

# LIGHT: Implications in Feather Mutilation Behavior

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**F**eather Mutilation Behavior – three dirty words in parrot aviculture. The causes of this behavior and ways to resolve it challenge avian veterinarians, behaviorists, breeders and companion parrot owners. People whose parrots exhibit these behaviors often feel frustrated and even ashamed when they are unable to resolve the problem. Even parrots in “good” health, eating a “good” diet, and receiving “good” care, social guidance, and mental stimulation, can suffer from it.

## What is Feather Mutilation Behavior?

Briefly described, feather mutilation behavior, also known by such names as feather abuse, picking, or barbering, is when a parrot picks, plucks, chews, shreds, amputates (etc.) his/her feathers. The bird may even mutilate his own body, or may extend the feather or body mutilation to his mate or cagemates. The seriousness of the condition to the health of the bird may vary from a scruffy appearance to illness and death.

Any level of feather mutilation behavior indicates that something is “not right” with some aspect of the parrot’s life.

Many articles have been written about possible causes of and treatments for this behavior. In several of these articles, authors point out that the cause of much feather picking behavior seems to originate with a physical problem, such as disease, parasites, or injury. Tammy Jenkins, DVM, in her article “The Basics of Feather Picking”<sup>1</sup> lists 10 of its most

likely significant causes. Interestingly, the last item on the list is behavior. Behavior, once thought to be among the first of most significant causes, seems to be considered less so by a growing number of professionals.

Endocrine/Reproductive Disease and Hypothyroidism are third and sixth on Dr. Jenkins’s list. She indicates that some endocrine stress may be due to the absence of stimuli that cause natural cycles of breeding. Possibly owners of birds in captive conditions may unknowingly house them in ways that keep them constantly in a breeding or near-breeding state. Dr. Jenkins lists drug therapies that seem to have been helpful in reducing picking behavior from reproductive stress. These include Depo-Provera (medroxyprogesterone acetate) a synthetic progesterone, HGC (human chorionic gonadotropin), and Lupron (a synthetic type of gonadotropin-releasing hormone) that “works by obliterating blood levels of estrogen or testosterone for weeks or months.”

Other drugs that may relieve some feather picking due to endocrine issues may include anti-serotonin drugs and melatonin. Dr. Jenkins suggests that, in addition to drug therapies, changing the environmental triggers for reproductive behavior, such as removing perceived nesting sites, reducing daylight hours, and changing aspects of the diet may be helpful.

Slow, difficult, or abnormal molts may also contribute to feather picking. Old feathers may become frayed and worn, and the bird may

overpreen, possibly in an attempt to smooth them. Birds exhibiting a slow molt may be tested for hypothyroid. Thyroid tests, such as T<sub>4</sub>, are often not reliable in birds, which can make problems from this cause difficult to diagnose. Dr. Jerry LaBonde, MS, DVM writes in his article “Feathers”<sup>2</sup> that “Abnormal molts can be...a sign of illness, poor nutrition, or an imported bird to northern latitudes.”

## A Common Thread

There is a common thread that weaves through these two causes of feather picking that may warrant more thorough investigation. That thread is the importance of Light.

In the article “The Visual Capabilities of Birds,” William Hodos<sup>3</sup> states, “Of all the vertebrate classes, birds are the most visual dependent. Many aspects of their adaptation to their environment and their survival depend on precise and sometimes quite subtle visual discrimination.” In the article “Light and its Role in the Breeding of Birds,” Patrick Thrush<sup>4</sup> states “Of all creatures, birds show us the most dramatic response to changes in photoperiod. Lengthening or shortening the amount of light in a day triggers migrations, molting, nest-building and breeding.”

The eyes of most birds are very large in proportion to their bodies,<sup>5</sup> and the portion of their brains devoted to processing information from the eyes is well developed. This indicates that collecting and processing visual stimulus (light) is critically important to the survival of birds. Two avenues for interpreting light conditions are utilized<sup>6</sup> – the eye/retina and an organ that surrounds the eye, called the Harderian Gland. Light is gathered for the purpose of creating a visual image (sight) and for transmission of information about day length and light quality to the pituitary gland and to the pineal gland, the “master clock” of the body. In his article “Using Full Spectrum Lighting With Birds,”<sup>7</sup> Patrick Thrush states, “Taken together, these two pathways set the pace

for all subsequent endocrine related metabolic processes.”

### **Brief Discussion of Avian Biological Clocks**

There are three primary “clocks” within avians. One is contained within the genetic makeup. In fact, five avian clock genes have been identified and cloned by researchers.<sup>8,9</sup> The second and third are located within the brain: the hypothalamic oscillator and the pineal gland. In response to light stimuli, these systems regulate the production of melatonin and the release of hormones such as testosterone and utilizing hormone.<sup>10,11</sup> These clocks keep time cycles via both endogenous (internal) and exogenous (external or environmental) stimuli. Exogenous factors that drive these cycles are called “zeitgebers” (literally “time givers”). For avians, light duration and intensity are among the chief zeitgebers. Two familiar biological cycles or rhythms are circadian (about a day) and circannual (about a year). Light drives circadian rhythms via photoperiod (or day length). An example of a circadian cycle is the sleep/wake cycle. Light drives circannual rhythms via both photoperiod and light intensity. Examples of circannual cycles are migration, breeding, and molting.

It is easy to see how light is an important zeitgeber for the body clocks of Temperate Zone birds. Temperate Zones experience defined seasons and varying day length and light intensity over these seasons. The farther north or south from the Equator, the more pronounced the seasons and their associated changes in day length and light intensity become.

But what about Equatorial or Tropical birds? At the Equator, day length is nearly always 12 hours, and light intensity is greatest as the sun's rays strike the Earth the most perpendicularly. At 10 degrees north or south of the Equator, the variance between the longest and shortest day of the year is thirty-five minutes. New Guinea, much of Indonesia, the

Amazon and Congo basins lay within this band. At 20 degrees north or south, the variance is about an hour and twelve minutes. Between about 23 degrees north and south latitude is the area known as the Torrid Zone, or Tropics. Most of the parrots of the world are found in habitats within this band. As the Sun's intensity and day length are so consistent, Tropical seasons are not defined based on day length, but by factors such as rainfall. However, study of the Spotted Antbird in the near-Equatorial Panamanian rainforest indicates that the body clocks of birds can distinguish and respond to variances in day length of as few as seventeen minutes.<sup>11</sup> This fine distinction serves to further illustrate the importance of light to the biological clocks of Avians, even at the Equator.

### **Implications of Light in Feather Mutilation Behavior**

It has been shown that light is a critical factor in the biology of birds, and that many parrot species come from light-rich habitats. What does this mean to Feather Mutilation Behavior? To summarize:

- Light is gathered through the retina and Harderian gland and transmitted to the principal biological rhythm governors of the body, driving sleep/wake, reproductive and molting cycles.
- Two of the significant causes of feather mutilation behavior as listed by Tammy Jenkins DVM are Endocrine/Reproductive Disease and Hypothyroid. Possible therapies include drugs that affect quantities of melatonin and reproductive hormones.

But Light drives these things. Light is all around. Or is it?

### **How Bright is Bright?**

Both daylength and light intensity are measurable. Day length is measured in time – how many minutes or hours there are of sunlight within a day. Visual light is measured in lumens. The intensity of

visual light incident upon the surface of an object is called illuminance. This is measured in footcandles (lumens per square foot) or lux (lumens per square meter).<sup>12</sup>

To give an idea of how bright is bright, consider these examples from *The Effects of Light on Circadian Rhythms, Sleep and Mood* by David Avery, M.D. Professor, Psychiatry and Behavioral Sciences, University of Washington School of Medicine:<sup>13</sup>

“On a sunny day, the illuminance is about 50,000-100,000 lux; on a cloudy day, 1,000-10,000 lux; in a ‘bright well lit’ office, 400 to 600 lux; in most homes, 100-300 lux; in moon light 0.2 lux; in starlight .001 lux. Note that even a cloudy day is much brighter than being indoors.”

In *Health 4 Environment's* article “Lighting in the Office Environment,”<sup>14</sup> very detailed tasks (VDT) lighting that also requires paperwork tasks recommends illumination of 500-1,500 lux.

If a sunny day is 50,000 lux and a “bright” room is 1,500 lux it is reasonable to say that even brightly lit human indoor environments are virtually “in the dark.” Yet it is in these relatively dark environments that we often house our parrots.

Anecdotal evidence suggests that feather mutilation behavior may be more commonly seen in parrots housed in northern or southern latitudes – such as in the northern tier of the United States, Canada, South Africa and Great Britain. Even parrots housed with supplemental artificial lighting and with unfiltered daylight (in appropriate seasons) suffer. These areas see wide variation in daylength and light intensity through the seasons. It is possible that these variations cause the biological clocks of individual birds to desynchronize at least part of the time. This hesitation or “stuttering” of any part of the body clock could cause breeding or molting pattern shifts. Even small shifts could potentially result in delayed or prolonged near-breeding, breeding, or molting that could trigger feather mutilation behavior.

If this is true, why would not *all* parrots living in northern or southern latitudes suffer from feather mutilation behavior?

### A Hint from Humans

In humans, there is a condition called Seasonal Affective Disorder (SAD). SAD is a type of depression that affects at least ten percent of people who live in northern latitudes.<sup>15</sup> It is reasonable to assume that SAD also affects those living at corresponding southern latitudes. Light therapy using a 10,000 lux lamp can bring significant relief to SAD sufferers. Disorders resulting from jet lag and shift work also benefit from the use of light therapy. Humans suffering from these disorders have been found to benefit more quickly and thoroughly from light therapy than from drug therapies.

Taking a hint from humans, it is possible that a percentage of parrots may be affected by at least some aspect of clock desynchronization due to inadequate lighting.

How can aviculturists use light to help their parrots? Much has been learned about daylength and its relationship to breeding success and good health in parrots. Aviculture has also been studying the spectra of light and the importance of specific wavelengths, such as ultra-violet, to Avians. But perhaps an area that should also be studied is the most valuable indoor/artificial light intensity.

### A Hint from Plants

An instrument commonly utilized in horticulture is a light meter. This device measures light intensity in footcandles or in lux. A light meter is valuable in outdoor use as a means for a grower to decide where to place a given plant based on its light requirements. It is invaluable to the greenhouse grower, who is starting or growing plants outside their normal season or area (such as growing tropical orchids in an Alaska greenhouse). Greenhouses often utilize artificial lighting to meet the needs of plants. Some plants, such as *Cattleya* or *Vanda* orchids, require significant

brightness to grow well – about 3,000 footcandles<sup>16</sup> or 32,000 lux. Knowing this, the grower can provide artificial lighting that meets those intensity needs.

### Common Sense

A wise grower also understands something about the habitat his plant grows in. For example, an orchid with high light requirements would not grow well in light so strong as to cause leaf burn, as might occur with a beam of light focused directly at the plant. The proper light intensity would be delivered indirectly, filtered through shade cloth or other media.

The same consideration would be necessary for the aviculturist. As Patrick Thrush states in his article "Lighting and Your Bird,"<sup>17</sup> "Whenever possible, mounting [the artificial light source] from the ceiling is the best and most natural method...Overhead suspension accomplishes two things. First, the light is directed downward as it would appear outdoors. This ensures that your bird perceives the light as coming from a natural direction. In this manner, light direction cues are delivered consistent with what the avian brain expects to experience. Objects are illuminated equally in this fashion, and are placed into proper visual perspective. Secondly, it is easier to control the intensity of light reaching the cage areas. Too bright a light is not a good thing. If the area looks over-lit, it probably is. The same rules of visual comfort that apply to humans apply to your bird."

Mr. Thrush makes an observation regarding lighting comfort that sounds humorous, yet illustrates his serious point. "The author invites the reader to take a fluorescent lamp assembly and sit with it about a foot or two away from his/her face for 12 hours and then assess if they believe this to be a pleasant experience."<sup>17</sup>

While it may not be feasible or even recommended to duplicate natural Equatorial or Tropical light intensities in an aviary or home environment, it may be possible to provide sufficient light intensity to keep

the body clocks of birds properly set. A light intensity scale appropriate to parrots would need to be developed.


Utilizing known light intensity needs of orchids may be very useful in developing this scale. The requirements of some of the species of epiphytic (tree dwelling) orchids living in similar habitats as the parrots may serve as a model. As we have seen, orchids requiring high light intensity should receive about 3,000 footcandles or 32,000 lux. Orchids requiring intermediate intensity should receive about 2,000 footcandles or 21,500 lux. Perhaps somewhere in these ranges may be a good place to start with parrots.

Although aviculture is making headway in its efforts to prevent or cure feather mutilation behavior, lasting relief remains elusive. Perhaps one of the most effective factors in prevention or cure may prove to be among the simplest – Light.

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# Protect Your Rights

AFA has found that almost all cities and towns, counties and most states have ordinances or laws regulating behavior and ownership responsibility for animals. Since each locality starts with its own set of ordinances and local laws, some research is required for your particular locality. Often these laws were written with dogs and cats in mind, especially city and county animal control ordinances, or pertain to livestock in state laws. Therefore, you will need to do some homework to prepare yourself to inform and educate your legislators, city council, or whoever is responsible for enacting laws in your area. The American Federation of Aviculture has developed this brochure as a quick reference guide.

Be prepared as much as possible before you go to argue your cause but do not worry if you can not cite exact ordinance numbers, sections and paragraphs on every possible point. Do get as many of them as you can. Most concerned citizens are not lawyers. The important thing is that you are aware of what is being proposed and that you show up to voice your opinions.

Bring as many people with you as possible and present an obviously united front. Know what you want to have happen before you get to the meeting and agree among yourselves on key issues. Do not be distracted from your main objective by side issues. Do not argue among yourselves in front of the opposition. It is extremely important to look like you are a cohesive group of responsible voters to people who have the power to outlaw birds.

Decide before the meeting who will be the main spokesperson for your group. Encourage every other person to repeat one fact made by the main spokesperson. We do not want silent people to be

counted as part of the opposition. Individuals proposing restrictive legislation may range from the extreme fanatic who believes no one has the right to keep pets or use animal products, to people who have been misled by staged film propaganda to believe that they are saving birds and other animals from torture and a cruel death. Regardless of each person's beliefs or opinions, they have a right to express themselves. They do not have the right to impose their will on the rest of us. Do not be intimidated or afraid to tell your elected officials what you want. Always be polite to everyone. We want to be the reasonable, good citizens in any disagreement.

Finally, please share your experiences with us. We need to build on your successes and learn from other failures. Keep a log of everything that happens; names, dates, events. We will use what each person has learned to help the next one. One of the chief arguments you will hear is regarding health and safety questions related to the keeping of birds. Psittacosis (more correctly called ornithosis) is usually the chief concern. The following facts may dispel the myths:

1. This disease is endemic in the wild bird population in the United States. (University of Pennsylvania study showed 70% of pigeons in the city parks tested positive for psittacosis. Dr Joel Murphy estimates that "this bacteria is carried by 70% - 90% of wild pigeons and at least 100 other species of wild birds in North America without causing disease").

2. Psittacosis is rarely diagnosed in people. This disease produces mild to strong flu-like symptoms in most people who do catch it. It is not generally a life-threatening disease and is easily treated with antibiotics.

## **Birds Are Not An Animal Control Problem**

Birds do not present a problem for Animal Control like dogs and cats do. Birds are not a threat to public

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