FIG 1.5 Unsafe toys have snap-type clasps, open chain links and easily consumable toxic components. Toys that are safe for a bird under supervision have screw-type clasps and closed chain links. Toys with long ropes or chains should not be left in the enclosure of an unsupervised bird.

Mirrors

Many smaller birds housed alone are offered mirrors. Some mirrors contain mercury, which is toxic if consumed. Some properly made and designed glass and plastic mirrors are suitable for small birds but can be readily demolished and consumed by large Psittaciformes. Polished stainless steel mirrors are more suitable for large birds. Sexual regurgitation of food onto the mirror is common. If regurgitated debris is allowed to accumulate on or near the mirror, the debris may become a source for exposure to fungus or mycotoxins. Windows and large mirrors in rooms



FIG 1.6 Some publications discuss the use of leg chains to restrain companion birds. Chains can cause lacerations, fractures, concussions or death and should never be used with companion birds (courtesy of Ross Perry).

where birds are allowed to exercise should be covered to prevent inexperienced or startled birds from flying into these fixed objects causing severe head and neck trauma.

Hygiene and Sanitation

With a companion bird, it is better to be fanatical with cleanliness rather than to rely on disinfectants to prevent disease transmission in a dirty, contaminated environment. Good hygiene involves the frequent cleaning of a bird's enclosure and is far more important in the prevention of disease than the use of disinfectants. Organic debris (food, excrement, feathers) must be physically removed before a disinfectant will be effective. Water and food containers should be physically scrubbed or placed in the dishwasher on a daily basis to prevent the accumulation of slime and algae.

Multiple layers of butcher's paper, recycled computer paper or newsprint can be used in the bottom of the enclosure. The soiled layer should be removed each day and the entire enclosure should be thoroughly cleaned and dried in sunlight on a weekly basis. Clients should be advised to avoid the inhalation of mold spores and dried, aerosolized particles of excrement.

There has been some discussion of an increased risk of lung disease in clients that are exposed to companion birds. The primary problems that have been reported are in association with the keeping of pigeons in loft-type enclosures where fecal and food debris are allowed to accumulate. One report that discussed an increased risk of lung cancer in association with the keeping of companion birds did not address the type of birds or adjust for exposure to cigarette smoke. However, clients that maintain any type of pet in the home should keep the pet's living space clean and should ensure a fresh supply of air at all times. The addition of electrostatic-type air filters to a central air system can also reduce the amount of animal-related debris that is circulating in the air. Clients should always be encouraged to inform their physicians that they have companion birds. This information may be of value in diagnosing and treating some zoonotic diseases.

When disinfectants are necessary, chlorine or glutaraldehyde preparations are effective for most avian pathogens (see Chapter 2). Many disinfectants emit toxic fumes and should be used only with adequate ventilation and never near a bird. Disinfectants should be thoroughly rinsed from an enclosure to prevent the bird from contacting residual compounds.

Home Hazards

Birds that are allowed unrestricted access to the home can encounter numerous physical dangers or toxins (see Chapter 37).

Mixed Aviaries

Many species of birds are highly territorial or aggressive toward other species of birds and would not be suitable for a mixed aviary. Others may be compatible except during the breeding season. The dietary preferences of some birds change during the breeding season such that they may predate eggs and nestlings from other birds. Some birds may appear quite compatible during the day but become active and possibly predatory at night.

The birds in established mixed flights develop a pecking order or hierarchy that is likely to be upset by the introduction of another bird, even if it is of a compatible species. This introductory period causes a substantial "stress" in the flock and may precipitate subclinical disease problems. It is best to plan well in advance the number and species of birds intended for a mixed aviary and to introduce all the birds to the facility at the same time. Almost certainly there will be a need for multiple feeding and drinking stations, each of which can be easily cleaned and accessed by the aviculturist. At least some of these feeding stations should be situated within smaller "trap-type enclosures" constructed within the large flights. The trap door is normally secured in an open position, but can be used to safely catch a particular bird with minimal disturbance of the other birds. Mixed flight aviaries should be provided with a variety of sight barriers and retreat areas for those individuals low in the pecking order. Each bird needs to have an area in which it can rest and feel secure.

Feeding and Watering Techniques

Healthy birds should always have a supply of clean, fresh, uncontaminated water. There is frequent discussion concerning the use of chlorhexidine in the water to reduce bacterial growth; however, in addition to reducing bacteria in water, this agent also alters the normal microbial population of the gastrointestinal tract (see Chapter 5). The routine addition of any disinfectant to a bird's water should be discouraged. Water that has been "sitting" in plastic or copper pipes can accumulate toxic levels of some chemicals, and pipes should be flushed for several minutes before collecting drinking water. During the

summer months, some city municipalities add disinfectants and algae inhibitors to the water that can be toxic to birds and fish.

Many companion birds will readily adapt to a water bottle, which is easier to clean and keep free of contaminating food and excrement than a water bowl. The use of water bottles is encouraged in birds that will use them and not destroy them (see Figure 2.9). In general, medication should not be added to drinking water; this is particularly true when water bottles are used. If a medication settles out of solution, it will settle to the bottom of the bottle, which could result in a bird consuming toxic levels of a medication (see Chapter 17).

Birds should be provided fresh food in clean bowls on a daily basis. A combination of formulated diets (70%) supplemented with some fresh fruits and vegetables (30%) appears to keep a bird in the best health (see Chapter 31). Some companion bird clients allow their pets to eat at the dinner table, by serving the bird from its own plate or by allowing the bird to roam the table and sample whatever it chooses from the plates of family members. Other clients may hold food in their lips and allow a companion bird to nibble at the food. This practice should be discouraged. High levels of salt and ingestion of some foods (chocolate, avocado) can be toxic (see Chapter 37).

Grit

Whether or not to provide soluble shell grit and insoluble coarse sand grit to a bird is controversial. This practice is viewed with disfavor in the United States, especially if given free choice, which may lead to over-consumption and obstructive gastritis. In Australia, grit is frequently offered to companion birds with few ill effects; however, birds fed formulated diets are unlikely to need either insoluble or soluble grit. As a compromise, a cockatiel-sized bird can be offered five grains of grit biannually; a cockatoo-sized bird can be offered a half-teaspoon of grit biannually. Cuttlefish bone may be provided as a supplemental source of calcium; however, with the widespread availability of formulated diets, these agents are no longer required to provide supplemental calcium. Additionally, cuttlefish bone may accumulate high levels of toxins (particularly heavy metals), and with the severe and continued degradation and pollution of the environment, this product may pose a health hazard to birds (see Chapter 37).

Seed bells that have been fashioned with wood glue should not be offered to birds. Additionally, these

products may contain a wire loop or hook that is a potential health hazard. Mite protectors are not effective for birds, and the constant exposure to the aerosolized toxins in these products may be a health hazard. Effective therapy is available for the occasional bird that develops a mite infection (see Chapter 36). In nature, birds will sometimes be observed feeding from sun-bleached, uncooked bones. Charcoal may be consumed by a bird when it is offered; however, it has been shown that charcoal can cause a vitamin B deficiency and it should not be offered on a regular basis.

■ Preventive Care

Wing Clipping

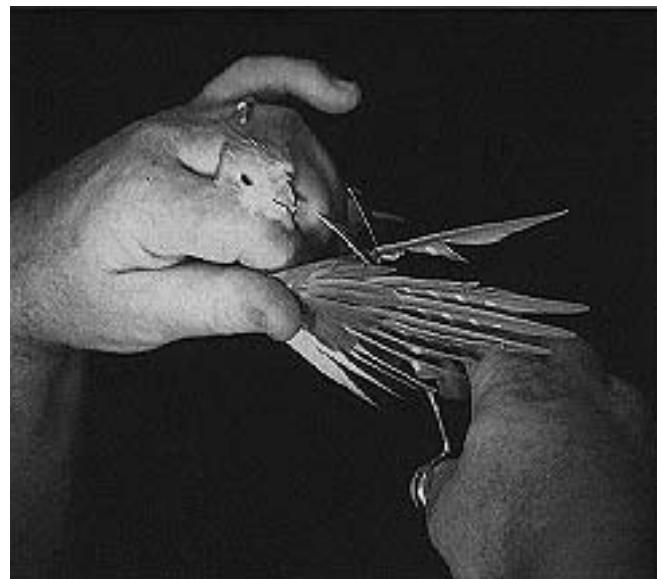
Advantages and disadvantages exist for each of several methods for clipping the wings. The clinician should determine the client's expectations of the appearance and the reduced flight capacity of the bird prior to performing a wing clip. The client should authorize the trimming or removal of any feather that will alter the appearance or function of the bird, particularly with respect to show or racing birds. It is important to identify and avoid any pin feathers (blood feathers, blood quills), as a developing feather that is cut below the pulp cap will bleed profusely.

The goal of clipping the wings is to prevent the bird from developing rapid and sustained flight and *not* to make a bird incapable of flight (Figures 1.7, 1.8). A bird that is unable to gain any lift with the wings becomes a free-falling object if it jumps from a high location. Excessive wing trims can result in fractures of the legs, wings or lacerations of the keel (see Color 8).

A bird will require additional trimming eight to twelve weeks after the start of a molt cycle. Wing clipping has been loosely associated with feather picking and self-mutilation in species that are prone to this behavior (Gang Gang Cockatoos, Major Mitchell's Cockatoos, Moluccan Cockatoos, Rose-breasted Cockatoos or rosellas); however, the role that feather clipping plays is unsubstantiated. In smaller athletic birds, both wings may require clipping to reduce flight capacity.

Nail Clipping

Healthy birds usually have strong, sharp nails that can be uncomfortable to the client when the bird is perching on the arm or shoulder. A short length (usually about 2 mm) of the nail can be removed by trimming or grinding without causing pain or bleed-



ing (Figure 1.9). Sandpaper perches are contraindicated for birds and are not an alternative to nail trimming. Short-blade podiatric nail clippers can be used to trim the tip of the nail with minimal risk of accidentally cutting adjacent toes.

Alternatively, a motor driven hobby grinder (preferably with a rheostat foot switch) with a cone-shaped stone may be used for filing and shaping nails and beaks (Figure 1.10). When using a grinder, it is easy to slowly reduce the length of the nail or beak and to stop at a point just before bleeding might occur. Any bleeding that does occur is best controlled with a bipolar radiosurgical unit (beak), silver nitrate stick (nails) or Monsel's solution (both). It is best not to use a silver nitrate stick around the beak. The silver nitrate deposited at the wound site can remain active

FIG 1.7 During the wing trimming process, the wing is held at the shoulder with the humerus in a fixed, extended position. Each individual feather is depressed with the scissors and cut below the covert, being sure to miss any pinfeather shafts to avoid bleeding. An aesthetically pleasing wing trim can be performed by pushing a feather to be cut ventrally and then clipping the quill at a level under the wing covert feathers.

and cause caustic burns to the tongue or oral mucosa. The dust created by grinding the nails and beak is a health hazard and should be exhausted. The grinding stone and nail clippers should be sterilized between birds.

Bathing

Many birds enjoy a bath or shower and should be given the opportunity to determine the degree and duration of exposure to moisture. Frequent misting encourages normal grooming activity, which is critical to proper feather maintenance. After bathing, birds should have access to a warm, draft-free area to preen and dry. Some birds like a shallow container in which to bathe, while others prefer a fine spray (clean misting bottle). Some smaller birds prefer to bathe in a wet clump of grass or wet salad greens. Some like to fly onto and off the client's shoulder or head while the client is having a shower.

Very few birds like to be physically placed in bath water and washed. The few indications for manually bathing a bird include the removal of oils, greases, waxes, paints, dirt and dried medications. Unless a material contaminating the plumage is toxic, it can be removed a little at a time with repeated baths of short duration. This prevents the bird's exposure to excessive quantities of soaps and detergents (see



FIG 1.8 In larger birds, clipping the secondaries and all but the most distal two or three primaries generally results in a bird that has some flight capabilities that allow it to float to the ground in a spiral fashion. In smaller athletic birds, both wings may require clipping to reduce flight capacity.

Chapter 15). It may take months for birds that have been washed in soaps and detergents to regain the normal color and water resistance of their plumage.

Medications or food particles that have dried and become encrusted on the feathers around the mouth are removed by pre-moistening the material, then gently washing with a cloth a few minutes later.

■ Identification Methods

Leg Band Removal

Open leg bands should always be removed from companion birds. Some closed leg bands aid in the identification of a bird and may suggest that the bird was captive-bred; however, they can constitute a health hazard. Potential band-induced problems include entrapment of the leg in the enclosure accessories or the accumulation of a constrictive ring of keratin (usually associated with malnutrition or *Knemidokoptes* mites) between the band and the leg that can lead to impaired circulation and necrosis (Figure 1.11). Flat bands that are often too wide to comfortably ride on the tarsal bone can lead to traumatic exosteo bone formation. Any details on the leg band should be recorded in the bird's record prior to removal. The client's consent should always be obtained before the band is removed. A highly prized breeding bird could be rendered almost valueless if its leg band is removed and no other form of identification (such as a microchip) is available. A band that is removed should be given to the client.

Bands are easiest to remove before they begin to

constrict the tissues. It is generally recommended to anesthetize a bird with isoflurane to ensure that a band is safely removed. This prevents the bird from suddenly moving during the band removal process, which can result in lacerations or fractures of the leg depending on the type of removal device used. In removing any band, it is important that forces be applied to the band itself; pressure must not be applied from any direction to the leg.

Small closed bands made of plastic or aluminum can be easily transected with Heath-type stitch removing scissors (Figure 1.12). Two diagonally opposing cuts



FIG 1.9 Nail trimming is most easily achieved using a motor driven hobby tool.



FIG 1.10 Beak trimming can best be accomplished using a motor driven hobby tool. Resting a finger on the beak or head can facilitate control when trimming the upper beak. The lower beak can be most easily trimmed by placing the tip of the upper beak inside the lower beak.

are made and the band falls off in two halves. Large split bands are easiest to remove by using two pairs of locking pliers to apply opposing force at the site of the opening. Attempting to cut large, open import bands can result in collapse of the band against the leg, resulting in bruising, lacerations or fractures (Figure 1.13). Additionally, the force placed on the band becomes uncontrolled at the point where the cutters fully penetrate the band, and undue stress is placed on the leg.

Bands that are associated with constrictive accumulations of keratin (in-grown bands) can best be removed by using a variable speed hobby tool and a fine tip cutting bit. The bird should be anesthetized and the leg should be held by the individual using the hobby tool to prevent slipping of the tool or leg, which can result in severe laceration (Figure 1.14). The constrictive rings of accumulated keratin should be removed by moistening them with skin softeners or aloe vera gel and gently peeling them away. A bandage or light splint may be necessary to support the bone if it has been weakened by the constricting material.

Closed bands are applied to developing neonates to indicate that the bird is captive-bred; however, this is not reliable identification because closed bands may also be placed on free-ranging neonates in the nest, or chicks of free-ranging species can be close-banded after their eggs were stolen from the nest and carried illegally to other countries. Closed leg bands can be of different colors and may have imprinted on them a variety of coded information. They are designed to be worn permanently by the bird but can create problems in some situations.

Tags

Numerous shapes and sizes of tags have been applied with varying degrees of success to the wings, the patagial membrane or backs of birds. This method of identification is used by field biologists in the study of free-ranging birds and is rarely encountered with companion birds.

Tattoos

Specific information placed in the skin of a bird by tattoo rarely remains legible. In practice, tattoos are

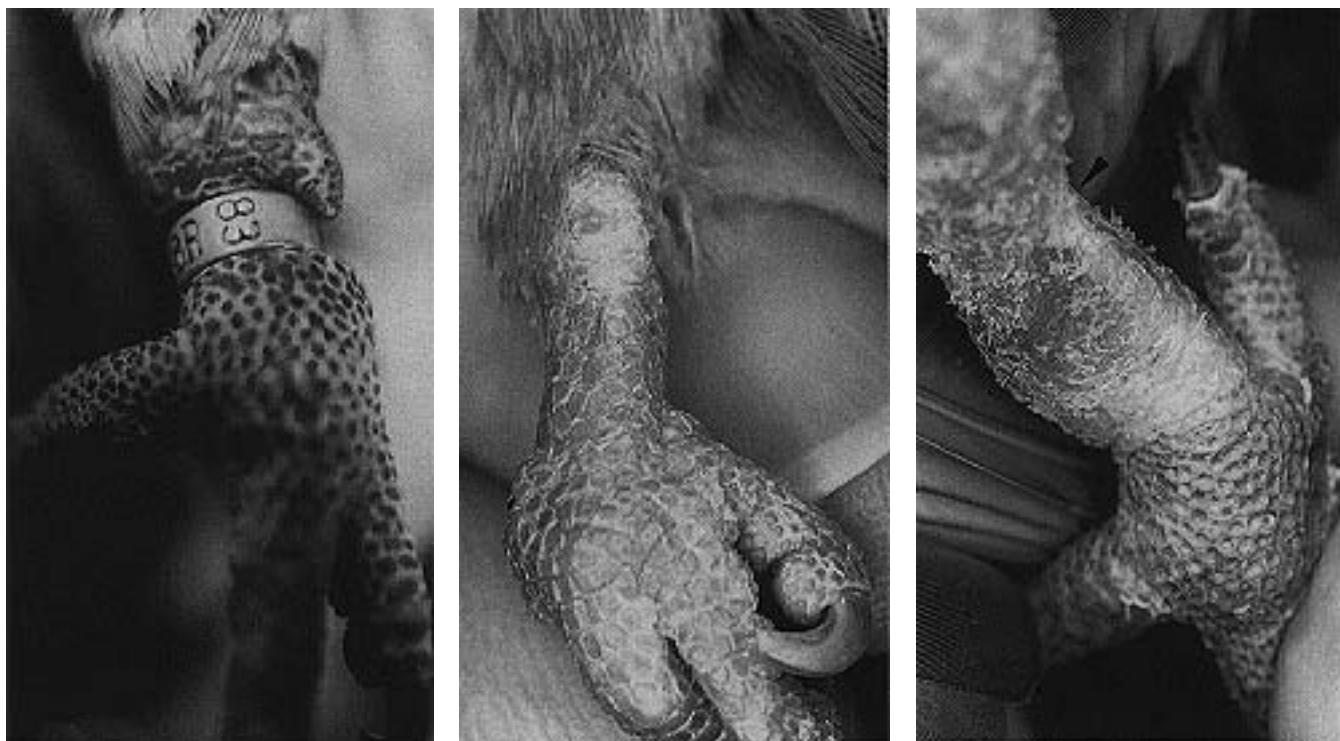


FIG 1.11 Closed bands that are too small can cause constrictive lesions or can lead to the accumulation of keratin debris under the band, which results in constriction. The leg of an Amazon parrot after removal of a band shows the constriction of the soft tissue (arrow), and bruising and swelling of the distal limb (open arrow).

generally restricted to indicating the gender of a bird following endoscopic evaluation of the gonads. By convention, tattoo ink injected into the left patagial membrane indicates a female and in the right patagial membrane indicates a male (see Color 8). The tattoo ink used should be sterilized to prevent the ink from serving as a nidus for bacterial granulomas.

Microchips

Microchips are small electronic devices that are injected into the musculature (usually, the pectoral muscle of birds) to provide permanent identification. A radiograph can establish the presence and location of a chip (Figure 1.15). The microchips are coded and the code can be read by use of an appropriate reader (see Figure 2.1). Microchips are of particular use for establishing proof of ownership of

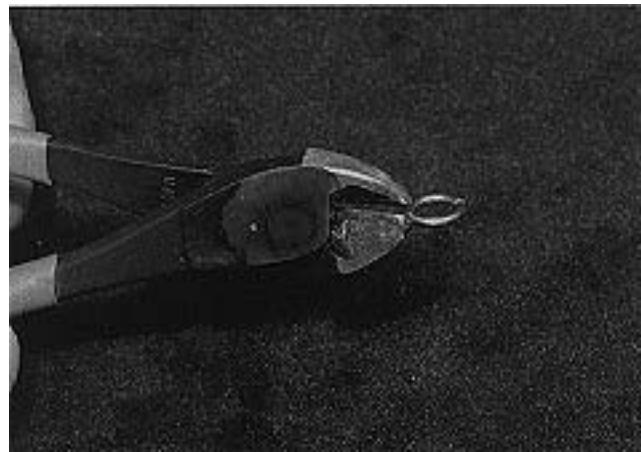
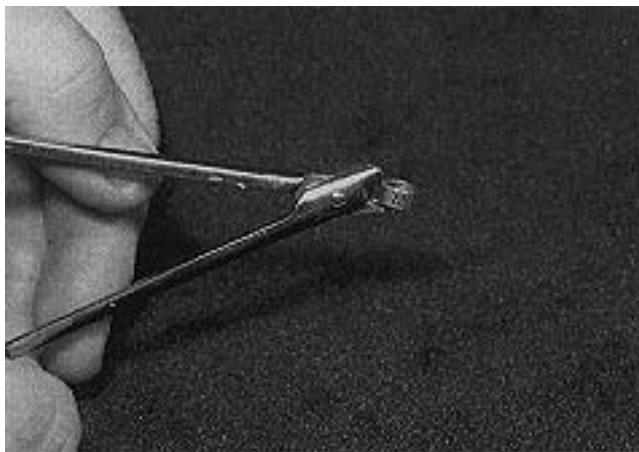


FIG 1.12 Stitch removal scissors and flush cutting or diagonal cutters can be used to remove small aluminum or steel bands, respectively.

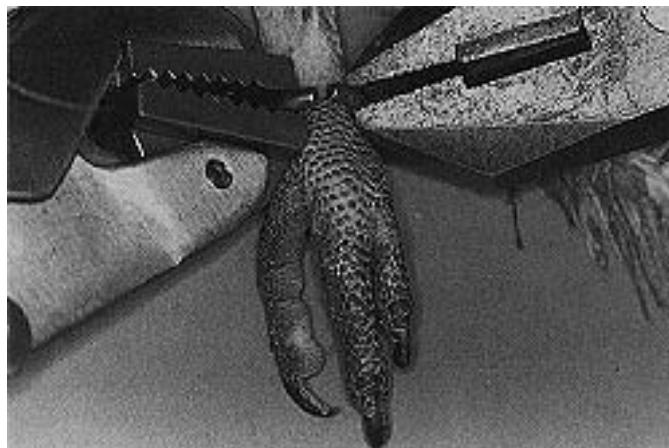


FIG 1.13 The easiest and safest way to remove open steel bands is to use two pairs of locking pliers to control the opposing force of the band's opening. Attempting to use large bolt cutters to remove these bands can cause lacerations or fractures. Note that gaining sufficient purchase on the band with the cutters places opposing force on the leg (arrow).

birds that are likely to be stolen. The use of microchips is hindered only by their cost and the restricted availability of readers. Unfortunately, there is no industry standard, and a single reader model cannot identify all available microchips. Microchips can be injected into the pectoral muscle of most birds without sedation or anesthesia, although given the option, the author prefers to perform the procedure in an anesthetized bird. The public awareness of the implantation of microchips into endangered birds or other populations that are susceptible to illicit trapping may act as a deterrent to illegal collection and movement of these birds.

DNA Fingerprinting

DNA fingerprinting offers a technique for accurately identifying an individual bird and, with proper samples, identifying the bird's immediate relatives. Storage banks for DNA collected from Psittaciformes are currently available in some countries. Collecting and storing the information is relatively inexpensive, but the manipulation or evaluation of the data is relatively expensive.

DNA fingerprinting may be of particular value in studying free-ranging birds for government officials involved in the monitoring of local and international bird trade or for establishing genetic information on birds in large aviaries or zoologic collections. In sev-



FIG 1.14 A hobby tool with a fine cutting bit is best for removing closed bands that are constricting tissue. The patient should be anesthetized for the removal process and fluids should be constantly flushed over the band to prevent it from heating during the cutting process.

eral legal cases, DNA fingerprinting was used to evaluate the lineage of birds. In one case in Europe, this technology was used to prove that a group of birds had been illegally imported, resulting in the proper criminal prosecution of a smuggler. In another case, DNA finger printing was used to disprove that

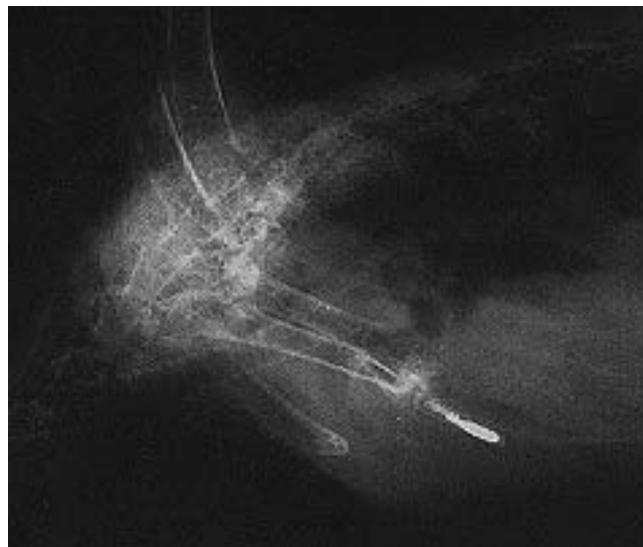


FIG 1.15 Radiographic appearance of a microchip implanted in the pectoral muscle of a companion bird.

a pair of supposedly proven breeding birds had not been the parents of a neonate.