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Psittacines

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Introduction

Currently, there are over 9000 documented species of birds living on Earth.¹ Birds are among the most popular companion animals in the United States. Psittacine birds, in particular, are appealing companions because of their social behavior, exotic plumage, and vocal mimicry ability. There are over 300 different species of birds in the order Psittaciformes living in various parts of the world. They are found mainly in tropical and sub-tropical forests located in Central and South America, Australia, Southern Asia, New Guinea, New Zealand, and Central Africa, occupying habitats ranging from grasslands to mountain ranges to arid plains. The percentage of households in the United States keeping pet birds was estimated to be 3.9% in 2007, with the total number of pet birds estimated to be 11,199,000.²

Common characteristics of psittacine birds are hooked beaks with a downward curved upper maxilla that fits over an upward curved lower mandible and a thick, muscular tongue. They have a zygodactyl toe arrangement, with the second and third toes projecting forward and the fourth toe and hallux projecting backward.² These specialized feet allow them to maintain a good grip on branches and enable them to hang upside down or sideways. While climbing, psittacine birds use both their feet and beak for grasping.

The order Psittaciformes includes the families Loriidae, Cacatuidae, and Psittacidae. The birds belonging to this order are more commonly referred to as psittacines. The family Cacatuidae includes all cockatoo species and the cockatiel. The family Loriidae includes the lorries

and lorikeets. The family Psittacidae includes Amazons (*Amazona* spp.), pionus parrots (*Pionus* spp.), macaws (*Ara*, *Cyanopsitta*, and *Anodorhynchus* spp.), conures (*Aratinga*, *Cyanoliseus*, and *Pyrrhura* spp.), rosellas (*Platycercus* spp.), budgerigars (*Melopsittacus* spp.), grass parakeets (*Neophema* spp.), African gray parrots (*Psittacus* spp.), Cape, Jardine's, Ruppell's, Meyer's parrots (*Poicephalus* spp.), lovebirds (*Agapornis* spp.), hanging parrots (*Loriculus* spp.), ring-necked parakeets (*Psittacula* spp.), and fig parrots (*Opopsitta* and *Psittaculirostris* spp.).

Psittacine birds are highly social. In their natural habitats, they typically live in large social groups with complex intraspecific interactions. Their daily activity patterns include flying, foraging, resting, and self-maintenance, as well as interactions with other members of the group. In captive settings, it is not uncommon for psittacine birds to develop abnormal behaviors. In order to provide suitable captive environments and effectively manage undesirable behaviors of captive pet birds, there must first be an understanding of natural psittacine behavior.

Flock behavior

Psittacine birds form complex social groups called flocks. Flock formation serves to reduce predation pressure, facilitate cooperative foraging, improve reproductive success, and strengthen territorial defense.³ Birds travel to different areas to locate adequate food, and flocking increases the efficiency of food-searching activities. Flocking provides security for group members and allows them to forage more

efficiently in a shorter amount of time. There is increased safety within a large flock such that individuals located in the center of the group are less likely to fall victim to predators.³

Flock size can vary depending on the availability of certain resources, such as food or nesting sites. Species that rely on small clumped food sources, such as fruit trees, tend to live in small diurnal feeding flocks. Galah cockatoos (*Cacatua roseicapilla*) and budgerigars (*Melopsittacus undulatus*) utilize widely dispersed food resources and typically form larger flocks.⁴ A large roosting flock will often separate into smaller foraging flocks during the day. This may be a strategy adapted to minimize intraspecies competition for food.⁵

The parrots' day consists of a cyclic pattern of flying, vocalizing, foraging for food, resting, grooming, and social interactions.^{6,7} Most flocks are active soon after sunrise, but tend to decrease their activities during the warmer periods of the day.⁶ In the evening with decreased light available for foraging, birds engage in intraspecies social activities and focus on predator avoidance.⁸

Flock hierarchy

Within any complex social group, a system must evolve that enables flock members to determine allocation of resources and coexist with minimal aggression. Overt aggression directed at members of the flock would interfere with flock activities and increase the risk of injury and mortality within the flock. The formation of a dominance hierarchy promotes stable, predictable interactions between flock members. A dominance relationship is said to exist when a consistent pattern of dominance–submissive postural signaling occurs between two individuals within the group. The higher-ranking individual will exhibit assertive behavior toward the subordinate, and the subordinate will passively defer, reducing the incidence of overt aggression. Dominant (assertive) or submissive (subordinate) behavioral responses are determined by the outcomes of previous interactions between the individuals involved.³ Once a dominance relationship has developed, it functions to decrease aggressive encounters between flock members, reducing competition and conferring priority of access to limited resources to higher-ranking individuals. The following behaviors were exhibited by assertive members of a cockatiel flock: turn threat, beak gape, peck threat, beak spar, peck, wing flapping, sidle approach, slow advance, and rushing and flight approach.⁹ Birds exhibiting submissive or appeasement behaviors typically crouch, fluff their feathers, wag their heads, lift a foot, or avoid assertive flock members.³

The individuals with higher rank may benefit from preferred access to food resources, roosting sites, nests, and mating opportunities.³ Hardy noted that aggression occurred more frequently during feeding, bathing, or seeking roosting sites.⁶ Seibert and Crowell-Davis found

that higher-ranking males in a captive flock of cockatiels had greater access to mates and preferred nest boxes.⁹ They also noted that males were more aggressive than females, and females were more aggressive toward other females than males. While dominance relationships are critical to flock success and stability, the existence of cross-species dominance relationships has not been investigated.

Diet

In the wild, parrot diets are dependent upon the environment. Parrots are opportunistic foragers that primarily consume fruits, nuts, and seeds.^{7,10,11} They have high-energy requirements due to their foraging and reproductive efforts. They may occasionally ingest insects while consuming their staple diets. Keas (*Nestor nobalis*) inhabiting the alpine region of New Zealand are the only parrots known to be omnivorous. Their diet includes plants, seeds, fruits, insects, and carrion.^{12,13} Lories and lorikeets have special dietary requirements. In their natural setting, lories and lorikeets feed on fruits, seeds, blossoms, buds, and berries; they also have a specialized tongue that allows them to collect pollen and nectar from flowers.¹⁴

Parrots will include seasonally available items in their diets. Scarlet macaws have been observed feeding on seeds, fruits, leaves, flowers, and bark from 43 different plant species in Costa Rica. Some of the food items are non-native plants introduced in the local area for agricultural purposes.^{11,14}

Reproduction

Male birds display certain ritualized behaviors during courtship. Male budgerigars display head bobbing during courtship.¹⁵ Other psittacine courtship behaviors consist of bowing, head pumping, hopping, wing flicking, flapping, tail wagging, and strutting.¹⁶ Male cockatoos may erect the crest feathers during a courtship display, along with opening the wings and spreading the tail feathers. When the cockatoo crest is erected during times of non-breeding, it may be an indication of excitement or arousal. Psittacine birds also use vocalizations specific to courtship. Budgerigars sing a warble song to synchronize reproductive behavior between the breeding pair. Male budgerigars have been found to warble at a higher rate than females.⁴

There are many reproductive systems used by avian species. The type of system used is dependent on ecological and social factors.¹ To briefly summarize, the different systems are:

- **Polyandry**—A female forms pair bonds with multiple males. Both females and males provide parental care.
- **Polygynandry**—Males and females both pair with multiple partners. They form a communal nest and all individuals participate in raising the offspring.

- *Polygyny*—A male breeds with multiple females. The female is responsible for raising the offspring. The male may not provide any parental care.
- *Monogamy*—A single male and single female form a pair bond for breeding and raising the offspring through the season. This is one of the most common mating systems in the avian world.

Within a monogamous reproductive system, several different breeding strategies can be employed to ensure the survival of offspring.

- *Territorial breeding*—A pair defends an established territory that contains the nesting site, or food and other resources.
- *Colonial breeding*—All mating pairs position their nests in a colony. This strategy is chosen when there are limited nesting sites near a food resource. Cooperative defense against predators is a key characteristic of colonial breeding.
- *Cooperative breeding*—The breeding pair has helpers, who may be individuals from their previous brood, who assist in feeding and protecting the offspring.

Pair bonding

Pair bonding is defined as a mutual attachment between a male and a female for the purpose of reproduction. Members of a bonded pair show preferential affiliative behaviors toward their mate, characterized by allopreening, beak touching, and allofeeding. Bonded pairs will often mutually exclude other individuals from these interactions. Males have been known to regurgitate to their partners as part of their courtship, but this behavior may also function to strengthen and maintain the pair bond.¹² Bonded pairs have also been observed to engage in aggressive behavior in defense or support of the mate.⁶

Allopreening usually occurs between breeding pairs or preferred associates and provides mutual benefits to the performer and recipient.³ The preening is often directed to the head and areas of the body that the recipient cannot easily reach. For a bonded pair, the physical interaction of allopreening serves to strengthen their relationship. Allopreening occurs most frequently when pair bonds are first formed or after the pair has been separated. Solicitation of allopreening, with feathers fluffed and head bowed or withdrawn, can also be used for appeasement in the event of an aggressive act.

Monogamy is the formation of a pair bond that lasts through the breeding season. Parrots that form serial monogamous bonds may remain with one partner throughout the breeding season but may take part in extra-pair copulations.^{9,17} After the breeding season, some pairs may stay together throughout the year.⁶ More experienced pairs typically have a higher reproductive success than newly

formed pairs.^{4,18} Budgerigars often maintain the same pair bond from one breeding season to the next, whereas green-rumped parrotlets (*Forpus passerinus*) frequently have different mates from season to season.⁴ Certain species of parrots have adapted to different social systems at different times of the year. They may pair bond during the breeding season, then form family groups when their chicks become fledglings.

Nesting

During the breeding season, parrots nest in tree cavities. While they do not create holes in trees, they can and do modify the cavity or entrance by chewing with their beaks. Most parrots have individual nests that they defend against intruders and predators.

Some species, such as the monk parakeet, engage in communal nesting. They are colonial breeders and are the only parrots that build nests.¹ Each pair has a separate entrance into the nest. It is not uncommon for monk parakeet breeders to have a helper.

Pink cockatoos (*Cacatua leadbeateri*) sometimes displace Galah cockatoos (*Eolophus roseicapillus*) from their nests after eggs have been laid. The pink cockatoos may raise Galah cockatoos along with their own young. Galahs raised by pink cockatoos produce contact calls of pink cockatoos and associate with the foster species, even when exposed to their own species.⁴

Parental care

Hatching occurs asynchronously. In some clutches, the eldest can be several days older than the youngest hatched. Newly hatched psittacines are altricial, meaning that they are born naked, blind, weak, and helpless. They are unable to maintain their body temperature and rely upon the parents to keep them warm. Chicks are completely dependent upon the parents for food and protection from predators until they fledge and leave the nest. Due to the huge parental investments required for reproductive success, psittacine parents often engage in cooperative biparental care of offspring. Males often provide for the female and the chicks.¹⁸ In some species of cockatoos, the males have been observed to assist with incubation of eggs.⁴ As the chicks develop, the parent's nest attendance declines.¹⁸

Social interactions with the parents and clutch mates are necessary for vocal learning and social development. Budgerigars raised in isolated groups can eventually learn normal behavior and vocalizations once they rejoin a flock.⁴ However, individual chicks raised in total isolation continued to display aberrant behaviors even after exposure to other birds.

Different species engage in a variety of parental care strategies. Meyer's parrots (*Poicephalus meyeri*), and several other psittacine species, place their juveniles together in

a communal nursery area.¹⁹ Parents continue to care for their own fledglings, and fledglings recognize and respond to contact calls from their own parents.

Once old enough to leave the nest, juvenile parrots form large foraging groups. Young psittacine birds have been observed to engage in different forms of group play. They beak wrestle, push each other with their feet or chase each other on foot or in flight. Some juvenile keas exhibit object play with a stone, stick, or any small object that they can grasp and toss in the air.¹²

Vocal communication

Avian vocal communications are comprised of different types of calls (short, innate, stereotyped vocalizations), and songs (longer complex vocalizations that are learned) used to convey specific messages. Parrots use contact calls for flock members, alarm calls for predators, flight calls, calls to indicate that food has been located, and more. Other vocalizations are used to indicate particular social relationships within the species or to identify potential mates.²⁰ Psittacine birds are generally silent during the day while they are feeding. Vocalizations are associated with roosting and flying from foraging sites.^{1,5,6}

Vocal mimicry is an innate part of a bird's vocal development. It enables juveniles to learn the calls and songs required for communication with flock mates. While songbirds have critical periods for song learning, psittacine birds exhibit vocal plasticity in which they can learn new vocalizations throughout their lifetime. Adult budgerigars can learn and imitate complex sounds.²¹

Vocal mimicry can be utilized in predator defense, and nest and territory defense.²⁰ When there is a threat to a nest or an individual, the threatened individual can give the mobbing call of another species. Birds of the other species will be attracted to the call and mob the predator. If an intruder approaches a nest or territory, the threatened individual can mimic the call of a predator and frighten the intruder.

A study by Masin, Massa, and Bottoni on fledgling Meyer's parrots showed that young chicks exhibit vocal learning while they are in the nest.¹⁹ By the time of weaning, the chicks exhibited 100% similarity with the father's vocalizations. Chicks raised without vocal context produced subsongs that were simpler and more monotonous than chicks raised with a vocal tutor.

A contact call is a distinct vocalization that a bird makes when attempting to establish the location of other members of the flock. Contact calls are one of the most common calls observed within a flock of parrots.²² These calls can be very loud and carry for great distances. Parrots can discriminate contact calls between family members and non-members and use different contact calls for different social companions.

Vocal mimicry and plasticity enable juveniles to learn the calls and songs required for communication with other

flock members. Juveniles mimic adults and learn from auditory feedback of their own calls. Amazon parrots roost in communal groups each night comprising 50–200 birds. Each group has its own dialect, and flock members only respond to calls within their own dialect.²² Juveniles must learn this dialect before dispersal in order to interact with members of its flock.

Vocal plasticity also allows adult parrots to learn vocalizations that help maintain bonds within a flock, which is particularly relevant for species in which individuals change flocks several times in their lifetime, such as the Galahs.⁴ Psittacine birds can selectively learn to mimic the vocalizations of the individuals with whom they are closely bonded.²³

The range of hearing for psittacine birds includes frequencies from 1 kHz up to 4 kHz. Budgerigars have the ability to discriminate and remember complex vocalizations that occur in the range in which they hear best.²⁴ Auditory feedback is important for young birds to learn the appropriate songs. If budgerigars are deafened, they vocalize less and have contact calls that differ from the calls of normal siblings.²⁵ Adult birds also need auditory feedback in order to maintain the learned songs.

Non-vocal communication

Non-vocal communication consists of signals and displays. A signal is a behavior that changes the behavior of the recipient in a manner that benefits the sender. A display is a ritualized signal that conveys a specific message to the recipient. Displays are used by psittacine birds during courtship rituals.

Plumage and color also play a role in communication. Bird vision is considered tetrachromatic because they can visualize both near ultraviolet (UVA) and ultraviolet (UV) wavelengths.¹⁵ They have the ability to see UV wavelengths because they possess a UV-sensitive cone in their retina. Parrots can also see fluorescence, which occurs when short wavelength light is absorbed and re-emitted. When the light is re-emitted, it occurs in longer wavelengths.^{15,26} Certain Australian parrots, such as certain cockatoos, rosellas, blue-winged parrots, and budgerigars, have been found to possess a yellow fluorescent pigment in their feathers undetectable to the human eye.

Budgerigars are sexually dimorphic parrots that live in the arid regions of Australia. Several studies that involved altering the fluorescence of male budgerigars¹⁵ demonstrated that alterations in reflectance in the UVA waveband affected female choice of mates. Budgerigars also possess fluorescent yellow plumage in contrast with UV reflecting blue plumage on their heads, which is used during courtship displays.²⁶ Hausmann et al. examined 108 species of birds and found that significantly more UV reflective plumage is found in body regions associated with active courtship display.²⁶ In parrots, there are twice as many

species with fluorescent plumage in areas used for courtship displays, than non-displayed areas on their body.

Birds may have adapted the use of UV signals for many reasons.²⁶ It can be used to signal over short distances. Birds can signal with less risk of being exposed to mammalian predators since most predatory species cannot perceive UV light. UV signals contrast sharply against foliage. They may also be an indication of good health since they are created by feather microstructure rather than pigmentation. The UV signals are also iridescent which may help to augment courtship displays.

Diagnosis and treatment of common behavior problems of psittacine birds

Complaints about behavior can arise when pet birds struggle to cope with inappropriate environmental conditions, when social interactions are poor in quantity or quality, or when caregivers misconstrue normal parrot behaviors. Early adverse experiences can also influence later behavior, particularly those that occur during sensitive developmental periods. Conditions associated with some captive breeding programs, such as early separation from clutch mates, maternal and paternal separation, hand weaning practices, and inadequate socialization, can have long-term consequences on coping styles, neuroendocrine responses to stress, neural circuitry, and social competence.²⁷ The impressive cognitive capabilities of parrots may also be a factor in the development of behavior problems, because of the lack of adequate intellectual and occupational challenges in captive environments.^{28,29}

Many parrots are kept as single-housed birds, making the human caregiver the sole target of social contact. Problem behaviors reported by owners of psittacine companion parrots include aggression and biting, feather picking and self-inflicted injuries, social avoidance of family members, excessive vocalization, destructive behavior, fears and phobias, inappropriate sexual behaviors, overeating, and failure to accept new diets.

Behavioral evaluation

The diagnosis of a primary behavioral problem requires establishing a doctor–patient–client relationship, obtaining a thorough behavioral history, performing a physical examination and appropriate diagnostic testing, evaluating the nutritional status of the bird, evaluating the environment, and observing the behavior of the bird within the environment, including interactions with caregivers and family members.³⁰ Important historical information that should be collected during a behavioral evaluation is listed in Table 1.1.³¹

Behavior symptoms include feather picking, mutilation, screaming, aggression, and avoidance behaviors. Symptoms

Table 1.1 Historical information during a behavioral evaluation

Early history: source of the bird, type of weaning
Housing: size and style of cage, perching areas, list of cage contents
Object enrichments: toys (style, number, rotation)
Locations of cages and play areas
Feeding schedule and foraging opportunities
Photoperiod: sleeping arrangements and schedules
Confinement schedule: time in cage, out of cage, alone
Primary caregiver interactions: time spent with bird, nature of interactions
Family member interactions
Presence of other species
Bathing
Training and commands: methods used
Reaction to new objects or people
Play behavior
Physical exercise and locomotor activities
Sexual behaviors
Air and lighting quality
Recent changes to environment
Description of a typical day for the bird

should not be mistaken for diagnoses. A list of differential diagnoses should be developed based on diagnostic testing and the behavioral history. Specific information about the behavioral complaint or complaints should include a detailed description or videotape of the behavior, age of onset and any particular events associated with the onset of the behavior, temporal or seasonal patterns, and an estimated or recorded frequency of the behavior. It is also important to determine if the behavior is more likely to occur in the presence of particular individuals, or in specific locations. The caregivers' response to the behavior and the outcomes of previous interventions should be detailed. For aggression complaints, document who (the victim), where (the location), and what (the specific behaviors of the bird) for each episode, as well as the outcome of each episode.

General treatment considerations

Environment

The environment should, to the extent possible, allow for the expression of species-typical natural behaviors, and accommodate the natural time budgets for these activities. Attention to foraging opportunities, sleep patterns, physical activities, and social interactions is important in the treatment of behavioral disorders in birds.

The majority of psittacine birds kept as pets are from tropical to semi-tropical regions where the typical photoperiod would include approximately 12 hours of light and 12 hours of dark. Sleep and rest occupy the majority of the 24-hour time period when time budgets are measured in the wild.³² Budgerigars studied under conditions of constant illumination spent an average of 38% of a 24-hour period in sleep states.³³ Half-moon conures (*Aratinga canicularis*) under similar experimental conditions spent 57% of the 24-hour period sleeping or drowsing.³⁴

Sleep is essential for mental and physical health. Sleep deprivation has been suspected as a risk factor for increased reproductive activities, fears or anxiety, stereotypies, and aggression or irritability. A minimum of 12 hours of uninterrupted sleep in a quiet, dark area away from household activities is recommended for any bird that is presented for behavioral abnormalities.

Foraging activities and food handling occupy a significant proportion of a parrot's waking hours.³⁵ When pet birds are fed pelleted or seed diets *ad libitum* from a dish, the time budget required for feeding activities is drastically altered. This has been postulated to contribute to the development of abnormal behaviors. In a study of wild crimson rosellas, young birds spent an average of 67% of their active time in foraging and feeding activities.³⁶ In captivity, a variety of feeding techniques can be used to encourage foraging, or food searching, such as placing non-perishable foods in multiple locations around the cage or mixing non-edible items with the food (Figure 1.1). Placing food on clean areas of the cage floor and adding branches, leaves, or shavings is another option. Foraging devices and puzzle feeders are commercially available or can be easily constructed.³⁷ Attention to safety, as well as adequate nutrition, is important when incorporating foraging enrichment strategies.



Figure 1.1 A cage containing a variety of foraging devices and toys.

In addition to food-oriented activities, additional strategies can be used to address deficiencies in the captive environment. Captive environments are rarely able to accommodate all species-typical activities (reproductive behavior, flight, flock interactions), but substitutions can focus on providing acceptable alternative activities to occupy the time budget. For any problem parrot, recommendations should focus on creating appropriate intellectual stimulation (training opportunities), providing exercise (flying, flapping, swinging, running, climbing), beak activity (chew toys, branches) (Figure 1.2), and positive social interactions. Effects of social enrichment were documented in a laboratory study involving orange-winged Amazon parrots. Isosexual pair housing of young Amazon parrots resulted in greater use of enrichments, fewer bouts of prolonged screaming, less time spent preening, and less inactive time, than singly housed control birds.³⁸

Behavior modification

Behavior modification uses operant conditioning techniques to strengthen the occurrence of desirable behaviors and diminish the occurrence of undesirable behaviors. With operant conditioning, behaviors are goal-directed and controlled by their consequences, or controlling stimuli. Operant conditioning paradigms can involve positive reinforcement, negative punishment, positive punishment, and



Figure 1.2 A macaw exercising on a stand outside of its cage.

negative reinforcement.³⁹ For a detailed discussion of the meaning of these terms and their application, see Chapter 18.

Desensitization, counter-conditioning, and flooding are all techniques commonly used to modify behavior. These techniques, their advantages and disadvantages, and instructions for their application are covered in detail in Chapter 18.

Training parrots to understand and comply with simple requests (commands) can build confidence, reduce fear, and facilitate predictable interactions between bird and human. Commands can be practical (step up, stay, quiet), or promote physical activity (dance, swing, turn around), and will serve to increase the caregiver's ability to communicate effectively and predictably with the parrot, and allow for the intellectual stimulation associated with learning new commands.

Pharmacotherapy

Pharmacological treatment options for behavioral disorders in birds are detailed in Chapter 19. Medication can be used to prevent self-harm, improve quality of life, or facilitate responses to the behavior modification plan.³⁰

Fears and phobias

Fear responses in psittacine birds involve characteristic vocalizations, defensive postures, avoidance, escape attempts, frantic behavior, displacement behaviors, and aggression. A variety of factors contributes to fear responses in psittacine birds. Parrots are prey species, many of which do not have long histories of domestication, and some of which suffer from socialization or developmental deficits. Housing conditions, environmental stressors, and sleep deprivation can also contribute to fear responses.

The effects of environmental enrichment on fear responses to novel objects in orange-winged Amazons (*Amazona amazonica*) were evaluated.⁴⁰ Physical enrichments included swinging ladders and spiral boings. Foraging enrichments included fruit cages, toy boxes, and treat baskets. Parrots housed in enriched environments were significantly less fearful of novel objects compared to parrots housed in barren environments.

The effects of rearing conditions on the development of fear were studied in Nanday conure chicks (*Nandayus nenday*).⁴¹ Four different treatment groups were raised in either enriched environments (with other chicks, soft toys, and sensory stimulation) or restricted environments, and were either exposed to early handling or were not handled beyond the feeding routine. Both handling and environmental enrichment were found to significantly reduce fear of novel objects.

Treatment of fears and phobias involves identifying sources of fear, and removing or minimizing contact. Frightened birds should be removed from high traffic

areas and allowed to explore new objects and places on their own schedule. A sleeping cage that allows for security and uninterrupted sleep can be vital for fearful parrots.

Caregivers should avoid reinforcing (giving excessive verbal comfort or attention to) behaviors consistent with fear. Positive reinforcement training should focus on building confidence through acquisition of new commands and skills.

Gradual desensitization can be used when the stimuli that elicit fear or anxiety can be identified and manipulated for controlled exposures. Fear can result from a variety of stimuli, many of which may not be apparent to the human caregivers.⁴² Fear can also occur as a result of interactions or associations with humans. In a case report of a Goffins cockatoo (*Cacatua goffini*) diagnosed with a conditioned fear response of the primary caregiver, desensitization and counter-conditioning were used successfully to improve the relationship and reduce the fear.⁴³ Anti-anxiety medications can be used in severe cases of fear or phobias, but limited data is available regarding efficacy and safety.

Feather plucking and self-mutilation

Feather picking may not be the most prevalent behavior problem affecting companion psittacine birds, but it is the most common complaint for which the veterinarian is consulted. The plumage serves multiple functions, including flight, insulation, protection from physical trauma, protection from UV radiation, waterproofing, and visual communication.⁴⁴ After foraging, grooming occupies the largest amount of a wild bird's time budget. Self-preening and allopreening (preening of another individual) function to maintain feather condition, provide comfort or de-arousal, and strengthen social bonds.⁴⁵

Feather picking disorder, or behavioral feather picking, is characterized by self-initiated feather removal or damage, and/or self-inflicted damage to soft tissues, in the absence of an identifiable primary medical explanation^{46–51} (Figures 1.3 and 1.4). In addition to aesthetic consequences, feather chewing or plucking can result in abnormal feather development, hemorrhage from damaged blood feathers, follicular damage, discomfort, and loss of insulation. Consequences of soft tissue mutilation might include hemorrhage, secondary infections, and penetration of body cavities.

A variety of medical differentials or risk factors should be investigated including organopathies, infectious diseases, internal and external parasites, seasonal hormonal changes, dermatological conditions, toxin exposures, malnutrition, food sensitivities, conditions causing pain or discomfort, and neoplasia.^{46–48} In a review of dermatohistopathology findings for 408 feather picking and self-mutilating birds, paired biopsies from affected and non-affected skin were evaluated.⁵² Inflammatory skin disease was diagnosed based on the histological presence of inflammation in both



Figure 1.3 A macaw with severe feather damage due to feather picking.



Figure 1.4 A cockatoo with feather loss due to feather picking behavior.

affected and unaffected skin samples. Macaw species and Amazon species were most likely to be diagnosed with inflammatory disease. Traumatic skin disease was diagnosed by the absence of inflammation at both affected and unaffected biopsy sites. Traumatic skin disease was reported in cockatoos and African gray parrots. Traumatic skin disease and inflammatory skin disease were reported with approximately equal frequencies in conures, eclectus parrots, Quaker parrots, cockatiels, and caiques.

There are many suggested risk factors for feather picking disorder, but none scientifically proven to cause feather picking in pet birds. Possible environmental factors include inadequate bathing, mechanical injury or skin irritation,

poor air quality, toxin exposure, abrupt changes, and sleep deprivation.⁴⁷ Possible behavioral risk factors include lack of stimulation, lack of control or unpredictability, lack of foraging opportunities, confinement, crowding, social incompatibility, and social isolation. Individual factors include chronic hormone induction, species, gender, neurotransmitter abnormalities, and individual differences in coping styles.⁵¹ A single retrospective study has identified several significant risk factors for feather picking in pet parrots: species (African gray parrots), gender (female), and lack of play behavior.⁵³ Additional species predispositions have been reported based on clinical impressions, including conure, macaw, and cockatoo species.⁵⁰

Treatment considerations should include attention to nutrition, general health, social interactions, photoperiod, housing, and air quality, and control of reproductive behaviors. Special attention should be given to foraging enrichment and stress reduction.^{50,51} Foraging and physical enrichments were shown to prevent and improve feather picking behavior in laboratory-housed orange-winged Amazon parrots and in African gray parrots.^{54,55}

Neurochemical abnormalities should be considered, particularly in cases of chronic feather picking. Feather picking disorder has been compared to trichotillomania, an impulse control disorder of humans.⁵⁶ Medications used to treat compulsive or impulsive behavioral disorders in other species may be helpful in treating persistent feather picking or self-mutilation problems in psittacine birds. Selective serotonin reuptake inhibitors are the treatment of choice based on treatment responses in a variety of species. Successful adjunctive use of medication for the treatment of feather picking has been reported using fluoxetine, paroxetine, clomipramine, naltrexone, gabapentin, amitriptyline, and haloperidol.^{57–63} Hormone therapies may also prove useful. Pharmacological interventions are described in detail in Chapter 19.

Reproductive behavior problems

The onset of puberty, ranging from 6 months to 6 years depending on the species, may be associated with a variety of behavioral complaints. Behavior problems associated with hormonal changes may include screaming, or frequent contact calling, aggression or territorial defense of cage and nesting sites, intolerance of handling, irritability, favoring one person, sexual displays, frequent regurgitation, panting, and masturbation.⁶⁴

While species differences exist, typical environmental cues that trigger reproductive behaviors include changes in day length, temperature, or rainfall, the presence of nesting sites, and the presence of potential mates. Caregivers that stroke their birds over the back or tail can also stimulate sexual behavior and should be advised to discontinue any forms of handling that stimulate the bird.⁶⁵ Seasonal variations in temperature, photoperiod, and food supply

are typically absent in captive environments, which can result in chronic hormone stimulation.⁶⁶

Persistent sexual behaviors in pet psittacine birds create challenges for behavioral management as well as physical health. Potential medical concerns for females include dystocia, cloacal prolapse, pathologic fractures, and coelomitis. In male birds, orchitis and cloacal prolapse are possible.⁶⁷ General treatment recommendations should include decreasing the photoperiod, providing more dark time, removing potential or perceived nesting areas, and reducing the fat content of the diet. Hormone therapy, such as leuprolide acetate, may also be indicated.⁶⁸ However, species differences in sensitivity to leuprolide acetate are possible as well as variations in effects based on the timing of administration during the reproductive cycle.⁶⁹

Aggression

The postulated causes of human-directed aggression (lunging, charging, pecking or striking, or biting) in psittacine birds include play and exploration, instrumental or conditioned aggression, territoriality, fear, mate-related and sexually induced aggression, and redirected aggression.⁷⁰

Play and exploration

Parrots use their beaks like hands to explore the environment. Juveniles of several psittacine species have been observed to engage in social play in the wild. Play behaviors included clawing, play biting, and mock fighting. Treatment of play aggression includes provision of chew toys, regular opportunities for appropriate play and interactions, and positive reinforcement (rewards) for appropriate play behavior. Corrections for play biting are often unsuccessful. Caregivers should be instructed to discontinue interactions if mouthing becomes excessive.

Fear aggression

Fearful behavior in psittacine birds may involve aggression if the bird is otherwise unable to extricate itself from the stressful situation. Caged birds that are unable to fly or prevented from escaping may choose aggression when flight or avoidance is not an option. Caregivers should receive instructions about how to recognize postures that are consistent with fear, and how to avoid eliciting these responses. Safety considerations are important for both the caregiver and the bird. Forcing unpleasant exposures is seldom helpful and tends to worsen fear responses and aggressive behaviors. Desensitization and counter-conditioning is often successful in cases of fear aggression.⁴⁰

Instrumental or learned aggression

For birds that do not desire to interact (to be petted or handled at particular times or by particular individuals),

biting is often a highly effective means of avoiding contact. If the bird can successfully use aggression to avoid certain activities, then negative reinforcement of aggression is possible. Caregivers should respect the preferences of the bird regarding interactions and avoid activities that elicit aggressive responses. Birds can be taught with positive reinforcement to comply with caregiver requests.

Territorial aggression

Many avian species establish, maintain, and protect access to particular areas in their natural habitats. Aggression may be directed against any intruder, regardless of familiarity. The bird is often normal and friendly when taken away from the vicinity of the cage. Treatment will require that the cage be moved away from high traffic areas to reduce the incidence of territorial displays. Otherwise, negative reinforcement of aggressive displays can influence the severity of the problem. The bird can be taught to step up on a hand-held perch, rather than a hand, to allow removal from the cage.

Gradual desensitization and counter-conditioning for approaches to the territory (cage) can be effective. The bird is allowed to have a special treat or offered verbal praise as individuals gradually approach the cage area from a comfortable distance. If the bird shows signs of defensive behaviors, the approacher stops and resumes once the bird has settled. Alternatively, the caregiver can work with the bird in a neutral area at a comfortable distance from the cage, and then gradually move the training sessions closer to the cage.

Sexual aggression

Lack of suitable conspecific mates and seasonal hormonal changes can result in sexual behaviors directed at a preferred human. Sexual behaviors may involve a combination of the following: regurgitation, masturbation, excessive contact seeking, guarding, and aggression directed at other individuals when the preferred individual is present. Problem onset may coincide with the species' natural breeding season, with lengthening daylight, or at random times when conditions support breeding behavior (households with unnatural photoperiods, presence of breeding birds, and stimulation of the bird by the caregiver).

Treatment suggestions include allowing non-preferred family members to participate in feeding and maintenance care when possible and avoiding any forms of handling that stimulate the bird to engage in sexual behaviors. Gradual desensitization and counter-conditioning for approaches to the bird when it is with its preferred person or in the nesting area can be attempted.

Hormonally mediated behaviors can be extremely frustrating for caregivers. Hormone therapies can be used to facilitate behavior modification by minimizing sexual and

aggressive behavioral responses and increasing the success of the behavior modification program.

Excessive vocalization

Differences in noisiness exist between species and in caregiver tolerance of noise. It is considered normal for most parrots to vocalize loudly several times a day for up to 15–20 minutes.⁶⁶ Causes of excessive vocalization include operantly conditioned attention-seeking behavior, fear-induced vocalizations, excessive contact calling, distress or injury, and lack of opportunity to engage in acceptable behaviors, or lack of environmental enrichment.

Caregiver influence on excessive vocalization behavior of psittacine birds should always be considered. Typical human responses to screaming often serve to reinforce the behavior. Yelling at the bird, running into the room to scold the bird, shaking the cage, or picking up the bird to return it to the cage can all be construed as reinforcing if the bird's goal was to get attention. It is likely that actions intended to be punishing may actually be reinforcing.

Screaming by a bird that is seeking attention should be ignored by all family members. As unacceptable behaviors are being extinguished via removal of the reinforcer (attention), caregivers should also establish and maintain appropriate behaviors by engaging the bird in regular training sessions, rewarding the bird during quiet times, and encouraging and reinforcing acceptable vocalizations, such as singing, whistling, or talking.

Negative punishment of excessive vocalization can also be effective. When screaming occurs, the caregiver should turn around, leave the room, close the door, or cover the cage. Removal of attention and stimulation (time-out) should be enforced just long enough for the bird to settle.

Environmental and behavioral strategies should focus on creating environments in which the bird and caregiver can be successful. If the caregiver diary indicates a pattern to the vocalization problem, then feeding, playtime, or training sessions can be scheduled just before the bird's "loud times." Preemptive strategies can be highly successful in reconditioning undesirable behavioral responses that occur with predictability.⁶⁴

Fear or distress calls should never be ignored, nor should contact calls. When contact calls become persistent, behavior modification techniques can be applied. Parrots in impoverished environments may be predisposed to excessive vocalizations, and appropriate environmental enrichments are indicated.

Conclusions

In their natural environments, parrots are presented with endless activities and challenges related to survival, social interactions, and reproductive success. A thorough understanding of natural psittacine behaviors, social structure,

and reproductive strategies helps to establish recommendations for captive housing and care. The prevalence of serious behavioral problems in captive psittacine birds raises important questions regarding the suitability of some species as captive companions, appropriate guidelines for breeding programs and chick rearing, and the possibility of preventive counseling strategies for caregivers of psittacine birds.

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