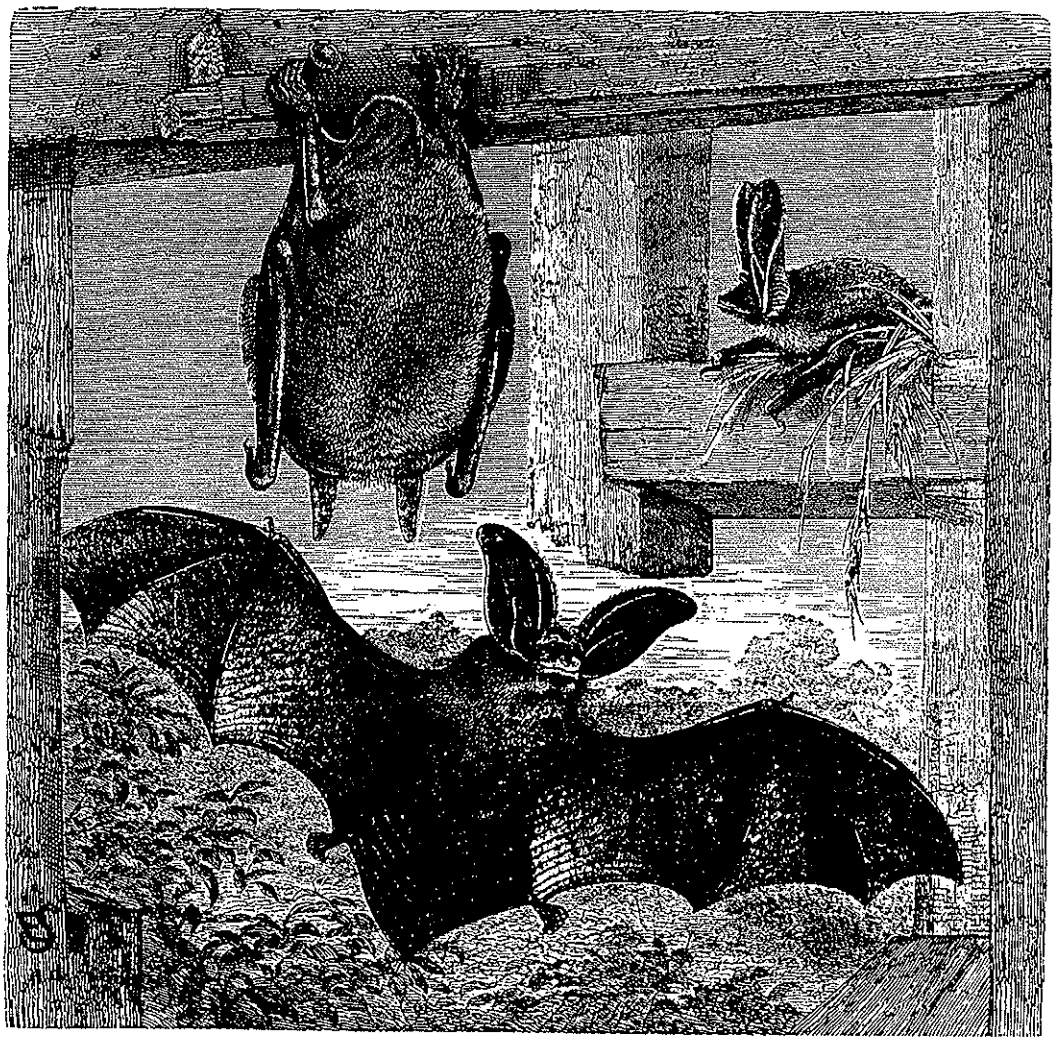
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JOURNAL of Wildlife Rehabilitation

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Guidelines for Authors

The *Journal of Wildlife Rehabilitation* is designed to provide useful information to wildlife rehabilitators and others involved in the care and treatment of native wild species with the purpose of returning them to the wild. All feature articles are subject to a review process, and our staff and reviewers work with authors to produce the most accurate information possible in our ever-changing field.

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6. Acknowledgments are limited to people who have contributed to the article in a major way.

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Editorial . . .

In Appreciation . . . .

How many times do you have to tell a subordinate something positive before they remember you said it even once? Believe it or not, most experts say four times. Conversely, how many times do you have to tell a subordinate something negative in order for them to remember you said it? Only once. This is the time of year when wildlife rehabilitation supervisors are up to their elbows in baby critters along with the usual assortment of roadside casualities and the last thing in the world any one is looking for is a lesson in counting. However, with volunteers harder than ever to recruit and maintain, it is more important than ever to consciously praise those who help us for every little thing that they do! In running a wildlife care operation, there is a constant need for guidance in the myriad of variables that can go wrong and result in unnecessary death. Supervisors have to make sure that disaster is averted AND motivate everyone in the process. That is a tall order! Since you know you will have to give countless corrections during the busy and stressful season, now you need to give four times that number in praise just to have people remember that you did appreciate their efforts. Giving thanks becomes a mantra for supervisors. However, unless it is personalized and given individually—it is not seen or remembered as sincere. Additionally, even when all these conditions are met, if the person does not feel supported (e.g., their good suggestions, organizational support received for individual projects) they see such words as hollow and you can expect mocking.

All of this becomes more complex when you work at home with your significant other as the chief associate and possibly a few other volunteers. It is so easy to forget this rule with a spouse—after all they are expected to be your partner. Well, I know a few people who have had conflicts over this issue and the rule of appreciation still applies—even (or especially) with the spouse.

If there is one regret I have from my twenties, it is not taking more time to nurture volunteers and staff. Building a wildlife care organization from scratch is hard and working a second job to stay alive left me sleep deprived and not alert enough to follow the appreciation rule. But I learned from experience that it applies no matter the condition of the supervisor. I remember one day I came in at the end of a shift and quickly ran through the center to see what had been done and what needed to be done in order to close. A volunteer twenty years my senior who was fairly new and learning the ropes had cleaned our raccoon pen incompletely. I went in to the building and found her and had her follow me to the pen where I pointed out what needed to be done and why. I thought, if she knew why, that would suffice as a motivator and she would do it right in the future. She listened to me quietly and said, "I will finish my work here today but you will never see me here again." She went on to say that I had not thanked her for all her efforts on the cleaning the pen and even knowing what was wrong and why did not take the place of being thanked. She left that day never to reappear. I felt very bad about the situation but it was clear at that point that the situation could not be salvaged. So I took the lesson, albeit a painful one, and applied it in volunteer management within my organization.

Good managers are aware of what the needs of the staff and volunteers are and they meet those needs. They are rewarded by low staff turn-over and lower costs related to recruitment and training. They have many individual approaches and techniques, but in general others see them as sincere people with positive attitudes and as

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Anorexia in Captive *Eptesicus Fuscus*: Two Case Histories

Selena Walker, M.A.
Volunteer Wildlife Network
16 Basswood Ave.,
Stittsville, Ontario
Canada, K2S-1M9
swalker@rohcg.on.ca

Abstract

A hypothesis is presented suggesting stress and diet are instrumental agents in the onset and treatment of anorexia in captive Big Brown Bats (*Eptesicus fuscus*) undergoing wildlife rehabilitation. A literature search uncovered few reported cases of anorexia in wild animals. In a wild raccoon and in domestic cows and cats, a strong association with stress and diet was noted. Reported signs of "Red Bat Syndrome" are also consistent with a diagnosis of anorexia.

Key words: *Eptesicus fuscus,* Big Brown Bat, bats, anorexia, stress, Red Bat syndrome, *Lasiurus borealis*

Relevance

Wildlife rehabilitation has been an ongoing activity for many decades now. The systematic collection of observations and information from our wildlife rehabilitation endeavours, however, is a relatively recent development in this field. As we gather information and gain experience, we ask questions about the experiences of others and blend this information with our own. We form hypotheses about certain aspects of our wildlife rehabilitation and we try to test those hypotheses. Gradually, we start to find the pieces of the wildlife rehabilitation puzzle.

It is essential to develop and test hypotheses, and to share those results with others to determine if our hypotheses are valid. Together, our puzzle pieces and those of others form a more complete picture. In this way we expand the knowledge within the field. In the following paper, I will outline a hypothesis regarding the onset of anorexia in bats. Within my own realm, I have begun to test this hypothesis and have drawn preliminary conclusions based on my personal observations and experience. Perhaps my puzzle piece will help solve another's puzzle. Perhaps someone will have another piece which will help solve my puzzle.

Introduction

Anorexia, a condition predominantly reported in human females, is characterized by a prolonged decrease in food intake and subsequent weight loss. It is generally believed to result from emotional factors inherent in the individual suffering from the disorder. Complications arising from self-starvation include: metabolic, gastrointestinal, cardiovascular, renal, hematological, and general malaise (Stavrakaki & Williams, 1990). Examples of wildlife suffering from syndromes resembling anorexia are not often reported in the literature. Nevertheless, animals suffering from stress may release hormones which in turn release corticosteroids from the adrenal cortex resulting in immunosuppression and metabolic changes. Secondary effects include decreased heart rate and appetite loss (Picton, 1993).

A review of the literature revealed little mention of anorexia or similar clincial signs in bats. Susan Barnard (1991), however, described 'Red Bat Syndrome' in her manual of the care and handling of captive bats. In *Lasiurus borealis* (Red bats), clinical symptoms of lethargy, anorexia, dehydration and sometimes hind leg paresis or respiratory distress often resulted in death. Autopsies revealed necrotizing hepatitis and hepatic lipidosis. The cause of the described

syndrome was undetermined (Barnard, 1991).

Lainson (1993) reported a single case, naturalistic study of anorexia in a captive raccoon. The initial history of the subject included trauma (presumably hit by a motor vehicle) and coma. Numerous external lesions were reported and spinal fracture was diagnosed. The raccoon recovered, although it was rendered paraplegic. Over the next 16 months, this animal apparently adapted to captive life and was used for educational purposes. Then, suddenly, the raccoon's appetite decreased. Subsequent blood work revealed anemia and dehydration. Within two weeks the animal exhibited extreme behavioural and physical signs including total anorexia, lethargy, disorientation and blindness. At this point rehydration with Ringer's solution coincided with alertness and playfulness in the raccoon, although the anorexia remained. For two more months the animal remained anorexic and was force-fed a bland diet and nutritional supplement. The raccoon also received a daily regiment of rehydration fluids injected subcutaneously. When it became obvious that the raccoon was suffering and that the illness would not remit, it was euthanized. Autopsy revealed symptoms of chronic anemia, inflammation and infection of the kidney, suggestive of chronic urinary tract infection and liver abnormalities, including (idiopathic) hepatic lipidosis. The author postulated that stress-induced immunological suppression may have led to the illness and subsequent euthanasia of this captive, wild-born raccoon.

Hepatic lipidosis, a condition often noted in domestic cats, is simply described as an accumulation of fat in the liver. Possible causes for the fat accumulation include: poor diet or metabolic reaction to injury, toxic agents, or diseases such as diabetes, hypothyroidism and pancreatitis (Perper & Kepner, 1985). Idiopathic lipidosis (lipidosis of unknown origin) has been reported in domestic cats and cows. Biourge and colleagues (1993) reported the occurrence of spontaneous lipidosis in six laboratory cats that had been obese, but otherwise healthy, and developed anorexia coincidental to a change in diet. These cats reportedly were anorexic for six to seven weeks and had lost 30 to 40 percent of their body weights. Treatment consisted of a high-fat, liquid diet supplemented with L-citrulline (an amino acid) and choline (a B complex vitamin essential for liver functioning) which was tube fed for about two weeks. Five of the cats recovered while the sixth cat had to be euthanized.

Similarly, Wentink and co-investigators (1992) described apparent cases of idiopathic hepatic lipidosis in pregnant dairy cows. The predominant clinical symptom was anorexia which occurred more frequently in cows carrying twins. Autopsy results from a small sample of the cows revealed fat accumulation in the liver. Treatment consisted of adding maize silage to the cows' diets. No further cases of the disease were observed following the change in diet.

In this paper, two cases of anorexia in *Eptisicus fuscus* are reported. Possible causes of the disease and courses of treatment are discussed.

CASE 1

In December of 1993, when winter conditions in Ontario were particularly harsh (temperatures were frequently -20 degrees Celsius or lower), an adult male Big Brown Bat was found hanging on the screen door of a rural residence near Ottawa. Initially the bat was suffering from dehydration, mild diarrhea, bat mites and had fur missing from its nose. The bat was a healthy eater and flew well at intake. In order to prevent infection which might have arisen from the abrasion on the nose (origin of the abrasion unknown), chloramphenicol palmitate, a broad spectrum antibiotic was administered for five days (dose .1cc/bat of a 125mg/cc solution, three times daily) under the supervision of a veterinarian. Additionally, the bat was lightly dusted with a powder safe enough to be used to treat external parasites in domestic birds, and which has been successful in eliminating mites on bats.

During the initial 14 day isolation period, the bat recovered fully and was subsequently integrated into a small colony of nine conspecifics. Nothing remarkable was noted during rehabilitative care. The general protocol for the care of this injured bat is described in the discussion section later in the paper.

Following a month of flight trials, where the bats were permitted several hours of flight in a room each evening, a release attempt in June of 1994, when insects in our geographical locale become plentiful, failed due to the bat's inability to sustain flight. The bat was returned to care with the intention of a second attempt to release in one month.

The return to care coincided with a decline in appetite that progressed rapidly (about four days) to full-blown anorexia. The bat was then isolated. Cause of the anorexia was unknown. Speculating systemic bacterial infection was either the cause or that it would result from stress-induced autoimmune suppression (Picton, 1993), treatment with antibiotics was begun and sustained for the next two weeks. Under veterinarian

supervision, antibiotic treatment with chloramphenical palmitate was administered (.1cc/bat of a 125 mg/cc solution, three times daily). When improvement was not noted after five days, the antibiotic treatment was changed to trimethoprim/sulfamethoxazole (ratio 1:5) suspension (dose .1cc/bat of a 15mg trimethoprim/cc solution). Simultaneously, the bat was maintained on a nutritional supplement paste typically used for cats and oral rehydration fluids for this two week period. Force feeding was introduced one week following the onset of anorexia. The food, which consisted of ground mealworms diluted with water, was presented with a syringe into the bat's mouth. Clinical symptoms of illness were restricted to the anorexia—otherwise the bat seemed alert and was now able to sustain flight.

Following the two week anorexic period without any notable improvement, the bat was examined by a veterinarian and administered a subcutaneous injection of .5cc lactated Ringer's solution. A few hours following the attempt at rehydration, blood was noted in the urine of the bat, and its condition deteriorated rapidly. Clinical symptoms included listlessness and refusal to drink water. The bat was kept warm using warm water bottles, as a comfort measure, but died that night.

Necropsy Results

The bat was submitted for necropsy to the Canadian Cooperative Wildlife Health Centre, a Canadian organization mandated to investigate and provide diagnoses of disease in wild species. Preparation of the specimen followed the accepted protocol which includes acceptance of frozen specimens. The bat's weight at death was 13.3 g [average weights for big brown bats range from 12 to 24 g (van Zyll de Jong, 1985). Gross autopsy revealed normal muscle mass, small amounts of intra-abdominal fat, and liver and kidneys which were bright yellow in colour. A more detailed examination revealed negative findings for rabies, positive findings of congestion and edema of the lungs, and autolysis in the spleen and liver. Although the final diagnosis remained open, the tentative diagnosis was hepatic and renal lipidosis.

CASE 2

Following this experience with anorexia in *Eptesicus fuscus*, another adult male Big Brown Bat exhibiting similar symptoms came into care in the fall of 1994. This bat was brought into care after capture from a home in Ottawa, where it had been seen two weeks earlier. Clinical symptoms observed in this bat at intake included emaciation and anorexia, although flight was capable and sustainable.

Previous experience with anorexia, in the bat described earlier, and its unsuccessful resolution led to an altered treatment course. This second bat was kept in isolation and cared for using the protocol for sick bats described in the discussion section. In addition, the bat was immediately maintained on oral rehydration fluids, and nutritional supplements. When nightly attempts to force-feed a diet of diluted mealworms failed, and the bat's appetite did not return, I began a more aggressive and experimental course of treatment as a last resort. The treatment consisted of concurrent dexamethasone treatment and a substantial change in diet.

Under veterinary supervision, oral dexamethasone was administered at a dosage of 2 drops twice daily to begin and then gradually eliminated over the course of two weeks. Additionally, two types of baby food were combined and syringed into the bat's mouth. The introduced baby foods were strained bananas and strained chicken (ratio 1:1). I thought that this combination of baby foods would be palatable, easily digested, nutritionally adequate over the short-term and, most importantly, I hoped that it would encourage the bat to begin eating again.

Nutritional analyses of the strained banana and chicken baby foods (Bowes & Church, 1970) revealed that the baby food banana consisted of 79% moisture, 0.5% protein, 0.1% fat, and 20.4% carbohydrates and, the chicken consisted of 75.6% moisture, 13.6% protein, 10.6% fat, and 0.2% carbohydrates. In comparison, the mealworms (Grubco, 1995) consisted of 62.9% moisture, 18.7% protein, 13.6% fat, 3.6% carbohydrates and 1.2% ash. Additionally, per 100 g serving, baby food banana provides a variety of minerals (30 mg sodium, 110 mg potassium, 4 mg calcium, 9 mg phosphorous, 0.4 mg iron) and vitamins (21 mcg thiamin, 22 mcg riboflavin, 0.2 mg niacinamin, 7.5g ascorbic acid, 63 iu vitamin A) (Bowes & Church, 1970). Baby food chicken also provides additional sources of minerals (196 mg sodium, 138 mg potassium, 91 mg calcium, 127 mg phosphorous, 2 mg iron) and vitamins (19 mcg thiamin, 193 mcg riboflavin, 3.4 mg niacinamin, 4.4 mg ascorbic acid) per 100 g serving (Bowes & Church, 1970). By comparison, Grubco (1995) reported that mealworms provide 3.3 mg calcium, and 3.8 mg ascorbic acid. Obviously, the nutritional components of the baby food combination and the mealworms differ, with the mealworms lower in moisture and carbohydrate content and higher in

protein, fat and ash content. Nevertheless, the nutritional analyses of the banana-chicken mixture in comparison to the mealworms suggests that, over the short-term and as a last resort to induce an anorexic bat to begin eating, the banana-chicken mixture supplemented by a nutrient paste and vitaminized water is nutritionally adequate.

Within two days of introducing both treatments, the bat's appetite began to improve. The baby food dosage was gradually increased until the bat would eat about 5.0cc per meal. Food was offered twice daily, early in the morning and again in the evening. At that point, mealworms were gradually reintroduced into the diet—one at a time and the banana-chicken mixture was gradually deleted from the diet. Over the course of about one and a half months, this bat slowly improved and returned to normal health.

DISCUSSION

Wildlife rehabilitation practices, for any given species including bats, are heterogenous, varying considerably with practical experience, education, available resources, and time. Sometimes it is difficult to judge whether rehabilitation outcomes (successful or unsuccessful) are the result of wildlife rehabilitation practices or the result of terminal disease states already present or developing in the animal brought into care. Evidence from autopsies may provide us with the answer for individual animals, while evidence in support of our rehabilitation practices, overall, may be found from our success rates. In order to address these issues, I have included in the discussion brief descriptions of the natural history of Big Brown Bats in Ontario, rabies in Ontario bats, and a general overview of the protocol I have developed for rehabilitating Big Brown Bats here in Ontario.

Natural History

Eptesicus fuscus or Big Brown Bats are one of the most common bats found in Ontario (Brown, 1992) and in many parts of Canada (van Zyll de Jong, 1985). These bats are medium to large in size (wingspan of 32-39 cm; forearm length of 41-52 cm; weight of 12-23.5 g), with brown fur of varying intensities, flight membranes that are typically black, small ears (12-19 cm) and calcar keeled (van Zyll de Jong, 1985).

Big Brown Bats are nocturnal, insectivorous, flying mammals which eat a variety of insects at night, preferably Coleoptera such as June bugs and other related species (van Zyll de Jong, 1985).

According to van Zyll de Jong (1985), Big Brown Bats can be found in a variety of habitats within Canada including wooded, semi-open and urban areas. Summer roosts include buildings, hollow trees and rock crevices, while winter hiberniculae include caves, mines, and man-made sites such as buildings and sewers. Big brown bats are not known to migrate long distances between summer and winter roosts.

Van Zyll de Jong (1985) reports that little is known of the social structure and dynamics of Big Brown Bats. Mating, however, generally takes place in the fall and sometimes the winter. Hibernating Big Brown Bats are generally found in small clusters and sometimes singly, with males most likely to be found in clusters. In late June or early July, the female typically produces one or two offspring. The maternity roosts of Big Brown Bats can consist of up to 200 individuals, although the average size is less than 100.

Statistically, mortality rates appear to be highest when bats are young, decreasing with age until rising once again as the animals reach old age. In Ontario, mortality rates for any given year have also been reportedly higher in females than males (van Zyll de Jong, 1985). Fenton (1983) also notes that severe weather conditions, such as winter conditions of the Ottawa region, can place extra demands upon bats and may result in mortality (especially) in young bats, most likely due to insufficient energy storage for hibernation and/or migration.

Rabies

Whenever you consider bats, you must consider rabies. Rabies is found in Canadian bats. The rate of incidence varies depending upon the geographical locale (Fenton, 1987). In Ontario, historically, the rate of incidence in bats has been very low, equivalent to the rate found in domestic pigs (Fenton, 1983). The Ontario Ministry of Natural Resources rabies statistics for Ontario in 1994, show that the total number of rabies cases (including wildlife, domestic pets and livestock) was 606, the lowest attained since 1961 (McInnes, 1995). The total number of cases for 1995 was even lower at 328 (McInnes, 1996). For both years, foxes and Striped Skunks, respectively, represented the two highest vectors in the province. Bats represented 6% of the wildlife cases submitted in 1994, and 6.6% in 1995. Of the total number of rabies cases submitted, including wildlife, domestic pets and livestock, bats represented 4% in 1994 and 4.9% in 1995. By comparison, domestic cattle represented 20% of the total number of rabies cases submitted in 1995.

The Silver-haired Bat strain of rabies, a rare variant, was contracted by a boy from Connecticut in 1995, and an individual in New York in 1993 although there was no known direct exposure (bite, scratch) to any rabies-suspect species (McInnes, 1996). There have been no known cases of bat-related rabies deaths in Ontario, however, and the last rabies-related death was documented in 1967 (McInnes, 1996).

Rabies is typically transmitted through the bite of a rabid animal, although aerosol transmission in environments where millions of bats reside has also been reported (Constantine, 1988). Rabies incubation periods are not fixed and can range from several days to one year, however, the longest incubation period recorded for a Big Brown Bat was 209 days after capture (Constantine, 1988). Therefore, caution is advised when handling bats. Bats should be handled with gloved hands. Pre-exposure shots are recommended for those working with wild and domestic animals, including bats. Post-exposure shots are available to those exposed to rabid or potentially rabid animals.

Protocol for the Care of Bats Undergoing Rehabilitation

The protocol I follow for rehabilitating bats is based on the guidelines provided by Barnard (1991) with modifications which reflect my northern locale, the low rate of rabies incidence in Ontario bats, the health of the individual bat in rehabilitative care and practical constraints.

At intake I routinely record: demographic information about the bat entering care including where, when, how and who found the animal; general condition upon admission including energy level/lethargy, external wounds, condition of fur, wing membranes, eyes and ears; requirement for veterinary services to prescribe medication, or to euthanize when necessary; and description of food intake, elimination of wastes, mobility and flight. Follow-up assessments record any significant changes in the health or condition of the bat over the course of rehabilitation. Release and death records document the outcome of the intake or rehabilitation process.

Susan Barnard (1991) recommends adult bats be housed separately, in an effort to prevent the possible spread of disease, as well as injuries which may result from fighting, competing for food and general stress. British bat workers, however, do not necessarily house captives in separate accomodations (Wright, 1995). In my experience, co-housing Big Brown Bats in small colonies ($\leq$10) following a quarantine period appears to reduce stress exhibited by individuals, and although squabbling sometimes occurs, there has been no serious fighting or injuries in the five years I have used this method.

My approach to quarantine and housing issues is to conduct a cost-benefit analysis in which the variables include: species of bat (some species are naturally colonial, some are naturally independent); rabies rate of incidence (high, low); and general health of the individual bat in rehab care (poor, good). Those animals with positive factors (colonial species, low rabies incidence and good health) are held in isolation for lesser periods (minimum of 14 days), while those with negative factors are housed separately for longer periods, or perhaps indefinitely.

Upon admission, bats are quarantined for a minimum of 14 days. Following this period, bats are maintained in plastic, "shoebox", ten gallon aquariums adorned with flannel bedding which lines the bottom of the aquarium and is draped over the side to provide a place to hang and hide. Bats are kept in a room, isolated from contact with domestic animals and humans other than the primary caregiver, with natural lighting, fresh vitaminized (1 drop of bird vitamins per cup) water provided ad lib and are fed mealworms [which are maintained as recommended by Barnard (1991).

The feeding schedules I follow reflect several factors including my more northern locale, the season, the age, size and health of the bat, and obviously the size of the mealworm. Healthy bats (normal eating, urination, elimination, mobility and behaviour) which are in care or admitted during the fall and winter months, October through February, are fed 6-15 mealworms once a night. In spring (March through June) they are fed 15-30 mealworms, and in the summer (July through September) are fed 20-25 mealworms per night.

Autopsy results have confirmed the presence of roundworms in the majority (92%) of submitted bats, therefore, once stabilized following intake, they are dewormed with pyrantel pamoate oral suspension (Strongid-T®) (.1cc dose of 50mg/ml, once per week for three weeks).

At admission, injured or sick bats (exhibiting abnormal eating, urination, elimination, GI motility or behavioural symptoms signs) are housed in individual, plastic, two gallon aquariums and, depending on the circumstances, warm water bottles may be used as a comfort measure and to help maintain body warmth. Quarantined bats are kept isolated in a separate room with natural lighting. Introduction of modified feeding schedules and, when appropriate, antibiotics and other medications may begin.

Most sick bats, regardless of season, are fed as much as they will consume twice daily, once in the morning and once in the evening. Although the potential for overfeeding exists, in my experience, sick bats have depressed appetites and do not overeat. Subcutaneous injections of lactated Ringer's solution have been recommended in the treatment of dehydration (Barnard, 1991), and oral electrolyte solutions have been used successfully to treat collapsed bats with diarrhea (Routh, 1995). In my care, bats which require rehydration are maintained on oral rehydration fluids administered at least four times daily, or if seriously dehydrated, are administered subcutaneous injections of lactated Ringer's solution by a veterinarian. This schedule of feeding and rehydration is continued until all symptoms of malaise (for example, reduced appetite, excessive thirst, diarrhea, constipation, lethargy) have remitted, whereupon bats are maintained on the appropriate seasonal feeding schedule outlined earlier.

Given the difficulties associated with artificially hibernating bats—bats that are thin, dehydrated, sick, injured, infants and bats that come into rehabilitative care during the active seasons (spring, summer and sometimes fall for big browns) should NOT be refrigerated (Barnard, 1991) and, that refrigerators are very dry environments—I do not artificially hibernate bats within my care. In my experience, artificial hibernation is contraindicated for the bats that have come into care.

For bacterial infections, antibiotic treatment has been suggested (Barnard, 1991). Postmortem examination of 245 bats in the United Kingdom revealed that 25% of the bats died of septacemia caused by *Pasteurella multocida* (bacterial organism) and all of these bats were thought to have been caught by cats (Simpson, 1995). Thus, for bats exposed to cat bites, routine antibiotic treatment to begin prior to clinical signs exhibition is highly recommended (Simpson, 1995). Some controversy exists over the use of antibiotics in the treatment of wild animals, nevertheless, a number of antibiotics have been used successfully including tetracyclines and penicillin-based antibiotics (Routh, 1995).

CONCLUSION

Suspected idiopathic hepatic and renal lipidosis occurred in a male *Eptesicus fuscus* during rehabilitative care. The clinical symptoms were restricted to anorexia. Research into the causes of lipidosis in domestic animals suggests that diet and obesity play a significant role in spontaneous lipidosis. These causes, however, may be secondary to stress. In the reported cases of idiopathic lipidosis in cats, cows and bats, the animals were found in unnatural and stressful environments and/or situations. The cats were laboratory cats likely isolated and housed in small cages with limited opportunity for excercise and play. The cows were pregnant dairy cows subjected to the stresses associated with both pregnancy and farm life. The bats were housed captive in cages with minimal opportunity for flight. With the recent addition of a secure, outdoor, raccoon-proof, covered flight cage (4' wide X 3' long X 6' high), and of a secure, indoor, flight room (3' wide X 8' long X 6' high which can be extended an additional 6'), I now house healthy bats (following the isolation period) in either of these facilities, depending on the weather. I hope this improvement in caging will reduce the stress for captive bats in my care.

The obesity or anorexia may represent obvious clinical signs of long-term stress in animals housed in unnatural environments or subjected to physical stress. The overeating and anorexia, in distinct ways, may have further contributed to physical changes in the body resulting from stress. Eventually these changes may have resulted in organ damage, particulary spontaneous hepatic lipidosis.

The hypothesis that stress, anorexia and lipidosis are related is supported by recent investigations into the relationship between the stress response and autoimmune regulation. In the human literature, it has been proposed that diseases characterized by inflammation (eg. rheumatoid arthritis) and emotional disturbances (eg. anorexia), are the result of underlying central nervous system (CNS) disruptions of the pathways subserving the stress response (Fricchione & Stefano, 1994; Michelson et al., 1994; Sternberg et al., 1992). Furthermore, medications that influence the stress response may be appropriate adjunctive treatments for illnesses typically thought of as immunological or inflammatory (Sternberg et al., 1992).

Regardless of the origin of the hepatic lipidosis, it appears that dietary changes alone (domestic cats and cows) or in combination with dexamethasone treatment (bat) may prevent possible organ damage, at least in some of the cases. In the first case of anorexia in a Big Brown Bat, death likely resulted from idiopathic hepatic and renal lipidosis. Attempts to prevent death entirely through diet management and antibiotic treatment in this anorexic animal failed. The second case described illustrates that an anorexic bat can fully recover following treatment with oral dexamethasone and a significant change in diet.

IWRC NEWSLETTER

Yet Another

The Lament of a Wildlife Rehabilitator
Trish Drum, 21 Oct 94

"Here's another one," said the woman unfettered, with a cheeky grin – looking like a dog who just delivered the ball it had fetched, or a child bringing home a report card with all A's – handing me yet another small box. "I'm so glad that you do what you do. How nice," she stupidly meowed. "I'll probably see you in a few days with yet another one," she purred. "Hope this one works out better than the last one," she mumbled. I didn't thank her. I just ceremoniously took yet another small box – silently gritting my teeth, dreading examining it's contents. Inside, as usual, yet another victim fallen prey to yet another pampered pet. Through terrified eyes, staring helplessly at me – a robin. It's fragile hollow bones crushed and mangled. It's once beautiful feathers rumpled and bloody. Out of yet another box, I tenderly lift the petrified body. It's rapid heartbeat belies the horror of the ordeal. It knows not if I am friend or yet another – like the feline fiend who so maliciously snared it's existence from it's habitat – it's home. Sometimes, we're granted a miracle and we get to see them mend and fly free again. But most often – we do all that we can – watch them struggle to survive and then watch them wither and die. We bury their bodies, but we never seem to be able to bury the grief that we feel for the demise of yet another life – because before long, yet another insensate cat owner will appear, with another small box, containing – yet another life – hanging in the balance.

** *ALERT* **

by Susan M. Barnard
Morrow, Georgia

In 13 years of hand-raising bats, I have observed only one case of bloat in a Big Brown Bat (*Eptesicus fuscus*), but during the spring of 1995, all bats being hand-raised bloated, including Big Brown Bats. The sick bats were also hyperactive and many drew up in a fetal position. It was discovered that the milk replacer, Esbilac®, was the cause of the illness and high mortality. Pet-Ag, Inc., the manufacturers of Esbilac®, recently changed the formula to include butterfat, replacing vegetable and coconut oils as the dietary fat.

Because Pet-Ag, Inc. also manufacturers Unilact®, for the Upjohn Company, be sure to check the ingredients on the label, for this and all other milk-replacers, before feeding them to bats. Only vegetable based oils may be suitable to supply dietary fat for pups.

If you know of a milk replacer that has proven successful over the years, please share the information with other bat rehabilitators. Also, listed below is a successful alternative to milk formula.

MEALWORM MILK-SUBSTITUTE
INFANT BAT FORMULA

Blend together:
- Mealworms*.....3g
- Soy oil.....1 dp
- Vitamin/Mineral.....1.5 ml

* Large mealworms weigh about 0.10 g

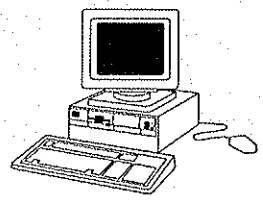
** Tap or distilled water.....30 ml
- Avitron® multivitamins.....1 drop (0.05 ml)
- Avitron® multiminerals.....1 drop (0.05 ml)

Freeze surplus and defrost as needed



IWRC members - this is your newsletter! So, if you have suggestions to make it better, please let us know! Also, if you have stories to tell, tricks of the trade, good books you've read, poems you have written, photographs, etc. send them to the IWRC newsletter editor:
Jennie Sauer, N7439 1/2 Hwy. V, Holmen,WI 54636
E-Mail Jennie_Sauer@nbs.gov

Wildlife Rehabilitation in CYBERSPACE!



Welcome to a new regular feature of the IWRC newsletter! Every newsletter we'll provide you with our latest web crawling in search of internet sites of interest to wildlife rehabilitators. We make no claims for content, except when noted. Write or E-Mail us if you have found some new and interesting sites when "Surfin' the Net"! Jennifer Sauer, IWRC Newsletter Editor, N7439 1/2 Hwy. V, Holmen, WI 54636 - Jennie_Sauer@nbs.gov

This weeks features:

The Wildlife Rehabilitation Information Directory
http://www.cc.ndsu.nodak.edu/~devold/twrid/html/hp.htm

This WEB site contains a plethora of information for wildlife rehabilitators and enthusiasts. Information can be found on first aid for injured wildlife, professional rehabilitation organizations, how to find a local rehabilitators and much more. Check it out and have fun!

IWRC FORUM CORNER

If you have questions for Marge, write her at:
Marge Gibson
Raptor Education Group
N2160 W. Rollwood 5
Antigo, WI 54409

Dear Marge,

Do you have any great tips to get a single Killdeer chick to live? It seems they go through so much energy peeping their little hearts out they don't want to eat!

Signed,
Central Wisconsin Reader

Dear CW Reader,

Killdeers can be a challenge. I'll give you the method that has been successful for me and others I know that do not only Killdeers, but single chicks like turkey, pheasant, quail, and ducks. Obviously, this method works for more than one chick too. The diet described is for Killdeer only.

A cardboard box, 24" x 24" or slightly smaller will work just fine for tiny chicks, but transfer to larger areas as they grow. In one corner hang a reflector clamp on light with a 25 watt bulb. You are aiming for a temperature of about 85 degrees. If your box is outside in a cooler temperature you may need to use a higher wattage bulb to attain that temperature. By having the light in one corner the chick has an area to get away from the heat if it is to warm or no longer needs an artificial heat source. The bottom of the box should be covered with sand or small gravel. This step is important for footing and prevention of splayed legs. A wind-up alarm clock placed in one corner (the louder the tick the better) will calm the single chick and solve your peeping problem. The ticking makes them feel they are not alone in the world and they can concentrate their attention on feeding and growing.

Killdeers can start eating, on the day of hatch, live mealworms (dusted with an avian powder vitamin and mineral supplement) which are scattered on the sand floor. They are not as comfortable eating from a dish, in fact, many refuse and will starve rather than eat meals provided in a container. The insects movement attracts the chick when placed on the floor of the box and mimics what would be natural to them in their native environment. Earthworms also are a good choice and add variety to their diet. Try adding moths and other small insects, such as ants, to enhance their options for diet choices. Remember to offer a variety of things, as the minerals and vitamins necessary for proper growth and development cannot be obtained from a single variety of insect. A shallow water dish also is needed. Be certain it is shallow with low sides as young Killdeer can drown easily by stumbling over the lip of the bowl and falling in the water as they drink. They are happiest when they are standing in the water as they drink.

The chick should spend some time in an outdoor pen with soil floors as soon as possible. The chick should be brought in for the night and during rain or harsh weather. They are not able to regulate their body temperature for several weeks after hatching.

Release comes when the chick is feathered and can fly, and demonstrates that it can find food on its own.

Best of luck to you and your Killdeers. They are a sensitive little bird, but worth the extra effort involved in rearing them!

Sincerely,
Marge Gibson

Dear Marge,

HOW DO YOU DEAL WITH SITUATIONS WHERE PEOPLE SEEM WELL MEANING, BUT ACTUALLY CREATE ABUSE SITUATIONS FOR WILDLIFE? FOR INSTANCE FEEDING YOUNG CROWS OR RAPTORS INAPPROPRIATE DIETS AND CAUSING PERMANENT DISFIGURING OR DEATH. I am having a difficult time "keeping my cool" in these situations and wonder what other rehabilitators do. I feel more and more like a euthanasia center for peoples mistakes. Is there an ethics code that deals with this?

Sincerely,
Feeling stressed in Alabama

Dear Feeling Stressed,

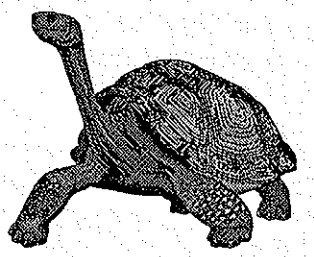
To answer your question, I queried several rehabilitators in various areas of the country. Please know you are not alone in your frustration. The problem is widespread and includes many native mammals that are still legal to own in several states.

Most people I talked to agreed on one thing, and that is so much is dependent on the situation the animals comes out of. If it is a well-meaning person that has tried to save an animal, but didn't have the right information, you can use the opportunity to educate. Explain the needs of the chick or the neonate as clearly as you can without pointing blame at the individual. If they are concerned about wildlife they will understand that they are the reason for this animal suffering. Most of the time those individuals are hard on themselves about the situation and quickly get the idea that specialized advice is necessary when obtaining a baby animal. One rehabilitator shared with me a story that started with an individual malnourishing a baby fox, and ended with a strong supporter of not only her wildlife center, but a nearly militant advocate of wildlife education.

If the abuse is done with intent or with mutilation as a part of the problem the advice is very different. Most rehabilitators, myself included, suggest turning to your state or federal agencies or the humane society if the abuse is done with intent. Police departments and other law enforcement regulatory agencies are taking animal abuse much more seriously than they have in the past. Recent studies show that people that end up as serious criminals, even serial killers, have often mutilated animals first. This tendency frequently appears in early childhood. Animal abuse should not be considered a childhood curiosity or a prank, but addressed as the serious preview that it is to an unbalanced adults' future, and unfortunately ours as well!

If you reach the end of your rope over a case, feel free to call and talk about it. Sometimes just talking to others that understand helps ease the grief we all feel at these times. Take care.

Sincerely,
Marge Gibson



MISCELLANEOUS ANNOUNCEMENTS

Zoo needs donations of artifacts - The Dreher Park Zoo, in West Palm Beach, Florida, needs a variety of animal artifacts for their educational programs. The items needed would be such things as skeletons, feathers, and eggs. If you have items you could donate or need more information contact:

Michele Dzama
Docent Council
Dreher Park Zoo
1301 Summit Blvd.
West Palm Beach, FL 33405-3098
(407) 533-0887

Information needed - Susan M. Barnard is compiling clinical data on both mega- and microchipterans for future editions of *Bats in Captivity*, now being published by Wild Ones, Springville, CA, and a forthcoming publication *Handbook of Exotic Animals*, Manson Publishing Ltd., London. The following information is needed: captive longevity data, methods of wing repair and results (radiographs would be a plus); interesting pathological reports (e.g., myopathies, neoplasms, other); blood and urine values, especially from megabats, and electrolyte content of plasma or serum samples. Send information to: Susan M. Barnard, Department of Herpetology, Zoo Atlanta, 800 Cherokee Ave. SE, Atlanta, GA; FAX (404) 627-7514

Volunteers needed - Jardin Gaia, the first licensed Wildlife Rescue Center in Costa Rica, is looking for volunteers, wildlife advisors (for the different wildlife species in the area), veterinary equipment, liaisons with veterinary schools, and veterinary students for externships. Contact:

Dario Castelfranco, Director
Jardin Gaia Wildlife Rescue Center
Phone/Fax (506) 777-0535
gaiamrsa@sol.racsa.co.cr

Request - Joan Peluso, a member of IWRC, is looking for rehabilitators that have had a CA-125 blood test that has turned up positive. (The CA-125 blood test is an indicator of ovarian cancer.) A medical paper is being put together if enough individual case studies are collected. For more information contact:

Joan Pelusa
311 Champion Drive
Hampstead, CA 28443

Zoologic® Milk Matrix Comparison - Pet-Ag, Inc. recently introduced a line named Zoologic® Milk Matrix to the zoo and rehabilitator community. Because of the numerous inquiries we have received regarding how these milks compare to Esbilac®, KMR®, and Multi-Milk™ we are offering the following comparison.

Milk Matrix 33/40 is based upon the older non-instantized Esbilac. Both have 33% crude protein and 40% fat. Milk Matrix 42/25 compares to the older non-instantized KMR with 42% protein and 25% fat. Milk Matrix 30/55 is a match for Multi-Milk, containing 30% protein and 55% fat, and only a trace of lactose.

Realizing that many rehabilitators had developed formulas for wildlife using older formula versions of Esbilac and KMR, Pet-Ag kept these formulas in the Milk Matrix line while instantizing Esbilac and KMR to make them easier to mix for dog and cat breeders.

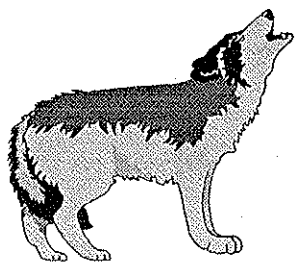
Pet-Ag believes the above information will help you in selecting a Milk Matrix formula which is equivalent in nutrient composition to Esbilac, KMR, or Multi-Milk.

If you have any questions or need further information call the Technical Service Department at 1-800-323-0887.

ATTENTION FELLOW REHABILITATORS!

The Wildlife Center of Virginia is sponsoring a fall conference, "CALL OF THE WILD", Virginia's First Wildlife Rehabilitation Conference. A wide range of wildlife rehabilitation issues will be offered either in plenary or break-out session format. Topics will include, permits, and wildlife laws, ethics, euthanasia, housing, and emergency care. The conference promises to be educational, informative and a fun chance to meet others who share similar wildlife concerns. For details, call Donna Sweet at 540-942-WILD.

DATE: November 9, 1996
TIME: 8:30am - 5:30pm
LOCATION: Stauton, VA (which is centered in the Shenandoah Valley, just outside the Blue Ridge Mountains)
FEE: $50 Early bird registration (by 10/31)
$60 after 10/31
$35 for full-time college students



International Wildlife Rehabilitation Council

1996 Summer Sale Catalog

Take advantage of our low sale prices, during IWRC's annual literature clearance! Increase the size of your information libraries while you help us lower our inventory. Summer sale prices are available to IWRC MEMBERS ONLY!!

This sale form MUST accompany all orders, and must be received no later than September 30, 1996, in order to receive the sale prices. Any orders received after that date will be invoiced at the regular rates. IWRC member discount DOES NOT apply to summer sale merchandise.

Drug Dosage Wall Chart (8 1/2" x 14") New, Smaller Size!

Wildlife Flow Chart--1991 Dosages provided or reviewed by Keath Marx, DVM; Michael Murray, DVM; Janna Wynne, DVM; Steve Sanders, DVM; and Jan White, DVM

This 8 1/2" by 14" coated flow chart shows what steps should be taken upon receiving an injured animal. Starting at the bottom of the chart, and, depending on what condition the animal is in, various protocols are followed on up through the chart. There is also a list of antibiotics and their dosages for easy reference.

Regular Price $3.00 **Sale Price: $1** _____

Wildlife Journal Reprints--Specially Priced at $.50 each

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____Oral Lesions in Raptors: diagnosis & treatment, S. Emanuelson, DVM, Vol. 6, # 1
____How to Read & Use a 1cc Syringe, M. Johnson, Vol. 8, # 3
____Tubing Mixtures for Rehabbers on the Run, K. Hobson, Vol. 8, # 4

Annual Overstocked Literature Sale

Our annual literature sale on selected items will be in effect until September 30, 1996. Only those items listed in the sale catalog will be sold at these reduced prices.

1993 Conference Proceedings, Lake Tahoe, Nevada: *"Wildlife Rehabilitation: A Perpetual Learning Process"*

Papers include: The Sex Life of Owls, Kay McKeever; You Can't Catch a Meal if You Ain't Got the Feel: Prevention & Treatment of Bumblefoot, Joanne Richards, DVM & Marnie Allbritten; Working Procedures for Non-Releasable Raptors, Diana Granados & Jenny Papka; Preventing Diseases & Death in Young Passeriforme Birds, Donna Burt; Gambel's Quail: Rescue, Rehabilitation, & Release, Barbara Maxwell, RN, MA; Tunnel Rats: Ground Squirrel Rehabilitation, PC Hanes; Raising Orphan Raccoons, Susan Kelly; Hepatic Lipid Accumulation in a Captive Raccoon, Jessica Lainson, DVM; A Review of Harbor Seal Nutritional Uptake on Two Artificial Formulas at a Rehabilitation Center, Patty Chen, et al.; Stiped Skunks: Care of Orphaned & Injured Babies & Injured Adults, Meryl Faulkner; Rehabilitation of the Woodchuck, Dale Carlson; Raising Fawns Wild, Cheryl Millham; Fecal Diagnosis Tecniques for the Detection of Parasitism in Wildlife, Toni Guarnera; Good Guys vs. Bad guys: Understanding the Immune System, Rebecca Picton; The Use of Friendly Plastic in External Fracture Fixation & Wound Management, Joanne Richards, DVM; Avian Hematology: Changes With Disease, Victoria Joseph, DVM; Reptile Hematology: An Outline, Victoria Joseph, DVM; Ninja Turtles & Heavy Metal Snakes: The Effects of Popular Culture on Reptile & Amphibian Rehabilitation, Melissa Kaplan; Computers in Wildlife: An Overview, Bob Hanes; The Development of a Quality Internship Program in a Wildife Rehab Facility, Mary Kmak; Oh, By the Way, Don't Forget to Laugh: Coping With Burnout, Hope Douglas & Dale Carlson; Creating a State Organization, Hope Douglas; Living in Cold Country: The Treatment of Hypothermia, Cheryl Millham; Cleaning & Disinfection Processes in Avian Rehabilitation, Jan White, DVM

Sale Price: $8 _____

1992 Conference Proceedngs, Naples, Florida: *"Under Our Wing"*

Papers include: The Ecological Significance of WL Rehabilitation by Dr. John Fitch; The Value of Medical Management of the Florida Panther in Assessing a Population Decline by D. Jansen & Dr. M. Roelke; Environmental Education - A Back to the Future Approach for Protecting WL & Their Ecosystems in the Next Decade by W.C. Crawford, Jr.; WL Rehabilitators & State WL Agencies-Uneasy Allies or Fast Friends by M. Allbritten; Video: An Effective Tool for Fundraising by H. Douglas; Public Speaking by C. Millham; Fundraising in the 90's by D. Carlson & H. Douglas; Computers for WL Rehab by T. Millham; Computer Networks (BBS) & Databases for Rehabbers by B. Marshall; Rehabilitation, Computers, & Communication by R.G. Hanes; Emaciation: Unraveling the Mysteries of Recovery by L. Shimmel & J. White, DVM; Treatment of Pododermatitis in Cormorants by C. Harvey-Clark, DVM; Rescue & Rehab of Burrowing Owls in Silicon Valley by J. Priest; The Slit-wing Wing Wrap by J. Priest; Reintroduction of Endangered Species - Combining Rehab & Species Preservation in the 90's by W.C. Crawford, Jr.; Raising Hell, Raising Bobcats by P. C. Hanes; Tx of Burned Raccoons: A Case History by S. Heckly; Initial Care of Orphaned N. Elephant Seal Pups by D.M. Smith & M. Stone; Isoflourane: A Safe & Effective Anesthetic for Marine & Freshwater Turtles by S.L. Shaw, et al; Euthanasia by J. Richards, DVM; Intraosseous Fluid Administration in Birds by J. Wynne, DVM

Sale Price: $7 _____

1991 Conference Proceedings, Vancouver BC, Canada: *"Handle With Care"*

Papers include: How to Make Your Wildlife Education Programs More Effective by M. Gibson; Home Care & Wildlife Rehabilitation by M. Allbritten; Squirrel Rehabilitation Project by C. McIntyre; Handling & Restraint of Wildlife Species by F. Tseng, DVM; Seal Pup Rehabilitation Program by L. Braun; Rehabilitation of Orphaned Sea Otter Pups by J. Hymer; Rehabilitation of the Beaver & Muskrat by C. Millham; Rehabilitation of the Coyote by J.Wasserman; Study of 129 Coracoidal Traumas, Successes Without Intervention by K. Chubb; Current Protocol for the Rehabilitation of Oil Affected Waterbirds by J.White, DVM; Care of Coots, Rails, Plovers, & Sandpipers by M. Faulkner; Aspergillosis in a Rufous Hummingbird Colony by C. Harvey-Clark, DVM; Avian Hematology: An Overview of Specimen Processing, Sample Evaluation, & Interpretation by V. Joseph, DVM; Basic Public Speaking for the Rehabber by A. Ottomeier; Raising More Money in Hard Times by B. Marshall; Hand-Rearing Techniques for Raptors by C. Hager & W. C. Crawford, Jr.; Rehabilitation of Orphaned Raptors: The Fostering Alternative by B. Woodbridge; An Investigation Into the Health Status of Bald Eagles of BC by K. Langelier, DVM.

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Modern Live Virus Canine Distemper
Vaccines in Gray Foxes

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What's Wrong With Bug Butter?
Tired? Who's Tired? Not Me!

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Physical Examination of Songbirds

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Raising White-tailed Deer "Wild"
Avian Trichomoniasis
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Natural History Notebook: Turkey Vulture

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Sea Lion's Share of a Whale of a Job
How to Get Media Coverage
Internship Programs: An Overview
For the New Rehabber; Newsletters

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A Review of Avian Hematozoa Parasites
Euthanasia
1988 IWRC Annual Report

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Alaska Oil Spill Bird Rescue Efforts

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San Miguel Sea Lion Virus
Simple Things: Y-Perch Holders
Guidelines for Exercising in Rehabilitated Raptors

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ROMANCING THE MACAW: A VOLUNTEER EXPERIENCE IN GUATEMALA

Corey J.A. Bradshaw
Amy E. Lightfoot

After 4 hours of riding on top of a run-down chicken bus, pelted with tropical rains and dodging oncoming branches that seemingly reached out to grab us, we were relieved to arrive finally at the only bit of paved road for hundreds of kilometres in any direction. Welcome to the Petén, northern Guatemala, and some of the last pristine tropical rain forest remaining in this part of Central America. This is also the home of *La Asociación de Rescate y Conservación de Vida Silvestre* (Wildlife Rescue and Conservation Association), or ARCAS, a non-profit wildlife rehabilitation and breeding organization whose main goal is to rehabilitate tropical wildlife confiscated by the Guatemalan Wildlife Service (CONAP), or donated by individuals and businesses.

With our backsides just a little more tender than usual, our belongings just a bit wetter and a rudimentary knowledge of Spanish, we were about to embark on a very interesting three-week adventure of volunteer service. Arriving in Flores (the only vestige of civilization in the area) after our grueling ride through jungle mud on the chicken bus, we were hoping that we could find the ARCAS office, and, that someone was expecting us. Although we had sent several letters to ARCAS prior to our departure, we were not sure if they had been received. Our fears subsided though when we were directed to the office and found Victor Acedo, director of the Rescue Centre. Victor, a fun-loving and energetic Mexican-American living in Guatemala for the last ten years, was one of the founders of ARCAS and is the heart of the Rescue-Centre's spirit. After a description of the Centre and a cheerful "Cool, baby!" from Victor, we set out in the back of a pick-up truck to the Centre, some 20 km from Flores.

Daily Schedule

Life at the Centre began early - mainly because it was impossible to sleep over the ear-piercing squawk of the scarlet macaws and myriad of other parrots that invariably woke at 6:30 each morning. Climbing out of the mosquito nets that covered our beds and hurrying to the outhouse (a facility also visited frequently by uninvited guests such as scorpions, jumping spiders and swarms of flies) was the first activity of the day. All staff and volunteers would meet at *la cocina* (kitchen) at 7:00 where the daily tasks were delegated. The first job was cleaning all the cages, including the removal of faeces, washing of water and food dishes and raking the debris from the cage floor.

After these tasks were complete, we moved on to the feeding. For many of the bird species, we prepared a special mixture of Guatemalan corn, Incaparina (a corn-based protein mixture), vitamin supplements and wild fruits that was scooped into bowls in each cage. We fed certain animals the mixture twice per day, whereas the predators and nocturnal species were usually fed only once late in the afternoon. After the cleaning and feeding, a hearty breakfast of at least 3 Guatemalan staples was served by the multi-talented Doña Juana, the incarnate mother-figure of the Centre. Breakfast (and, as it so happened, lunch and supper) consisted of *frijoles negros, arroz y tortillas de maiz* (black beans, rice and corn tortillas). These simple and seemingly unappealing foods were, however, served with such originality and promptness that the lack of culinary diversity was easily tolerable.

After breakfast we usually turned to the task of the day - usually something involving cage maintenance, trail repair, quarantine duties, gardening or general clean-up. Of course it was somewhat difficult to take directions when our lack of Spanish vocabulary reared its ugly head at every turn. So, with a little help from Chema, an unassuming and patient ARCAS employee, we made our way through the compound to learn the various terms - *jaula* (cage), *escoeta* (brush), *martillo* (hammer), *arbol* (tree), not to mention the common names for the animal residents - *guacamayas* (macaws), *loros* (parrots), *pizotes* (coatis), *mico leónes* (kinkajous), *monos arañas* (spider monkeys), *tigrillos* (margays), *gabilánes* (hawks), etc.

Often our mid-morning projects were the direct result of Amy's creative thinking. She was more capable at picking out some of the problems associated with this level of animal care and rehabilitation. She did not hesitate to point out the structural flaws of some cages, the condition of certain animals, and the required diversity of bird and mammal diets. A keen eye for injured or sick animals, Amy contributed to the overall function of the Centre by communicating her observations to ARCAS personnel, including veterinarian and co-founder, Dr. Oscar Murga.

After a humbling lesson from Doña Juana on its proper use, I became quite capable at wielding a *machete*. The preferred tool in the jungle, *machetes* are multi-purpose instruments that can cut down trees to be used for perches and structural supports, straighten boards for building material, clear trails through the bush, and even sharpen pencils. After acquiring my new-found skills, Amy made certain that they were put to good use.

Work continued steadily until the midday meal that consisted of a fresh batch of *tortillas* and *frijoles*. Hard work in the jungle heat and humidity made this meal one of the most awaited of the day. Accustomed to the hectic pace of Canadian life, we began our stay by wolfing down lunch in expectation of the afternoon chores. Central American gastronomic customs are, understandably, quite different. We soon learned to enjoy

these meals because work would not begin again until 2:30 or 3:00 in the afternoon. Early afternoon *siestas* are commonplace, although the heat usually prevents actual sleeping. We often used this time to wash our ever-filthy clothes in the *pila*, a multi-purpose concrete wash basin and water storage structure commonly found in the centre of every village. However, the lack of sufficient sunlight through the dense forest canopy usually precluded a quick drying of the laundry - so we soon became accustomed to damp and musky-smelling clothes. Or, we used this time to catch up on some reading, enter interesting tidbits in our journals or simply play a game of cards.

The late afternoon was reserved for the completion of projects begun in the morning, and for the second feeding of the day. Darkness comes early in November, so by 5:00 pm we packed up the tools and headed for the showers. Somewhat of a miracle, the douse of cold water in the little brick shower house washing away a full day's-worth of sweat and mud was wonderfully refreshing. In preparation for leaving the comfort of the rafters of our *palapa* (palm-roofed sleeping structure) for a night of hunting insects, a little brown bat or two would often join the unwary bather in the shower. Refreshed and exhausted after the day's work, we then made our way back to the *cocina* for another dose of *frijoles*, *arroz* and *tortillas*. Sometimes an added surprise in the form of *protemás* (a soy bean by-product) garnished the supper plate.

The Rehabilitation and Breeding Programmes

The main goal of ARCAS is to rehabilitate and release birds and other animals that have found their way into the hands of the smuggler or unaware pet-owner. The task of preparing a domesticated or semi-domesticated animal for eventual release into the forest is overwhelming. Many animals must be "retrained" to survive, and this includes recognizing edible wild foods. In addition to the staple diets of vitamin- and protein-rich mixtures, ARCAS staff member, Amilcar, made regular forays into the jungle surrounding the Centre in search of natural foods regularly consumed by the animals' wild counterparts. Amilcar had a knack for finding even the smallest wild fruits that may have been suspended up to 30 metres above the forest floor. How he obtained the fruit is even more impressive. With nothing but a *machete* on his belt, Amilcar shinnied his way up a 30-metre branchless tree trunk. Once at the top, he proceeded to hack away at only the most productive of branches so that they fell to the ground for easy harvest. This technique not only guarantees a constant supply of rare and important food items (*e.g.*, *campanilla, copal, ramón blanco* and *saltemuche*) for the Centre's residents, it is also an environmentally-friendly alternative to deforestation for the sake of feeding.

Recognizing the multitude of dangers that an animal will face upon release is the second aspect of the rehabilitation programme. Although still in its planning and implementation stages when we were at the Centre, the use of a complicated system of cage corridors and pulleys will ensure that prey species recognize at least some of these dangers. The plan includes linking a series of cages together with a wire-mesh corridor in which a resident jaguar will roam. Cages suspended above and around these corridors will allow many species, especially the canopy-dwelling parrots and macaws, to equate ground-dwelling predators as potentially dangerous.

Another element of the ARCAS endeavour is the implementation of a Scarlet Macaw (*Ara macao*) breeding programme. Paired birds are housed at the Villa Maya Hotel, a luxury tourist facility only a few kilometres from the Rescue Centre. In fact, it was the duty of some volunteers to tend to these birds - and the trek through the jungle was a welcome change to the daily routine at the Centre. To date, some success has been achieved, but the expansion of the programme to private breeders in the Petén is the scope of this particular project. It is hoped that the fledglings produced by the programme will supplement the release of rehabilitated macaws and increase the output of birds that will survive to reproduce in the wild.

After three weeks at the Rescue Centre, it was time to move on. Our stay was relatively short but ARCAS volunteers may remain for longer periods. A weekly fee was charged to cover food and lodging costs, but the benefits reaped far outweighed this small monetary sacrifice. Although simple in theory, ARCAS strives to implement a reasonably new approach to wildlife rehabilitation by incorporating local practicality with a global vision of conservation. With the increasing efficiency of pet-smuggling networks, more and more rare species are in need of rehabilitation and release - and ARCAS is beginning to fulfill this need. Our time in Guatemala and ARCAS was one of purpose, and we left feeling we had done our little part in preserving the beauty and wonder of this most beautiful and vital region of our planet.

If you are interested in volunteering for or contributing to *La Asociación de Rescate y Conservación de Vida Silvestre* (ARCAS) in Guatemala, write or fax the following contacts to obtain more detailed information:

Victor Acedo	Myriam Monterroso
Director de Voluntarios	Directora Ejecutiva
ARCAS	ARCAS
Flores	Petén
11 Calle 6-66	Zona 2
Guatemala, C.A.	Guatemala,C.A.
(5029) 500566 (tel & fax)	(5022) 535329 (fax & tel)

State and Provincial Representatives

The following is a list of IWRC representatives. Members seeking information about the IWRC or IWRC events from a member's viewpoint, may contact their representative. If a representative is not listed for your state or province, contact the IWRC office at (707) 864-1761. Or if you are interested in becoming an IWRC representative contact: Marnie Allbritten, 292 Cleveland Hill Rd., Roseburg, OR. 97470
503-440-6895

Alberta, Canada
Karl Grantmyre
A.S.I.B.P.
51562 - RR. 222
Sherwood Park
Alberta, Canada T8C 1H4
403-922-3024

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Susan Herunter
Wildlife Rescue Association of BC
5216 Glencarin Drive
Burnaby, BC V5B 3C1
Canada
604-526-7275

Connecticut
Hope Douglas
Wind Over Wings, Inc.
22 Old Road
Clinton, CT. 06413-1855
203-669-4004

Illinois
Jane Seitz
Wildlife CPR
5695 W. Hill Rd.
Decatur, IL. 62522
217-963-6909/217-422-9564

Kentucky
Barbara Rosenman
Kentucky Wildlife-line Inc.
Rt. 1, Box 274
Smithfield, KY. 40068
502-222-1853

Maryland
Andrea Hicks
1800 Rushley Rd.
Baltimore, MD. 21234
410-668-8901

Mississippi
Genevieve Tharp
141 Kaiser Lake Rd.
Natchez, MS. 39120-8936
601-442-4622

New Mexico
Penny Elliston
1619 Saunders SW
Albuquerque, NM 87105
505-873-2338

Nevada
Karen Kvasnicka/Kerri Bright
2793 Kayne Ave./POB 5476
Minden/Reno, NV.
89423/89313
702-267-2424

Oregon
Becky Picton
Chintimini Wildlife Care Center
311 Lewisburg Ave.
Corvallis, OR. 97330
503-745-5324

Quebec, Canada
Harriet Schleifer
PO Box 664, Snowden Station
Montreal, Quebec
Canada H4V1Z6
514-485-3697/514-369-0963

Texas
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135 Litchfield
Houston, TX. 77024
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318-984-1491

Michigan
Cathy Gidner/Louise Sagaert
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Eaton Rapids, MI. 48827
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517-886-1626 (Cathy)

New Jersey
Jo Balliet
Balliet's Wounded Knee
Wildlife Refuge, Inc.
8 Eldorado Drive
Tabernacle, NJ. 08088
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12305 Fletcher Chapel Rd.
Medina, NY. 14103
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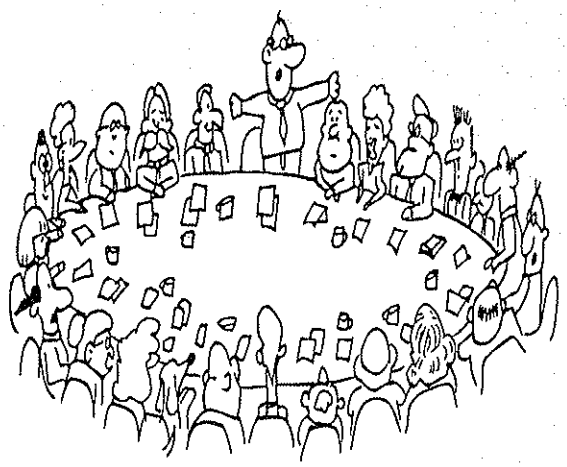
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Philadelphia, PA. 19128
215-482-8217

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Pat Isaacs
9491 Caddell Dr.
Fort Mill, S.C. 29715
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Kent Knowles
3512 Duff Dr.
Falls Church, VA. 22041
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Melinda Fitzgerald Kidd
2644 Red Pine Court
Green Bay, Wisconsin, 54313
414-434-3959



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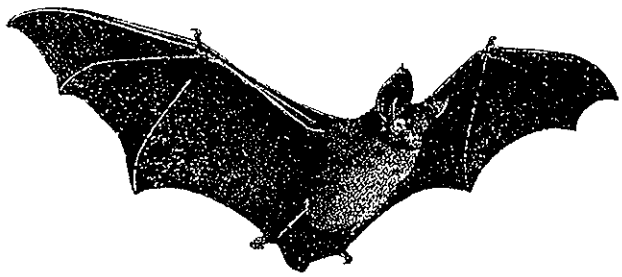
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I would like to thank Edythe Butler, friend and colleague, who spent many hours to make this paper worthy of publication.

Author Profile

Selena has been active volunteer in wildlife rehabilitation since 1990 when she began as a volunteer for a local wildlife rehabilitation organization. In the following year, in a joint effort with Edythe Butler, they founded their own home-based wildlife rehabilitation organization whose members who liase to share information and resources.

The author specializes in bats, but has occasionally assisted with raccoons, squirrels, groundhogs, songbirds and toads. She has been actively rehabilitating adult bats for four uears now, with an overall success rate of 75%. Networking and information gathering and sharing are important aspects of her work. In addition to wildlife rehabilitation, she is a research assistant at a psychiatric hospital and have received a Master's degree in experimental psychology. He activities as a researcher have assisted her greatly in her wildlife rehabilitation endeavors.



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Glucocorticoid Treatment of Neurologic Trauma in Northern Flickers (*Colaptes auratus*): 61 cases

Barry K. Hartup, MS, DVM
Chitra Natarajan, DVM

Willowbrook Wildlife Center
Forest Preserve District of DuPage Co.
525 S. Park Blvd.
Glen Ellyn, Illinois 60137

Abstract

This report details a retrospective study of the treatment of 61 Northern Flickers (*Colaptes auratus*) with central nervous system (brain and spinal cord) injuries. A chi-square analysis was used to evaluate the potential benefits of glucocorticoid use in relation to case outcome. We found no statistically significant difference in the proportion of released cases between glucocorticoid treated and control (no glucocorticoids) flickers with CNS injuries. Further studies are recommended to investigate two variables not controlled in this study: the severity of neurologic injury and the clinical application of glucocorticoids in cases of varying severity.

Key Words: Northern Flicker, *Colaptes auratus*, Family Picidae, glucocorticoids, nervous system, trauma, wildlife rehabilitation

Introduction

Impact injuries, such as window strikes and automobile collisions, are a common finding in wild birds, and often have fatal or debilitating consequences for the victim (Klem, 1979). Many birds are killed instantly or are knocked unconscious and later succumb to their injuries or scavengers (Klem, 1990). Others appear startled or stunned, and fly off shortly after impact seemingly unharmed.

Impact injuries typically include concussion, skull or vertebral fractures, localized brain or spinal cord hemorrhage and cell damage, long bone fractures, internal hemorrhage and organ trauma (Klem, 1990; Dawson and Dalby, 1973). Neuronal trauma within the brain may cause a functional encephalopathy due to alterations in cellular function (Evans, 1987). Resulting clinical signs include head tilt, circling, opisthotonos, torticollis, convulsions, seizures, abnormal limb posture, paresis or paralysis.

Central nervous system (CNS) injuries from impact trauma are the most commonly diagnosed conditions of mature woodpeckers (Family Picidae) at our facility (unpublished data). Normal operating procedure in these cases consists of high dose parenteral glucocorticoid therapy (most commonly dexamethasone sodium phosphate @ 2-4 mg/kg IM or IV) and placement in a dark, isolated environment. Fluids, such as normal saline or lactated Ringer's, are administered subcutaneously or orally, and antibiotics are administered in cases with contaminated wounds.

The benefits of glucocorticoids for CNS disease reportedly result from protection of cellular membranes against oxygen-free radical effects, improvement in microvascular integrity, stabilization of cellular junctions, control of edema and lowered intracranial pressure (Behrend and Greco, 1995; Papich and Davis, 1989). Unfortunately, conflicting reports exist on the efficacy of glucocorticoids used with head and spinal cord injuries in mammals (Papich and Davis, 1989). No comparable studies have been undertaken in birds.

The purpose of this study was to analyze the effects of glucocorticoid administration on case

outcome in Northern Flickers (*Colaptes auratus*) with CNS injuries. Our hypothesis was that glucocorticoid therapy was associated with an increased proportion of released cases compared to those treated conservatively.

Materials and Methods

Medical records of 61 flickers diagnosed with CNS injuries were reviewed. All cases were presented to Willowbrook Wildlife Center, DuPage County, IL, between January 1, 1990 and December 31, 1995. Information collected included month of admission, sex, age (hatch-year juveniles and adults only), weight (grams) and body condition (scale 1-5, emaciated-obese) at admission, cause of injury, primary diagnosis, treatment(s) provided, case outcome and duration of stay. Causes of injury were determined using clinical presentation and reliable historical information from clients. Flickers which died within 24 hours or were euthanized on arrival were not included in this study due to overall grave prognosis at admission.

Data were tabulated and analyzed using statistical software (StatView 512+, BrainPower, Inc., Calabasas, CA 91302) for microcomputers. One and two-way ANOVAs were used to examine effects of sex and age on the weights and body conditions of the flickers. A series of contingency table analyses were used to identify confounding among primary variables in this study that may have interfered with our test of association between glucocorticoids and outcome (i.e., month of admission, sex and age were compared to outcome to test for significant associations). A chi-square test without correction for continuity was used to determine association between glucocorticoid therapy ($\geq$ one administration) and case outcome (released vs. died or euthanized 24 or more hours after admission) (Thrushfield, 1986). A p value $<.05$ was considered significant.

Results

In the six-year study period, 41 of 61 (67%) flickers with CNS injuries were admitted between the months of June and August (Fig. 1). Of 43 sexed individuals, 27 (63%) were male, and 16 (37%) female. Forty-seven of 61 (77%) admissions were adults, and 14 (23%) were hatch-year juveniles.

Weights and body conditions of all birds were within normal limits. The mean weight (±SE) of juvenile flickers (n=14, 102±3 gm) was less than adults (n=45, 114±2 gm) (p=.01), but there was no significant difference in body condition between the two ages. There were no significant differences found in weight or body condition between male and female flickers. There were no significant interactions between sex and age for either weight or body condition of the flickers as well.

Of 27 cases where a cause of injury could be determined, 24 (89%) involved impact trauma (hit by car or window strike) and 3 (11%) domestic animal attacks.

The primary diagnosis of all cases was described as central nervous system injury. No attempt was made to grade the severity of the injuries described because descriptive medical terminology was not reliably found on all records. Secondary diagnoses were also typical of trauma, including lacerations, fractures and hemorrhage. A systemic infection was identified in one case which died within two days of arrival.

Glucocorticoids were administered to 49 of 61 (80%) flickers, and 12 (20%) were treated conservatively (no glucocorticoids). The duration of glucocorticoid therapy was variable (dexamethasone was normally given IM SID for up to 3 days as necessary); treated flickers received one to three doses. Fluids and nutritional support were provided as needed to birds not capable of self-feeding. Antibiotics were not administered to any flicker. Invasive surgical procedures were not attempted in any case.

A total of 11 of 61 (18%) flickers were released (8 glucocorticoid-treated, 3 control); 50 (82%) died or were euthanized at some point after the first 24 hours of rehabilitation due to poor prognosis for survival or release. By comparison, 13 of 59 (22%) age-matched flickers, without CNS injuries and admitted during the same six-year period, were released. The mean length of stay of released CNS-injured flickers was 28±6.3 days (±SE; range 7-75 days).

No significant associations were found between the primary variables (month of admission, sex and age) and case outcome ($p>.05$). There was no statistically significant association between glucocorticoid therapy and release compared to cases treated conservatively ($p=.48$).

Discussion

Our findings suggest glucocorticoid administration (specifically dexamethasone) is not associated with a higher proportion of successful outcomes compared to conservatively treated flickers with CNS trauma. At a minimum, glucocorticoid administration does not appear to negatively affect outcome of flickers with CNS injuries.

This study is only preliminary, however, due to the limited sample size and shortcomings in data available from the medical records. No reliable written information was found to aid in grading the severity of clinical signs in the flickers, leaving open to debate the comparability of the treatment and control groups. Our record keeping now stresses grading neurologic injury as mild, moderate or severe, based on all clinical signs exhibited by an animal.

Because glucocorticoid treatment was overseen by two different veterinarians and may not have been applied randomly to the study population, additional bias may have been introduced. A contingency table analysis showed that each of the two veterinarians (each present for half the study period) used glucocorticoids in a similar proportion of flickers with CNS injuries. What cannot be deduced, however, is at what degree of severity of neurologic injury (and hence liklihood of release) glucocorticoid therapy was applied.

From personal experience, we tend to use glucocorticoids in cases exhibiting severe clinical signs. The use of glucocorticoids in cases of neurologic trauma is controversial (Papich and Davis, 1989). Numerous side effects of dexamethasone are known in animals, such as immunosuppression and delayed wound healing, and these must be balanced against the drug's potential benefits. Interestingly, the fact that the proportion of released treated cases was similar to untreated (perhaps less severe) cases may suggest a very beneficial, life-saving effect of glucocorticoids (e.g. initial shock management, anti-inflammatory effects) in flickers at serious risk of permanent injury or death. Bias from these sources would need to be addressed in future studies.

While advances in the management of neurologically traumatized animals have occurred, wildlife rehabilitators and veterinarians attempting to treat small birds for impact injuries must realize the limits to our intervention, and the poor prognoses these cases carry. Judicial use of glucocorticoids (preferably short-acting formulations such as methylprednisolone sodium succinate) together with supportive care measures (especially diligently applied fluid therapy) are most often recommended for birds with central nervous system trauma (Bennett, 1994).

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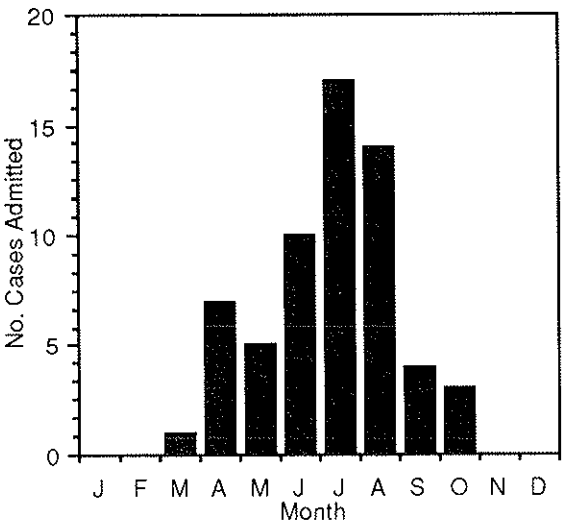
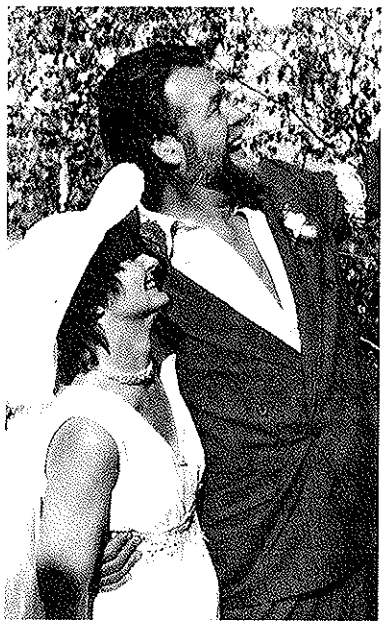


Figure 1. Number of flickers with CNS injuries admitted , 1990-1995.

In Memoriam



Donna Kiefer
1953-1996

IWRC, wildlife rehabilitation and I all lost a dear friend on June 11, 1996. The former Donna Allen-Barron, along with her husband of 2 months, Chris Kiefer, were killed in a tragic accident in Roma, Texas, on their journey to a new life in Costa Rica.

Donna was very active in San Diego's Project Wildlife for the past 12 years where she served as Co-leader of the Raptor and Education teams and as a member of the Board of Directors. Donna was involved with several research projects in the San Diego area during the past few years, as well was a long-time as a member of IWRC. She was looking forward to starting over with wildlife rehabilitation once she settled in Costa Rica as well as to being an IWRC international representative.

Donna was a familiar face at IWRC conferences and served as co-host of the San Diego Conference in 1994. Her generous nature, caring manner and love of wildlife were apparent to everyone that knew her.

To me, Donna was a dear friend, and she had many. She was the kind of person that always knew when to send a funny card to brighten your day, when to call to see how things were going. She was the kind of person you could count on just to listen when you needed to vent, and never gave advice unless you asked. She was the kind of person that always remembered your birthday even if it was smack dab in the middle of baby season. She didn't judge others, even when it might have been tempting to do so. Donna and I had history together. We dragged each other, kicking and screaming, through some serious bouts of rehab burnout. We always recovered, and always for the same reason; wildlife needs friends. She shared her joys, her hopes and dreams with such enthusiasm you couldn't help but feel a part of the entire process.

Her last card to me appeared the day I was notified of her death. I struggled to read her familiar script. "Change in plans, we're driving!, she wrote. "Yet another segment of our great adventure. . . more to follow." She was happy. The last day I spent with Donna was her wedding day just a few short months ago. She was radiant! She had found her happiness and was living the dream of a lifetime. The kind of dream that comes to a one to customer. "I feel like Cinderella, she laughed. I got my prince, I got my fairytale, now all I need is a good pair of glass slippers."

No one deserved that fairytale more than Donna. She worked hard and gave much not only to wildlife, but to anyone that needed her and her brand of kindness. Her life was too short, but sweet none the less. We will miss her. I will miss her. But I'm willing to bet she is smiling on us even now, shaking her head at our grief and concerned about our pain. Oh, and more thing, I just know she's wearing those glass slippers.

-Marge Gibson-

Continued from page 2

good listeners. Some organizations hold an annual volunteer appreciation event (e.g., picnic) while others just perform random acts of kindness. These good managers are the glue that bonds volunteers and other staff to an organization. Just having helpless wildlife in need will not result in a strong organization. In fact, animal groups may suffer from severe in-fighting if there is not a clear mission and organizational structure in place to guide everyone.

So today I just thought it was a good time to say thank you to all the dedicated managers, supervisors, staff, and volunteers who at this very moment are working with heavy loads of wildlife and probably wondering if they are crazy to do it. Well, I can't vouch for your sanity, but I can say that without all of you, wildlife rehabilitation would not have progressed from a hobby to a profession over the last 40 years! THANK YOU!!! THANK YOU!!! THANK YOU!!! THANK YOU!!! (Now, I expect that you will remember at least one of these four!) Have a good summer.

-Jan White-

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Scaring Macaws To Survive

Corey J.A. Bradshaw/Amy Lightfoot
University of Otago, Department of Zoology, P.O. Box 56, Dunedin, New Zealand 34B Albert Street, Dunedin, New Zealand
email: cory.bradshaw@stonebow.otago.ac.nz

Victor M. Acedo
Asociación de Rescate y Conservación de Vida Silvestre (ARCAS)
Flores, Petén,
Guatemala, Central America

Abstract

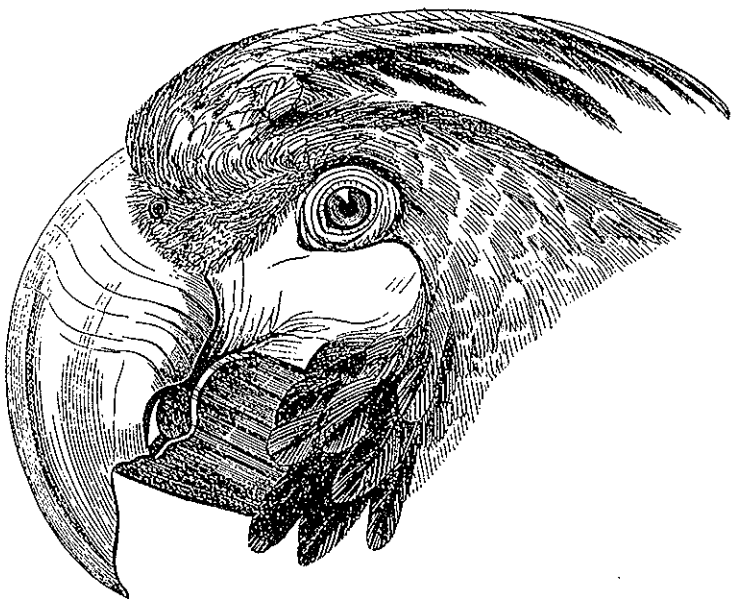
The Asociación de Rescate y Conservación de Vida Silvestre (ARCAS) in northern Guatemala has developed a programme to handle confiscated and donated Scarlet Macaws (*Ara macao*). The options for Scarlet Macaws include rehabilitation and release into the wild, use as breeding stock or use as behavioral models. The ultimate to goal is release Scarlet Macaws which are capable of survival and reproduction in their natural habitat.

Key words: Scarlet Macaws (*Ara macao*), endangered, rehabilitation and release, breeding programme, behavior models

Introduction

Although many pet owners marvel at the sight of an exotic bird, few consider the consequences that purchasing these birds have on natural populations. It is difficult for most of us to conjure up images of the tropical rain forest and the roaming flocks of parrots in the forest canopy when we see a personable, well-kept bird in captivity. Many larger parrots seem content and perfectly adapted to life with humans. However, ecological integrity depends on preserving healthy stocks of natural bird populations in their original habitat. In the spotlight is the impressive Scarlet Macaw (*Ara macao*), perhaps one of the most extraordinary avian species. Renowned for its beautiful plumage and intelligence, this species is now considered threatened in many parts of its Central American range. Extensive deforestation combined with poaching for the pet trade are primarily responsible for recent declines in numbers.

In Guatemala, special efforts to increase declining macaw populations, as well as those of other tropical birds and mammals, are being spearheaded by the Asociación de Rescate y Conservación de Vida Silvestre (ARCAS). Because the rain forests of northern Guatemala contain considerable areas of suitable macaw habitat, these areas are often targeted by poachers who smuggle the birds into other countries (mostly to Mexico and eventually the United States) for sale on the market. ARCAS, established in 1989, has constructed a rehabilitation and breeding centre near Flores, Petén on land owned by the Ortiz family



(concerned local residents). ARCAS' main goal is to provide a suitable location to keep macaws and other species confiscated by the Guatemalan Wildlife Service or donated by individuals and businesses, and then breed or rehabilitate these animals for eventual release into the rain forest.

Scarlet Macaws received by ARCAS are first brought to the Rehabilitation Centre's quarantine compound where they remain for 45 days. After this period of special care, including any necessary medical treatment, ARCAS officials must decide the fate of their temporary residents. There are a few options for the macaws depending on their condition; they can be rehabilitated and released into the wild, used as breeding stock or remain at the Rehabilitation Centre to act as behavioural models.

Rehabilitation and Release

The challenge when dealing with the young macaws confiscated during transport is their rehabilitation and re-introduction to an entirely wild existence. Many pet-trade poachers target chicks because of their relative ease of transport and the consumer demand for younger birds; these are the birds that will eventually make it to the Rehabilitation Centre. Although most would require extensive hand-feeding, human contact would be kept to an absolute minimum. For a successful release, a type of survival "training" must begin almost immediately upon arrival. In order that they learn their true position in the forest canopy, fledged chicks will be placed in cages suspended at different heights above the forest floor. Once fledged and able to fly well on their own, groups of juveniles will be released into areas already occupied by wild macaws.

A greater challenge is the rehabilitation of older macaws placed in the Centre. Birds that have never experienced the inherent dangers of living in a rain forest must learn to associate certain visual stimuli with danger. ARCAS personnel have just begun the first stage of the predator recognition programme. This simple plan involves the use of a resident jaguar at the Centre. A system of corridors interspersed among macaw cages will connect several jaguar cages in order that the jaguar may move freely in full view of the macaws. As mentioned previously, the macaw cages will be suspended above the jaguar corridors using a simple pulley system in order to raise and lower the cages for feeding purposes. Plans are also underway to construct a similar apparatus for a resident boa constrictor. It is hoped that the sight of a natural predator will instill a fear of animals prowling around the forest floor. Once able to recognize a potential predator, macaws released back into the forest will have a greater chance of surviving and reproducing.

Another element which adds to the survival success of a released macaw is its ability to recognize and consume naturally-occurring foods. ARCAS regularly supplements the diets of the birds with fruits such as campanilla (*Ipomoea spp.*), chilechachalaca (*Allophys kinlochii*), copal (*Protium copal*), escobo (*Crysophila argentea*), wild fig (*Ficus spp.*), wild olive (*Simaruba amara*), palo jiote (*Bursera simaruba*), pasaque hembra (*Simaruba glauca*), ramón blanco (*Brosimum allicastrum*), saltemuche (*Sickingia salvadorensis*), sangre de toro (*Swartzia cubensis*), tsalam (*Lysiloma bahamensis*) and yaxnic (*Vitex gaumeri*). ARCAS staff regularly collect these plants depending on seasonal availability in the forests surrounding the Centre. Plans are also being developed to alter the feeding schedule so that animals do not become accustomed to regular feeding intervals.

Breeding Programme

Some macaws are no longer capable of surviving on their own in the wild. These include birds that have spent too much time in captivity and have imprinted on humans, and those that are too old or debilitated to survive in the wild. Their dependence on humans for food and protection precludes them from an entirely free existence. These animals, if deemed in adequate physical condition, are likely candidates for the breeding programme. The breeding facility, though in its infancy, is based in the Villa Maya Hotel only a few kilometres from the Rehabilitation Centre. Several bonded pairs have already produced some eggs, with varying degrees of success, but efforts are continuing to increase the output of young macaws.

Once chicks are fledged by their parents and able to fly on their own, the intention is to release groups of juveniles into forest areas already occupied by wild macaws. In this manner, it is hoped that the minimal human contact during fledging will enable these young birds to adapt easily to survive in their natural habitat and identify with existing macaw populations.

Long-term plans for the breeding programme include decentralization of the main breeding area to outlying breeding centres and private owners. ARCAS hopes to increase the output of young macaws for eventual release by educating private owners and other breeding centres on macaw diet, social and nesting requirements, and by matching birds in different areas to form permanently bonded pairs through-

out Guatemala (and perhaps beyond). "Amigos de la Guacamaya" (Friends of the Scarlet Macaw) is a group of concerned Guatemalans, Canadians, Americans and English whose goal is to monitor and educate macaw owners on the specific needs of these beautiful birds. It is through such groups that extensive breeding networks can be formed to replenish the once macaw-abundant forests.

Behaviour Models

As an alternative to being used in the macaw breeding programme, unreleasable birds may continue to serve a vital role at the Rehabilitation Centre. These macaws will be used as resident "trainers". As animals accustomed to the design of the predator corridors and able to recognize potential dangers, trainers demonstrate the proper response to predators. In this manner, it is hoped that these behaviours will be learned by the new arrivals, thus hastening the rehabilitation process. To avoid habituation to the predators, longer-term macaw trainers will be rotated among the different predator enclosures.

Summary

Although simple in theory, ARCAS strives to implement a reasonably new approach to wildlife rehabilitation. With the increasing efficiency of local and foreign government authorities in breaking up pet-smuggling networks, more and more rare birds are in need of rehabilitation and release. ARCAS is fulfilling the roles of both a rehabilitation and breeding facility in order that the impact of poaching and deforestation may be lessened through a successful release programme. Moreover, ARCAS has begun to expand its conservation efforts to include environmental education. By educating local residents in the Petén area about the importance of maintaining sufficient numbers of native wildlife and their habitat, ARCAS hopes to instill a greater respect for these extraordinary species. As resources become more and more accessible, local training andeducation programmes can continue to expand.

If you are interested in volunteering for La Asociación de Rescate y Conservación de Vida Silvestre (ARCAS) in Guatemala, write or fax the following people to obtain more detailed information: Victor Acedo, Director de Voluntarios at ARCAS, Flores, Petén,Guatemala, C.A. (5029) 500566 (tel & fax) or Myriam Monterroso, Directora Ejecutiva, ARCAS, 11 Callee 6-66, Zona 2, Guatemala, C.A.(5022) 535329 (fax & tel).

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Author Profiles

Corey Bradshaw, M. Sc. (Zoology) is currently working on a Ph.D. at the University of Otago, New Zealand.

Amy Lightfoot, B. Sc. (Zoology) has completed the IWRC Basic Wildlife Rehabilitation 1AB course, Wound Management and Initial Wildlife Care courses through IWRC.

Victor Acedo is the director and on of the founders of ARCAS.

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Book Review

Bats in Captivity

Susan M. Barnard
Wild Ones Animal Books
Edited by Diane Cahill
1995, Springville, CA 194 pgs.
$19.95

Another name for this book could be "Everything You Ever Wanted to Know About Bats, Even if You Didn't Know What to Ask." This is an excellent book on all aspects of keeping bats in a captive environment, as well as the care and husbandry of zoological animals.

Ms. Barnard sets forth in clear, uncomplicated terms the many aspects of bat care including the basics of identification, nutrition, medical care, handling, housing and even producing mealworms for fresh food. The book ends with a very complete list of references and a list of where to obtain every product mentioned in the text with author comments on usage, advantages and disadvantages. I found the product list particularly thoughtful for the rehabilitator. I'm certain most of us can identify with the frustration of spending valuable time searching for products to save an animal's life, only to find we have been given only partial reference.

This book is extremely easy to use and understand. Not only is the language uncomplicated, but the presentation as well. Ms. Barnard explains not only the hows of bat care, but answers the whys along the way. Specific practical tips incorporating Ms. Barnard's years of experience are offered that may will make a difference in the successful rearing or recovery of an animal.

Bats in Captivity includes an unusual amount of charts and clear photos which offer further visual explanation of most subjects including housing and handling techniques. Nothing is left to the chance og inaccurate interpretation of the text. Each chapter ends with an empty page labeled "Notes." A simple thing perhaps, but so helpful in a working rehabilitation situation. I notice that most of my frequently used reference books have notes squeezed into the margins in the attempt to accommodate some useful tip or jog my memory.

Susan cares about bats. She goes so far as to suggest, should you have the old edition of this same book and have replaced it with the 1995 edition, that the other be given to zoos or other rehabilitation facilities in an effort to broaden the knowledge of bats.

Bats are beginning to receive the respect they deserve on the wildlife scene. As rehabilitators, we can expect more and more bats to come into our facilities as time goes on, as that respect and recognition touches the general public. This book is timely in that regard. Even if bats aren't a big part of your present rehabilitation efforts, maybe *especially* if bats aren't a big part of your rehabilitation effort, I would recommend this book be on your reference shelf. Hands on with bats is still the best teacher, but with *Bats in Captivity* as a guide the mystery shrouding this mammal is removed.

-Marge Gibson-



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To use the hotline: call (707) 864-1762; leave a message detailing your question, problem or what specific information you need. The Wildlife Hotline will return your call COLLECT with the help you need.

Photo by Tom Millham