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WILDLIFE JOURNAL

Journal of the International Wildlife Rehabilitation Council



Rehabilitating Green-backed Herons . . . Page 7

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2. Full length articles run between 1500 and 2500 words.
3. Fillers and short articles run between 500 and 1500 words.
4. The writer's name and address and organization should be typed on the first page, and name and page number should appear on all consecutive pages.
5. It is the writer's obligation to obtain permission or reprint rights if submitted copy has been published elsewhere.
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Editorial . . .

Bringing Balance To Your Life . . . . . .

As many of you may know, I am in the throes of finishing the last few months of my senior year in veterinary school. I have had several of my friends queery me regarding what changes the completion of my professional education will bring. One of them asked me if I was going to act "snooty" when I officially become a veterinarian! Two noted that for as long as they had known me, (both between 7-9 years), I had been a workaholic and they were worried that I would simply replace the school time with more work projects. One commented that they had never seen me when I wasn't pushed to the wall with work or school committments and I never looked very happy. Well, they were right.

I began to pursue pre-veterinary course in 1977 when I met a veterinary student, Sandra Emanuelson who turned me onto the values of using medicine in wildlife rehabilitation. I worked 30 hours a week for the Employment Development Department as a counselor to support myself, worked about 30 hours a week starting a wildlife rehabilitation center, and took varying amounts of chemistry, zoology, and physics. It was hard as I had just finished a four year degree in Social Work and was not science oriented. Still, I was in my mid-twenties and thought I could endure any amount of work. Before I knew it, I was embroiled in a legal conflict with the State Fish & Game authorities and about the time that ended, it was clear that my best friend and veterinarian, Sandra, was dying of cancer. We tried to plan for a rapidly changing future, and with her assistance, I was accepted into veterinary school in 1985.

It hardly seems that so many years have passed. With the help of a very dedicated staff and Board of Directors, I have been able to complete construction of the new Sandra Emanuelson DVM Wildlife Center in Suisun, California. I have in the last two years, become the executive director of the IWRC. Now, this June, I will complete the third leg of my travels and become a veterinarian. So, now what?

My very next goal is to bring a better balance of work and leisure into my life. Like many rehabilitators, work has become the center of my universe. The problem is, it does not make you a better worker—rather quite the opposite. Not enough time away from work makes one tense, and increases the chances of using poor or clouded judgement to make crucial decisions. Creativity and productivity decline as exhaustion sets in. Illness is then a likely sequela.

Many of my co-workers share similar experiences with me. Eventually some of us realize working everyday of our lives is not a badge of honor. Actually, it is a red flag, a mark of poor time managment skills. It can center around a number of issues in one's life, including the issue of control. A number of rehab directors I know share familial alcoholism in their background. As adult children of alcoholics (ACOA), we make very hard workers—too hard. Control of one's life becomes a major goal, as it was certainly unobtainable as children. Delegation of duties is especially hard for ACOA's. Living from one calamity to the next is a way of life as some become adrenalin junkies. But it is not fulfulling when it consumes your life. Bringing balance back into a life is just as medicinal as antibiotics to an infection.

I will soon embark on yet another challenge—to balance rehabilitation and medicine with leisure and a slower lifestyle. I will keep you posted on how it is going. Let us share some of your life experiences and all grow from them.

-Jan White-

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A Review of Avian Hematozoan Parasites

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Introduction

The occurrence of hematozoan parasites in birds has frequently been documented, but their significance is not well understood. Many studies have been done on the prevalence rates of hematozoan parasites in wild populations of birds, but the information available about their potential to cause disease is very limited.

A study done on the effect of hemoprotozoal infections on the rehabilitation of wild raptors in Louisiana found that birds with hematozoan infections had longer rehabilitation times and higher mortality rates than uninfected birds, but the authors determined that they were not sure of the pathogenicity of the hematozoan parasites (Olsen, 1985). Another study concluded with the statement that, "Few data are available on the pathogenesis of most avian hematozoa, and their possible significance as concomitant infections with other disease agents has yet to be realized (Peirce, 1983)."

The three most frequently encountered avian hematozoan parasites are *Leukocytozoon*, *Plasmodium* and *Hemoproteus*. These organisms are all within the protozoan group Sporrozoa. They replicate within two host species, with schizogony (asexual replication) occurring in the bird and sporogony (sexual replication) occurring in a specific invertebrate host. Transmission occurs when the infected invertebrate host (a biting arthropod) feeds on a susceptible bird.

The hematozoan parasites have life cycle stages in the bird, both in the tissues (exo-erythocytic) and parasitizing blood cells (intra-erythrocytic). It is possible for pathology to be associated with either of these stages resulting in either tissue pathology or anemia.

It can be very difficult to identify the species of the different genera of the sporozoan parasites even during the intra-erythrocytic stages. It is even more difficult, and sometimes not possible, to identify the sporozoa during their tissue stages when they may be found on histopathology and associated with myopathies or other tissue pathology (Gardiner, 1984). The International Reference Center of Avian Hematozoa at the Memorial University in St. Johns, Newfoundland can serve as a resource in these cases.

Plasmodium

Plasmodium is the causative agent of avian malaria. It is a frequent finding in wild bird populations, especially in passerines. It is worldwide in distribution (Beier, 1980). Infection rates are generally lower than for other hematozoa, ranging from frequent findings of 1-2%, to a level of 12% found in one study of a wild population (Beier, 1980). *Plasmodium* is transmitted via the *Culex* or *Aedes* mosquito. It can be diagnosed by finding pigmented schizonts and gametocytes within erythrocytes. The plasmodium organisms can be identified because they will usually envelop less than 25% of the erythrocyte's cytoplasm.

Infection occurs when sporozoites are released into the subcutaneous tissues when a bird is bitten by an infected mosquito. Within about an hour the sporozoites commence the exo-erythrocytic stage of schizogony in either the endothelial or the hematopoietic cells. On maturity these schizonts release merozoites which may enter new tissue cells for repeated generations of exo-erythrocytic schizogony, or may directly infect erythrocytes. Schizogony can occur within erythrocytes, a feature unique to the *Plasmodium*, and the merozoites released can infect new erythrocytes or other tissue cells and repeat the process indefinitely. Because of

the intraerythrocytic schizogony, *Plasmodium* can be transmitted between birds by the transfer of blood.

Merozoites within the erythrocytes develop into either macrogametocytes or microgametocytes. When these gametocytes are taken up by a mosquito, they develop into gametes in its stomach, and the microgametes fertilize the macrogametes. The resultant ookinete encysts in the stomach wall, dividing to form sporozoites which migrate to the salivary glands of the mosquito.

There are a number of reports documenting *Plasmodium* as a cause of disease. It is the most common cause of death in outdoor housed captive penguins (Stoskopf, 1979). It is also reported to cause mortality in anatids and has been documented as a cause of anemia in chickens. *Plasmodium* is also recognized as a cause of disease in pigeons and canaries (Wobeser, 1981).

Plasmodium is thought to have limited host specificity. Penguins are known to be susceptible to *P. relictum* and *Pl. elongatum*. These are two of the most common avian malarial parasites, also known to infect many passerines and anatids (Beier, 1980). Reports of mortality in anatids have been associated with *P. lophurae* and *P. circumflexum* (Sousa, 1982). *P. gallinaceum* has been shown to cause anemia in chickens (Williams, 1985).

An experimentally induced infection in chickens was used to investigate the relationship between the observance of green droppings, the occurrence of parasitemia with *P. gallinacium* and a drop in PCV. Green droppings were seen on day five to six post-infection. The change in fecal coloration was due to an increase in biliverdin due to hemolysis caused by the malarial infection (Williams, 1985). There have also been reports of severe anemia in ducks associated with malarial infections (Wobeser, 1981).

In a study of the pathogenesis of malaria in penguins, the results were quite different. No changes in PCV, erythrocyte numbers or plasma protein levels were documented, but signs in affected penguins included depression, anorexia, regurgitation, respiratory distress and death (Stoskopf, 1979). This difference in the pathogenic effects could be related to the fact that different genera of *Plasmodium* were being studied and there may be differences in the exo-erythrocytic portions of their cycles, variation in the physiologic responses of the different species of birds, or to other unknown factors.

In the study of penguin malaria, leukocytosis and a relative lymphocytosis were also found to be very characteristic, and possibly useful as a diagnostic aid. Relative lymphocytosis, from a normal count of 33-37% rising to greater than 50% lymphocytes, was seen in all cases of parasitized penguins and was frequently measurable before blood parasitemia could be observed (Stoskopf, 1979). This could be a useful indicator in programs screening penguins for malarial infection. Screening programs are important in the maintenance of penguins because there is frequently a very short time period (possibly hours) between recognition of signs and death.

In postmortem studies on a number of species the findings of hepatomegaly, splenomegaly and serosal hemorrhages have been reported (Burr, 1983). On histopathology, the tissue stages of the *Plasmodium* organism can frequently be found in many organs.

A number of treatment regimes, both for prevention of infection and for treatment, have been reported. In penguins 0.03 mg/kg SID of oral primaquine phosphate for two days given simultaneously with oral chloroquine phosphate using a loading dose of 10 mg/kg followed with 5 mg/kg at 6, 18 and 24 hours was used to treat affected birds. This treatment was found to be effective in preventing mortality and clearing parasites from the blood. Most birds were showing severe signs and were normal within four days of treatment (Stoskopf, 1979). Chloroquine has also been used on a weekly basis to prevent infection. Quinacrine, 0.24 mg/gm/day per os has been used to treat psittacines. Chloroquine, used at 40 mg/kg/day in chickens and 20 mg/kg/day in turkeys, has been reported as effective (Burr, 1983).

Leukocytozoon

Leukocytozoon is found almost exclusively in birds. It is worldwide in distribution. Infection rates of 35-45% are commonly reported (Kirkpatrick, 1985). There have been about seventy species identified. They are reported to be moderately host-specific (Fite, 1984). Transmission occurs via the bite of buffalo gnats (*Simulium spp.*). The organism can be differentiated from the other hematozoa in that it infects not only erythrocytes, but also lymphocytes and neutrophils. *Leukocytozoan* is also distinct in that it does not produce hematozoan pigments in infected erythrocytes. On a direct blood smear the organisms can frequently be recognized by their slow, irregular movement. Examination for *Leukocytozoon* can be aided by looking at a smear of the buffy coat.

Infection occurs when a bird is bitten by an infected gnat. The sporozoites enter the circulation and then enter hepatocytes in the liver and become hepatic schizonts. They mature in four to six days and rupture, releasing merozoites and multinucleated fragments or syncytia. The merozoites may reenter hepatocytes to produce a second generation

of hepatic schizonts or they can develop into gametocytes infecting circulating erythrocytes and erythroblasts. The multinucleate fragments are phagocytized by reticuloendothelial cells and develop into megaloschizonts. Megaloschizonts are most common in the spleen and lymph follicles, but they can be found in almost any tissue. Most megaloschizonts mature and rupture about day nine to twelve postinfection. An individual megaloschizont can release up to one million merozoites which invade leukocytes and erythrocytes and become attenuated to form elongated micro and macrogametocytes in the circulating blood.

When a Simulid fly bites an infected bird it ingests gametocytes. Following ingestion, fertilization and zygote formation occurs. Ookinetes can be found in the stomach of the fly within four to twelve hours after the gametes have been ingested.

Peak parasitemia in the bird occurs about nine to ten days postinfection. The level of parasitemia then declines to a low level which may persist for over two years. The level of parasitemia varies diurnally with peak parasitemia occurring during the daylight hours coinciding with the feeding period of Simulid flies (Fite, 1984).

The clinical signs of *Leukocytozoon* infection are highly variable, ranging from unapparent infection to acute death. Affected birds may show lethargy, anemia, weight loss, dyspnea, hepatomegaly, splenomegaly and greenish diarrhea (Burr, 1983). High mortality is frequently seen in populations of susceptible young ducks. The disease may have a sudden onset and short course resulting in rapid death. In adult birds the disease is generally less acute and death is uncommon (Wobeser, 1981).

The pathogenic effects of *Leukocytozoon* can be due to the anemia it causes or may be an effect of the development of megaloschizonts, which can become very large, develop in any tissue and may impair organ function. The development of anemia in birds infected with *Leukocytozoon* does not directly parallel the number of parasitized erythrocytes. The anemia has been shown to be due to an anti-erythrocytic factor which causes intravascular hemolysis, not erythrophagocytosis (Miller, 1983).

Leukocytozoon simondi has been recorded in at least 27 different species of waterfowl and is considered to be potentially very pathogenic (Fite, 1984). The disease is often seen in anatid populations in late spring and early summer, a time which coincides with the hatching of young, susceptible birds and the emergence of the Simulid vector. Infection of waterfowl with the parasite may be associated with listlessness, anemia, weight loss and increases in mortality in immature birds (Miller, 1983). The pathogenic effects of *L. simondi* tend to be more severe in populations of domestic ducks as compared to wild populations.

Relapses may occur in previously infected birds. Positive correlations have been shown between relapse and the reproductive cycle of the host (Miller, 1983). These correlations may be related to the stress of laying or to seasonal increases in the prevalence of the vector. Relapses can occur with activation of dormant sporozoites, retarded endogenous schizogony, variable developmental rates or reinfection.

Leukocytozoon smithi has been known to cause large death losses in young turkeys. Clinical signs are reported as anorexia, polydypsia, depression and muscular incoordination. *L. smithi* was not transmissible experimentally to chickens and ducks (Miller, 1983). Deaths thought to be due to *Leukocytozoon* infection were reported in wild three-week-old weaver bird nestlings in Kenya. The blood of dead and dying birds was heavily infected with gametocytes. The intensity of infection seemed to decrease with age, and adult birds were only slightly infected (Keymer, 1982). *Leukocytozoon* has also been reported as a cause of illness in psittacine birds (Burr, 1983).

On postmortem examination grossly observable hepatomegaly and splenomegaly are often present. The tissue stages of *Leukocytozoon* may be found. They can include schizonts or megaloschizonts found in skeletal or cardiac muscle, lung parechyma, and spleen, liver or kidney. The schizonts may be plus or minus a host inflammatory response and are frequently mineralized. Hepatic amyloidosis has been found in association with *Leukocytozoon simondi* (Miller, 1983). This finding may reflect the prolonged immune stimulation which may occur.

According to reports, numerous antimalarial treatments have been investigated for use in birds affected with *Leukocytozoon.* They have included quinacrine, quinine, plasmochin, paludrine and atabrine. All have been reported to be unsatisfactory (Fite, 1984). Other reports state that treatment may be effective if the parasite is detected on routine hematology. They recommend treating with quinacrine HCl per os at 250 mg/kg SID for five days, or chloroquine phosphate per os at 500 mg/kg SID for five days (Burr, 1983).

The use of clopidol (Coyden, Dow Chemical), as a feed additive to prevent *Leukocytozoon smithi* infection in turkeys has been found to be successful. Clopidol was added to the feed at a level of 0.0125%-0.025%. In chickens a combination of 1 ppm pyrimethamine and 10 ppm sulfadimethoxine have been added to the feed to prevent *Leukocytozoon* infection (Siccardi, 1971).

The addition of clopidol to the feed, at a rate of six ounces per hundred pounds, was tried in a flock of

one hundred ducks and teals which had a past history of mortality due to *Leukocytozoon simondi*. The clopidol was used from mid-April through October and no mortality due to *L. simondi* was observed during that period (Fite, 1984). Unfortunately neither the infection rate or the exposure was monitored during this period, but no unexplained deaths occurred and no toxicities were seen.

Hemoproteus

Hemoproteus is a common parasite of wild birds, especially of the columbiformes, apodiformes, anseriformes, and passeriformes. It is reported to be the most commonly encountered hematozoa in North American waterfowl (Wobeser, 1981). Infection rates of up to 44% have been reported (Castle, 1984). It is transmitted by the *Hippobosca* or louse fly and the *Culicoides* midge. It is diagnosed by the presence of pigmented gametocytes in erythrocytes. The erythrocyte nucleus is usually displaced or encircled by the kidney-shaped parasite. The gametocyte generally envelops greater than 50% of the RBC cytoplasm. On a fresh smear slow, ameboid movement of the organism may be able to be seen.

Sporozoites are injected into a bird when it is bitten by an infected vector. Schizogony occurs within endothelial cells of blood vessels or in pulmonary tissue. Following schizogony, merozoites enter erythrocytes and become macrogametes and microgametes. This cycle takes 14-21 days. When these gametocytes within the bird's erythrocytes are ingested during an arthropod's blood meal, maturation and fertilization occurs within the insect's gut, oocysts are formed, and sporozoites move to the insect's salivary glands.

Hemoproteus is considered the least pathogenic of the common hemoparasites of birds. It is usually thought that it will not be associated with clinical signs unless the parasite concentration is very heavy or the bird is subject to concurrent stress. In these cases *Hemoproteus* may be related to the development of a chronic anemia (Burr, 1983).

There have been two reports in the literature of fatal infections of *Hemoproteus nettionis* in muscovy ducks (Julian, 1980). In these infections the tissue-invasive (schizogonic) stages of the parasite were considered the causative factor. Pneumonia and pulmonary edema were present in association with large numbers of schizonts in endothelial cells. No intraerythrocytic stages were seen. In an experimental infection attempting to reproduce these effects no mortality occurred and *H. nettionis* was concluded to be nonpathogenic (Sibley, 1984).

There is one report of a vulture-headed parrot (*Psittrichas fulgidus*) at the Oklahoma City Zoo which became listless, lethargic and anorexic. A peripheral blood smear showed a *Hemoproteus handai* infection of 50% of the erythrocytes. The bird later died and its death was thought to be related to the parasitism (Halpern, 1983). A *Hemoproteus* infection of ornate lorikeets (*Trichoglussus ornatus*) was thought to be the cause of anemia and pulmonary edema in a number of birds (Keymer, 1982).

Treatment for *Hemoproteus* is rarely discussed because it is commonly considered nonpathogenic and not treated. Some investigators believe that treatment is unwarranted, while others claim that long-term treatment with chloroquine is beneficial. Use of chloroquine in the drinking water at 2.08 gms/liter for 2-4 weeks has been recommended (Stauber, 1985). Other recommendations have included quinacrine per os at 250 mg/kg/day SID for five days, or chloroquine phosphate per os at 500 mg/kg/day SID for five days (Burr, 1983).

Conclusion

Overall, the information available regarding the significance of finding hemoparasites in the blood work of our avian patients is very limited. It seems that these parasites, especially *Hemoproteus*, can frequently be found without any associated disease. Nevertheless, one of the factors of concern is that frequently, when we are dealing with nondomestic birds, they are in zoological collections or rehabilitation facilities and are certainly under stress, and frequently subject to concurrent disease. These are exactly the conditions under which hemoparasites are most likely to have pathogenic potential. This is especially true in the case of *Plasmodium* and *Leucocytozoon*, which are known to be a cause of disease.

There needs to be more work done on the relationship between the presence of hemoparasites and the occurrence of disease, and the evaluation of whether treatment is beneficial. Birds received at rehabilitation centers and birds at zoos being treated for disease problems should have blood examined. Presence and numbers of parasites should be recorded and treatment attempted. Follow-up blood work would have to be done at a later date and the results looked at in the context of the other signs and problems. Although results would still be difficult to interpret, the collection of this type of data would improved our ability to interpret the significance of hemoparasites.

Continued on page 15

Rehabilitation Notes:

Green-backed Heron *(Butorides striatus)*

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INTRODUCTION

Herons are members of a family (Ardeidae) of birds that include true herons, egrets, and the bitterns. True herons are graceful birds with long, sharply pointed bills that seem to extend right up to their eyes. They look like cranes, have narrow heads, long slender necks and bare stork-like legs. Many of the herons have long crests and plumes on their throat and body. Both herons and egrets have 2-3 patches of powder down which produce a fine powder. It is thought that the powder is used by the birds to remove fish slime and oil from their feathers. It may also assist in waterproofing of the feathers. Additionally, one medial claw per foot has been modified with grooves along the inside edge so it can be used as a comb for feathers.

Green-backed Herons are the most widely distributed member of the heron family. They are found from South & Central America (n. Venezuela, s. Colombia, and Panama) north to Canada. This "crow-sized" heron is also known as "Green Heron", "Little Green Heron", "Mangrove Heron", "Striated Heron", and "Lava Heron". These are only a few of the names that have been attached to this heron.

These birds are found in wet woodland areas, streams, and swamps, as well as coastal wetlands. They are at home in either fresh or saltwater. They are commonly seen along the edges of the water and like to roost on dead tree limbs or stumps.

DESCRIPTION

Adults: The adult Green-backed Heron has a blue-gray back and wings with chestnut head and neck. The wing feathers are edged with light gray. The legs are orange-yellow. There is a black crown and a white streak down the throat. The underparts are pale gray. The bill is a dark blackish-yellow color. The bird measures 15-22" (38-56 cm). The female of the species is smaller and less brightly-colored. This heron is one of the two smallest on the North American continent.

Immature: The young birds have streaked underparts and indistinctly barred upper parts and they are generally browner in color than the adults. The usual shape at rest is a hunched and drawn-in position on a branch. They are found normally in an area of protective cover with their head resting on their body with almost all or all of the neck hidden. When the Green-backed Heron is seen in grass or reeds with the head pulled back, it blends right in and is hardly discernible from the habitat.

The tail is very short and has the appearance of having been "cut-off". At times, the bird will change from a "frozen" position to in-place nervous movement. He raises and lowers his crest and twitches his tail in irregular jerks.



Fledgling Green-backed Herons.

When disturbed, the Green-backed Heron takes off in a less than smooth fashion; it can dart directly and with skill through overhanging branches of trees with relatively rapid wingbeats. The strokes are slightly faster than those of the other closely-related herons and equally as fast and more coordinated than those of the Least Bittern, with which it is sometimes confused when it first rises.

The legs are relatively short and extend beyond the tail only a couple of inches in flight. This can serve as a recognition factor since the legs and feet extend farther behind than do those of the other heron species. The average wingspan of the Green-backed Heron is just under 25" (63 cm).

As in all of the heron species, the beak is sharply pointed and, in the dorsal ventral silhouette laterally, fairly symmetrical. It is commonly used in defense when handled by humans and protective eye gear should be worn. The non-breeding coloration of the beak ranges from a pale, clear green to a distinctly dusky green, with the lower mandible more pale and more yellowish toward the base than the upper mandible. In the younger birds, the beak has a dusky ridge and is generally duller and paler green than in adults. During courtship, the bill becomes a glossy black.

In both adult and young birds, there is a slight webbing between the middle and outer toes. This aids young birds in swimming when they fall out of the nest and helps adults when they plunge into the water after prey and return with it. The middle toe, including the claw, is about the same length as the tarsus, with legs and feet orange-yellow in the adult and a pale dull greenish-gray in the young.

The crown feathers are always raised when the bird is nervous and are uneven and unruly-looking. It appears as if it is improperly combed. When the bird hunts, the crest almost always lies flat against the crown and nape.

There is only slight seasonal difference occurring in the adult plumage. The crown feathers are longer. There is a more intense coloration during mating season. A postnuptial molt occurs in the late winter and early spring. Yearling birds tend to undergo their first postnuptial molt, at which time, full adult plumage is obtained. This occurs as early as April, but more often in May or June.

Natural Diet

The diet of the Green-backed Heron depends largely upon the environment in which it finds itself. The main food is fish ,which make up about 40% of the diet. The range of food taken includes minnows, killifishes, catfish, prawn, crickets, crawfish, grasshoppers, frogs, snakes, mice, snails, water bugs, katydids, dragonflies, damselflies, earthworms, leeches and lizards.

Nests and Young

Approximately two to nine eggs can be laid, although the usual number is four or five. They are smooth-shelled, pale greenish or bluish, and have an average size of 1.5 by 1.1 inches (38 mm x 30 mm). The 20-25 day incubation is equally shared by both parent birds.

All of the eggs hatch at essentially the same time and usually on the same day (17 days). They weigh about 21.25 grams on hatching (3/4 oz.) and their weight increases about 14 grams (1/2 oz.) daily until about the tenth day.(Bent, 1963) They are fed by both parents , but the morning feedings (usually 6-7 visits by the parents) usually occurs only between dawn and sunrise. A similar evening feeding begins in the late afternoon, perhaps no more than one hour before sunset and continues until dusk, with 6-7 separate visitations by the parent birds (Bent, 1963). Feeding is accomplished by regurgitation but the food material is not predigested by the parent birds. Before beginning to assume juvenile plumage, the baby birds are covered in down which ranges from a medium brown on the crestless crown to a light buff or buffy gray on the underparts.

After seven days, the young can climb. At 15 days, they can jump from branch to branch and at 21-23 days, first flight may be accomplished. Usually by 34-35 days, they can successfully fly. It is during the brancher stage that these birds are often picked up by the public and presented to the wildlife rehabilitator.

Migration

The eastern Green-backed Heron begins a southern movement from the northern portion of its range, from as early as the first few days of September to as late as mid-to-late October. It winters in north-central Florida as well as sometimes in southern Georgia, southward through the West Indies and South America with southward migration completed usually no later than November 25 (Eckert, 1987)). The northern movement begins as early as mid-March and the birds have settled into the northernmost portions of their range before the end of April.

Initial Care

Green-backed Herons can be presented in a hypothermic state. Birds do best when placed in either an incubator or provided with overall warm-up via lights and a heating pad. The ambient temperature should be between 80-90°F depending on the condi-



Presidents Message. . .

Do you remember the book Born Free. It was written in the 1960's by Joy Adamson, a courageous woman who raised the infant African lion, Elsa, to adulthood in the wilds of Kenya, Africa. Keeping captive wild animals "wild" and returning them to their natural habitat was a concept that the majority of the public was not even aware of until Joy's personal account of efforts to raise and release Elsa were made public.

Joy's dream of keeping Elsa wild and free was laughed at, discouraged, praised, interfered with, celebrated, loved and hated. She was considered an unrealistic bleeding heart, a trouble maker and uncooperative. Finances and help of any kind were limited and game agents were of little help. Through it all she held tight to her vision, did the best she knew how and saw to it that Elsa lived a wild and free life. Unlike Joy Adamson, you have a forum that is distinctively yours.

IWRC was created as an organization whose sole purpose it is to educate, network,and see to the needs of wildlife rehabilitators. Our programs are designed to give our members the most up to date information on wildlife rehabilitation that is available. I think that one of IWRC's most valuable attributes is its ability to foresee and incorporate the needs of its members through reevaluating our existing programs and adding new ones as funds allow.

In this issue of the *Wildlife Journal* we have included our annual report to give you, the member a better understanding of the various ways IWRC uses its available resources. Also included are reports from all of our various committees explaining their accomplishments for 1988. Please take the time to see what your organization has been up to over the past year.

I get to tell you the future and the direction that we are moving in. As most of you know, IWRC has traditionally focused on its North American members in terms of supplying literature, offering skills seminars and conferences. However, we recognize we have a commitment to all rehabilitators around the world. As a part of our international outreach efforts, we plan to solicit articles focusing on unique rehabilitation programs and species around the world. In addition, our membership development department is currently adding to our fast growing international data base of wildlife rehabilitators and plans for our first international conference are already in the preliminary planning stages. Our projected date and location are 1991 in Canada.

As I mentioned earlier, IWRC is always exploring new ways to serve our members. In 1981, we began work on a national Standards and accreditation program. The purpose of this program is to establish professional standards and to encourage the development of outstanding wildlife rehabilitation programs. In 1984, the NWRA (National Wildlife Rehabilitators Association) joined forces with IWRC to complete the task of writing the minimum care standards. The Boards of Directors of both organizations have approved the program and the IWRC/NWRA Standards and Accreditation program is now available as an advisory packet to wildlife rehabilitators.

Earlier this year, IWRC received a $25,000 grant from the California Environmental License Plate Fund to begin a pilot project for the Standards and Accreditation program. The purpose of the pilot project is to allow us to get a feel for the program, iron out the kinks, and plan for the national program. The pilot project is limited to California rehabilitators and will take two years to complete. After that, the program will become available nationally. Both boards will be looking for ways to help fund the program to reduce the costs of the program to rehabilitators.

I am excited about the direction in which IWRC is moving. However, there is one essential ingredient that makes it all happen. That is you. We want to know your thoughts and concerns. We want to know what information or training you desire. The Wildlife Journal is made up of articles written by rehabilitators that recognize the value in sharing their wins and loses with others. Our Board of Directors contains committed people who know that each individual voice and opinion matters. The direction of IWRC depends on where you what it to go so let us hear from you. Make full us of it and enjoy it.

-Jay Holcomb-

The Treasury

by
Jan White, Executive Director
Crystal Norris, Treasurer

IWRC continued to grow financially in 1988. It used the funds to continue present programs and to centralize them in our national office located in Suisun, California. We have compiled some pie charts to illustrate where our revenues came from and how we spent our funds. We feel we got a lot done for the resources we had. We served nearly 1200 members with many membership services, about 250 wildlife rehabilitators at our 1988 annual conference in San Mateo, and 529 people in our skills seminars held across the United States. After reviewing our annual report, we think that you will agree.

Financial Statement 1978-1988

Revenues:

Skills Seminars	$29,243.00
Conference	$18,836.05
Literature Sales	$ 7,461.74
Membership	$15,903.00
Other Income	$ 1,834.46
TOTAL INCOME	$73,278.25

Expenses:

Skills Seminars	$24,328.22
Conference	$11,490.43
Journal	$13,030.80
Literature Sales	$ 3,041.21
Membership	$ 693.95
Administration	$11,367.32
Board of Directors	$ 1,107.38
Standards/Accred	$ 60.87
Hotline	$ 213.91
NWRA	$ 1,180.65
Miscellaneous	$ 302.58
TOTAL EXPENSES	$66,817.32

Membership Development

In 1988, the IWRC formed a separate and distinct Membership Development Department. The purpose of the Membership Development Department is to increase the membership numbers of the International Wildlife Rehabilitation Council. This increase will allow IWRC to more economically serve its membership.

Letters were sent to all United States state and federal wildlife agencies which issue wildlife rehabilitation permits as well as similar foreign agencies. The names and address of rehabilitators on these lists are being entered onto a computerized mailing list format where they could be retrieved in a variety of ways in geographic groups such as by state, country or region. Mailing labels were generated from these entries and membership brochures were mailed to over 1,000 licensed wildlife rehabilitators during the Fall of 1988. We estimated our response at approximately a 3% return rate which is very good for a cold, direct mail membership campaign.

The Membership Development Department also investigated possible membership incentive benefits such as group health insurance and possible free sample and discounted product special offers. This year we also redesigned the membership brochure and recommended the addition of a corporate category to increase support and organizational revenues. Next year we plan to begin a business associates program that will augment corporate and business support.

Our plans for the upcoming year include the development of an international data base of licensed wildlife rehabilitators in Canada and Europe. Eventually, we hope to seek out rehabilitators in all areas of the world. We will continue to send targeted membership brochures mailings to the individuals maintained on these lists. We will also continue to seek ways to develop as many membership benefits as we can.

-Dianne Pearce-

IWRC Fund Balance Sheet
Fiscal Year 1987-1988

Current Assets:

Cash-General Fund	$2,171.13
Payroll Account	451.23
Inventory	9,984.55
TOTAL CURRENT ASSETS	$12,606.91

Current Liabilities:

Accounts Payable	$3,547.84
Notes Payable	5,978.52
Payroll Taxes	197.12
TOTAL CURRENT LIABILITIES	$12,606.91

IWRC

LITERATURE ORDER FORM

DESCRIPTION	QTY.	TOTAL
IWRC SKILLS SEMINAR PACKETS **Session I** - BASIC WILDLIFE REHABILITATION 1A&B, by Jan White With the purpose of standardizing rehabilitation information into a professional packet, the author covers rehabilitation theories and techniques from capture to release. Basic animal physiology, treatments and medications, nutrition and husbandry are covered for mammals, birds and reptiles. Also included are nutrition and housing charts which can aid the rehabilitator in determining how to care for and raise wildlife. Revised 1987. **Price: $15.00**		
Session II - RESTRAINT OF WILD ANIMALS by Dave Jessup, DVM, William Clark and Brian Hunter, California Department of Fish and Game These materials cover basic considerations and responsibilities for restraint procedures, pharmacology, medical concerns, equipment and safety considerations for the rehabilitator handling wild animals. **Price: $5.00**		
Session III - LABORATORY PROCEDURES AND DIAGNOSTICS by Tami Anderson, AHT Procedures covered include the various aspects of hematology, laboratory tests, urology, parasitology, testing done for heart worm and basic information on bacteriology and culture and sensitivity testing. Revised 1987. **Price: $5.00**		
Session IV - PHYSICAL EXAMINATION AND INITIAL CARE by Sandra Emanuelson, DVM and Jan White Topics covered include intake procedures, initial exam, basic shock and treatment for selected poisons. **Price: $5.00**		
Session V - FEEDING AND NUTRITION OF ANIMALS IN REHABILITATION CENTERS by Murray Fowler, DVM Various aspects of feeding and nutrition in wildlife care are addressed including requirements for energy, protein, minerals, vitamins and hydration. In addition, sections on thermoregulation, zoonosis and metabolic bone disease have been included. **Price: $5.00**		
Session VI - PHYSICAL THERAPY IN RAPTORS by Nancy Horowitz, RPT A registered physical therapist, Ms. Horowitz brings to our field her knowledge of the principles, application and cautions in the use of physical therapy on wild raptors. This packet also includes "A New Method for Exercising and Rehabilitating Raptors," by Terry Schulz, Julie Klingman and Russell Tucker. **Price: $5.00**		
Session VII - BASIC NECROPSY PROCEDURES by Pat Gullett, DVM This packet provides rehabilitators with a procedure for both avian and mammal necropsy complete with diagrams. Reptile illustrations are included for reference along with a necropsy form for the rehabilitator. **Price: $5.00**		
Session VIII - FLUID THERAPY IN WILDLIFE CARE by Michael Murray, DVM Dr. Murray explains the different types of fluids available, when to use them, criteria for their use and routes of administration. Basic acid-base balance is also covered in this packet. **Price: $5.00**		
Session IX - WOUND MANAGEMENT IN WILDLIFE CARE by Michael Murray, DVM This packet offers step-by-step instructions on how to deal with wounds. The information includes sections on wound healing, management of contaminated and infected wounds, wound protection and preparation of the surrounding area, debridement, lavage antibiotics, wound closure and open-wound management. **Price: $5.00**		

	QTY.	TOTAL
Session X - HOW TO DEVELOP AND ORGANIZE A WILDLIFE REHABILITATION PROGRAM by Sally Lewis This packet is designed to accompany the actual seminar. Information is for everyone who wants to start a wildlife rehabilitation program AND for those who want to see their wildlife group *now* get better organized. Topics include starting up; finding an effective board of directors; managing a volunteer program; qualities in a good leader and in a good worker; fund-raising; public relations; working with difficult people; conflict resolution; preventing burn-out and more. **Price: $5.00**		

	QTY.	TOTAL
"Lessons of the Past-Pathways to the Future" Proceedings of the 1988 IWRC Conference Papers cover the following topics: Release of One-eyed, One-footed & Otherwise Physically Impaired Raptors by Pat Redig, DVM, Aspergillosis: Diagnosis, Treatment, & Prevention by Douglas Yearout, DVM, Avian Orthopedics: Practical Applications for Rehabilitation by Russel Tucker, DVM, Hand-rearing Infant Tree Squirrels, Injury & Illness in Tree Squirrels by P.C. Hanes, Raising Orphaned Flying Squirrels by Jeanne Wasserman, Deformities in San Jan Islands' Deer by Jessica Porter, DVM & Athena McEntyre, Raising Orphaned Beavers by Jo Ann & John Hicks, Applications of Data from Research on Wild Populations to the Rehabilitation of Harbor Seals by Julie Knight, Natural History & Captive Care of Turkey Vultures by Kirstine Thorne, Tourism & Wildlife Rehabilitation in Peru by Paul Beaver, Ph.D. and New In-vitro Techniques for Testing Oil Dispersant Toxicity to Seabirds & Sea Mammals. **Price: $15.00**		
IMMOBILIZATION OF SIMPLE & COMPOUND FRACTURES IN SONGBIRDS & RAPTORS by Victoria Welsh, 1983 This booklet covers many aspects of dealing with fractures in birds. Areas covered include cleaning and disinfecting wounds, fractures of long bones and their treatment and post-treatment rehabilitation. **Price: $3.50**		
IMMOBILIZATION OF SIMPLE & COMPOUND FRACTURES IN MAMMALS by Victoria Welsh, 1981 This booklet covers many areas of dealing with fractures in mammals. Rescue, transport, initial care, treatments for specific breaks, proper confinement, healing time, and rehabilitation. This information is complimented by illustration for splinting and wrapping methods of fractures. **Price: $3.50**		
RACCOON REHABILITATION by Jan White & Debbie Marcum, 1979 A 20-page booklet of the care, handling and release of raccoons. It includes details on infant and adult diet, medical problems, vaccinations, caging, growth charts, and much more. **Price: $3.50**		
HAND-REARING NON-DOMESTIC MAMMALS by Debbie Marcum, 1988 An informative paper in six parts covering subjects such as initial care, medical problems and their treatment, feeding and nutrition, housing, behavior and release. This paper includes a medial and dietary products list and a biological data sheet. Also added in the updated version are two papers on oral tube-feeding the Virginia Opossum and weaning the Virginia Opossum. **Price $2.00**		
A NEW METHOD FOR EXERCISING & REHABILITATING RAPTORS by Terry Schulz, Russel Tucker, & Judy Klingman, 1984 This paper introduces a new method of exercising raptors on a shoulder fight harness with a minimum amount of human contact. This method is ideal for the rehabilitation program that does not have room for a large flight aviary. Complete instructions to build a fixed flight line and harness are included. **Price: $1.50**		

	QTY.	TOTAL
Swallows, Various Species by Carol Meaney, 1980. This paper contains special housing needs, pesticides and the specific problems related to the care of swallows. **Price: $2.50**		
AVIAN DRUGS AND DOSAGES by Charles Galvin, DVM, 1976 A 48-page booklet that is an A to Z guide for drugs used on avian species. This booklet lists approximately 200 drugs that are used in birds and their recommended dosages. **Price: $5.00**		
RAPTOR CARE AND REHABILITATION by Gary Bogue and Dave Garcelon, 1977. A 140-page book on the complete care of raptors for rehabilitation. Sections include initial care, housing, medical problems, training and rehabilitation. Each section has great detail and address common and not so common problems that are encountered with these birds. Illustrations include perches, flying equipment, splints and wing/body wraps. **Price: $16.00**		
WILDLIFE RESTRAINT HANDBOOK Edited by the Wildlife Investigations Staff, California Department of Fish & Game, 1986. This 160-page book is designed for the wildlife rehabilitator and field biologist. It has sections on mechanical capture of animals, transportation of captured animals, restraint equipment (ropes, gloves, hobbles, Ketch-All Pole™, pole syringes, dart guns, etc.), pharmacology of restraint drugs, medical concerns in restraint, safety, and specific information on various species (including drug dosages) including Black Bear, Mountain Lion, Bobcat, Coyote, Fox, Skunks, Badgers, Fishers, River Otters, Beavers, Raccoons, and Sea Otters. **Price: $15.00**		
WILDLIFE JOURNAL REPRINTS **First reprint: $1.00 Each additional reprint is $.50.**		
REHABILITATION NOTES: KILLDEER, J. White; Vol. 6, No. 1		
REHABILITATION NOTES: AMERICAN KESTREL, J. White; Vol. 6, No. 3		
REHABILITATION NOTES: OPOSSUM, P. Nave, J. Lacy; Vol. 6, No. 4		
REHABILITATION NOTES: BLACK-TAILED JACKRABBIT, S. Fender, B. Stone; Vol. 7, No. 1		
REHABILITATION NOTES: NORTHERN MOCKINGBIRD, H. Ricter, B. Stone; Vol. 7, No. 2		
REHABILITATION NOTES: WOODPECKERS, P. Nave, B. Sone; Vol. 7 No. 3		
REHABILITATION NOTES: NORTH AMERICAN BARN OWL, J. White; Vol. 7, No. 4		
REHABILITATION NOTES: ANNA'S HUMMINGBIRD, K. Prill; Vol. 8, No. 1		
REHABILITATION NOTES: FOX SQUIRREL, B. Stone, S. Fender; Vol. 8, No. 2		
REHABILITATION NOTES: N. AM. GOLDFINCHES, B. Stone, D. Granados; Vol. 8., No. 3		
REHABILITATION NOTES: TURKEY VULTURE, K. Thorne; Vol. 8, No. 4		
REHABILITATION NOTES: BLACK-NECKED STILTS, D. Johnson; Vol. 9, No. 3		
REHABILITATION NOTES: AMERICAN ROBIN, M. Johnson; Vol. 9, No. 1		
REHABILITATION NOTES: COTTONTAILS, A. Hiss, Vol. 11, No. 2		
REHABILITATION NOTES: GREEN-BACKED HERONS, J. Schimmelman, Vol. 11, No. 4		
ORAL LESIONS IN RAPTORS; DIAGNOSIS & TXTMENT, S. Emanuelson, DVM; Vol. 6, No. 1		
EMACIATION; A PROTOCOL FOR RECOVERY, J. White, S. Emanuelson, DVM; Vol. 6 No. 2		
MANAGING VOLUNTEERS: ONE OF THE MANY ROLES OF THE WILDLIFE PROGRAM DIRECTOR, S. Lewis; Vol. 6, No. 3		
GUIDELINES OF FUNDRAISING FOR THE WILDLIFE REHABILITATORS, J. Lant, Ph. D., Paul Beaver, Ph.D.		
FLUID THERAPY IN BIRDS (PART I & II), R. Evans, DVM; USE OF THE PCV IN STATUS EVALUATION FOR RAPTORS, P. Redig, DVM; Vol. 7, No. 1 **Price: $1.00**		
STRESS MANAGEMENT FOR WILDLIFE REHABILITATION STAFF & VOLUNTEERS, S. Lewis, Vol. 7, No. 2		

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IMPRINTING AND WILDLIFE REHABILITATION, P. Beaver, Ph. D.; Vol. 7, No. 2		
PHYSICAL EXAMINATION OF SONGBIRDS, J. Heinemann, Vol. 7, No. 3		
RAISING WHITE-TAILED FAWNS 'WILD', M. C. Forness; Vol. 7, No. 4		
AVIAN TRICHOMONIASIS, S. Emanuelson, DVM; Vol. 7, No. 4; **Order** Barn Owl Rehabilitation Notes		
IS YOUR BIRD WATERPROOF? K. Thorne, Vol. 9, No. 2		
HOW TO READ AND USE A 1CC SYRINGE, M. Johnson, **Order** Goldfinches Rehab Notes		
TUBING MIXTURES FOR THE REHABBER ON THE RUN, K. Hobson, **Order** Turkey Vulture Rehabilitation Notes		

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THANK YOU FOR SUPPORTING THE IWRC AND WILDLIFE REHABILITATION!

The Wildlife Journal Committee

The *Wildlife Journal* committee was very busy in 1988 as we completed four issues, one of which was a special focus issue on administration. The assistant Editor, Sally Lewis was responsible for the recruitment and coordination of the special issue which was a hit with our members. We continued to build our network of scientific reviewers who assist authors by reviewing the technical content of the articles. Our editorial staff assisted authors with the P's and Q's that make the articles to understandable to our members.

This was the year of the Macintosh. We bought a Macintosh SE and began to type set the Wildlife Journal ourselves! This was quite an accomplishment, but was necessary to help speed up the production of the publication. We were all very pleased with the results of our efforts as three issues rolled off the presses in six months!

We can keep up the quickened pace with the help of our members and contributors. We did a member survey to see what our members wanted to read in the publication. An astounding 94% of the 205 respondents wanted to see more "Rehabilitation Notes". Eighty-five percent wanted to see more of the "Veterinary Corner", and 82% wanted more "For the New Rehabber" articles.

Some 91% wanted more articles on wildlife nutrition, 79% wanted articles on Post-Release Studies, and 73% on Zoonosis. Other popular topics were original studies (70%), natural history (67%) and clinical pathology (58%). Less often chosen topics included volunteer management (42%), administration (33%), computers (33%), fund raising (27%) and public relations (24%). Species that were requested for future articles included: peregrine falcon, nightjars, kites, herons, egrets, shrikes, bushtits, swallows, flycatchers, pelicans, ospreys, terns, bitterns, hummingbirds, red-tailed hawks, crows, kingbirds, nighthawks, gulls, shorebirds, Canada geese, white-tailed deer, bobcats, foxes, woodchucks, bats, flying squirrels, black bear, javelinas, muskrats, otters, marmot, moose, bighorn sheep, wolf, coyotes, skunks, cetaceans, amphibians and reptiles. Now we need your help to get the information together. If you raise any of these species and are willing to weigh the young and write up the care instructions in our standardized format, we want to hear from you! Remember, we have editors who can edit and assist you in the creation of the article. Contact our office for more information.

What do we have in store for our members this year? We have "Rehabilitation Notes" on the Green-backed Heron, Kingfishers, and River Otters, more on Avian Hematozoan Parasites, an article on Euthanasia, one on flight conditioning in raptors, several zoonosis topics including Lyme Disease, and another special focus issue on Fundraising.

We would like to say farewell to Sally Lewis who landed her dream job in Sacramento, California and will be moving on into other areas of her career. Our new Assistant Editor is Louise Shimmel. Louise has edited other professional publications and has been an Oregon rehabilitator for the last four years. We will look forward to her input and efforts. Special thanks to our ever present Sue Kelly for her coordination efforts with the printers and the finishing touches she adds to each issue.

We all look forward to serving you in the coming year and do thank you for your rave reviews of the *Wildlife Journal* in the survey in 1988.

-Jan White, Editor-

Hotline

In 1988, the hotline received over 85 calls. They covered a wide range of questions from members needing rehabilitation and medical advice to inquiries about our skills seminars and conference. The majority of the calls we received were for advice on orphaned wildlife. Many people had rare or unusual animals that they had never cared for before. There were the usual medical and injured animal callers that requested immediate assistance and there were the calls that I call the "Stump the Hotline" calls. They were the ones I had no idea how to answer. I always located the information that they needed and then added them onto the Hotline resource list in the process. When I get calls requiring speciality information, I use the resource list to call on people who do. Those people then contact the member and assist them.

Some of the more interesting calls we received this year were a request for help from an rehabilitator in Arizona who received a box of nestling Flamulated owls that were found in the box near a garbage area in a park, a southern California rehabilitator that needed information on the care of Great Blue Heron chicks whose parents nested on top of a mechanical crane 60' in the air. In one day, I received two calls on orphaned River Otter pups, one in Washington and the other in Massachusetts. The there the call asking what do you feed baby bats, followed by questions on a sick Prairie Dog, Woodchuck with broken legs, wrens, hummingbirds, Pileated Woodpeckers, Pygmy Owls. Then there was the one asking what to do with a Frigate Bird that found its way to the Appalachian mountains! All in all,

it was an active and interesting year for the hotline, one that benefited the rehabilitators and the creatures in their care.

-Jay Holcomb-

1988 Conference Report

The 12th annual conference of the International Wildlife Rehabilitation Council was held in San Mateo, California on January 22-24, 1988. The theme of the conference was "Lessons of the Past-Pathways to the Future". Coordinating with the Skills Seminar Committee, we were able to provide pre-conference events that included a trilogy of advanced skills seminars on Fluid Therapy, Wound Management, and Clinical Pathology. Additionally, we offered an advanced skills seminar on Volunteer Administration.

The conference then went on to offer three full days of lectures and hands-on opportunities. We had a workshop on computers in wildlife rehabilitation, a hands-on workshop on clinical pathology, as well as discussion panels on everything from starting a state organization to triage. Papers were offered on an array of species of native animals including Flying Squirrels, Tree Squirrels, Harbor Seals, Beavers, Turkey Vultures, and San Juan Islands' Deer. Rehabilitation issues such as criteria for release of physically impaired raptors, avian orthopedics, and the diagnosis, treatment and prevention of Aspergillosis. These papers were compiled and made available in the form of a conference proceedings through the literature sales department in June of 1988.

The event was attended by approximately 235 rehabilitators from 19 states and Canada. The conference received very positive reviews from the participants and was one of the highlights of our year.

The rest of 1988 was spent by committee members planning the 1989 IWRC conference scheduled for January 20-22 in Austin, TX. The theme for this event is "Wildlife Rehabilitation On The Move!" as IWRC takes its conference out of California for the first time. We look forward to meeting many new faces in the great state of Texas and hope it will be our most successful event ever!

-Jan White-

Skills Seminar Program

The IWRC program of hands-on continuing education for wildlife rehabilitators continued to grow in 1988. The program entered its sixth year and served 329 people in the Wildlife Rehabilitation 1AB Program and 200 people in the advanced classes. Classes were held in locations far and near from Solano Community College (within minutes of our national office) to York, Maine. This year, we got into the heartland of the United States with classes in Denver, CO and Wichita, KS as well as Raleigh, NC and Vincetown, NJ. We went south to Birmingham, AL and north to Canterbury, NH. Our team of instructors made tracks in every direction to personally assist rehabilitators in learning skills that help save lives.

Additionally, we offered 13 advanced skills seminars covering a wide range of topics from pathology to fluid therapy to chemical restraint to physical therapy. We also developed a new advanced class on Volunteer Management and Administration. All in all it was a very challenging and fulfilling year.

-Jan White-

Literature Department

This was truly a year of transition for our department. We had for years operated out of the upstairs of the home of Sue Kelly. After a while, the materials weighed so much there was concern for the soundness of the attic and we knew it was time to find a permanent home. Board member, Diana Granados, offered to assist us with her home until we could get our office established and then helped us move in and organize in Suisun. Diana continues to serve as the development chief who works with our members to develop new offerings.

Meanwhile, we hired part-time help to perform the sales portion of our efforts and to keep inventory and records. We revamped our literature form and put together a current *Wildlife Journal* Index. In the summer, we produced the conference proceedings book and began to market it to our members.

We embarked on a revision campaign to update existing materials. Specifically, we are working with the authors of the *Care of Oiled Birds, Substitute Diets of Orphaned Mammals* to reissue these papers. We plan to replace the *Avian Drug Dosages* offering in the next 24 months. We updated the *Wildlife Rehabilitation 1AB* manual and the Clinical Pathology Skills Seminar Materials. We feel like we have accomplished much and yet have so much more to do. Next year, we hope to begin revising the Raptor Care and Rehabilitation Manual. It looks like there will be no shortage of things to do in this department!

-Jan White-

tion of the bird involved.

Initial rehydration can be accomplished orally with Pedialyte™, if the bird does not require more intensive fluid therapy (subcutaneous or intravenous). Oral fluids are given on the basis of percent dehydrated. For example, a 300 g bird that appears to be 7% dehydrated will need about 35 ml of fluids over the first 24 hours. Oral fluids are contraindicated in the event of gastrointestinal impairment or severe dehydration.

Housing

Hatchlings to Fledglings:

Birds should be housed in a clean, warm environment. The author has raised this species from about 12 days of age and older. Individual birds have varying requirements for environment, and monitoring the bird is the best way to gauge the rehabilitation effort.

An incubator or "Portapet" with heat source above and below is adequate for nestlings. This may also be used for small fledglings for short periods of time. The environmental temperature required by the birds generally decreases with increasing age. At 12 days, 85° F is comfortable for the birds. With young birds, providing environmental heat (as opposed to a heating pad) is important as they tend to stand on the edges of towels away from such heat sources and can become too cold.

Younger fledglings can be comfortably housed in airline containers designed for large dogs. A rabbit cage (top lift door) can be used for older fledges. Care should be taken to cover the front of the cage with a light colored towel or sheet to create the privacy these birds require. If they have any problems with the wire, it should be covered with toweling as well.Today, fiberglass screening us used to line cages to protect from wire. Covering should be extended all over the cage at night to reduce the danger of drafts and chilling. The cage flooring can be lined with sheeting or toweling (not stringy) which are more absorbent and cleaner than newspaper. As is the case with waterfowl, caging must be scrupulously clean. Environmental heating systems for larger caging may include heating pads on the bottom and top of the airline kennel, small 4-6 watt Christmas lights placed overhead, or heating up a small room into which the kennel is placed. The Christmas lights can be changed using yellow, white, or red in the daylight hours and blue or green at night. A full-spectrum (natural light) bulb may be used during the day in a desk lamp clamped to the edge of the table. Care needs to be taken to observe the effects of lighting and to guard against hyperthermia. While these systems do not provide as well-controlled a heat source as a heated room or large incubator, they are sometimes necessary when equipment and resources are limited.

Note: With extremely weak birds, care should be taken to remove water dishes in the evening and to monitor very closely during the day to avoid birds drowning in them or getting wet and chilling. The caging facility should have a thick, stable perch otherwise, the food/water dish is sometimes used as a perch which results in contamination.

Care should be taken to place similar sized Green-backed Herons together in the same area. If there is a smaller heron involved, always introduce the larger one into the smaller one's area and the larger one will be less aggressive. Observe to see if their behavior is rougher than what is expected in the normal process of establishing the pecking order. They prefer the company oftheir species and like-sized birds from different clutches can be housed together without incident. It is expected that a few aggressive behaviors such as biting will occur, but no behaviors that cause harm should be tolerated.

These birds can be stressed and privacy is one of their major requirements. They should be housed in a low traffic environment. Eye contact is an additional stressor and should be avoided when possible.

Flight conditioning caging should be large enough to allow juvenile birds short flights and practice landing on swinging perches. Recovering injured adults may require more flight space, especially those with wing injuries that need evaluation of their ability to angle, gain height.

Diet

Natural food items such as those previously described can be used to raise these birds. Attention should be paid to make sure the food items are high enough in calories, have appropriate vitamins, including thiamine, and have a balanced calcium:phosphorus ratio. Dead fish contain thiaminase which will inactivate Vitamin B1 (Thiamine). Birds fed dead fish should have a vitamin supplement that includes Thiamine at a rate of 20 mg/lb. of bird or 50 mg. thiamin for every 200-250 g, of fish fed (Fowler, 1986). It should also be noted that the caloric content of fish varies widely depending on the time of year taken, age of fish, nutritional status of the fish when taken, as well as other factors (Geraci, 1986). For example, a commonly utilized fish, smelt, can range in calories from 700-1200 kcal/kg. and are often at the low end of that range. Birds that are not gaining weight normally should be supplemented with rodents, chicks, or tube mix. Good vitamin supplement, such as Superpreen™, are helpful and recommended.

A good tube feeding mix-

ture that has been used successfully as a supplement for this species is as follows:

1 cup Science Diet Feline Growth™ (Dry)
1 hard-boiled egg
1 teaspoon calcium powder (Tri calcium Phosphate)*
1 teaspoon Superpreen Vitamin™ and mineral powder
1/2 cup Purina Trout Chow
1-1/2 cups water or Pedialyte™ to make consistency desired for tube feeding. Pedialyte™ is a good substitute for water in dehydrated birds that are in good enough shape to receive oral hydration. Other similarly constituted electrolyte solutions will work as well.

*Since this diet is not particularly calcium deficient, a Calcium source with Phosphate in it is appropriate for use.

Diet Breakdown
(Dry Matter Basis)

Protein 30%
Fat 19%
Carbohydrates 17%
Kcal/gram 3.5

This diet is strictly a tube feeding diet. Initially, nestlings and branchers are given 10 cc as a supplement. This amount is increased up to 20-30 cc in birds who take the food well. Birds are fed 3-4 times daily depending on their weights. To minimize regurgitation,which is common in this species, care is taken to tube very slowly with a lubricated tube. Hold the bird's bill shut for a minute or so in an upright position after tubing. The bird is returned to the cage once it has quieted down and the room evacuated as soon as the bird is re-caged.

When they will not self-feed, as is often the case initially, cut up fish such as white bait (smelt) can be hand fed to them. They have large throats and crops and are relatively easy to force feed.

Many Green-backed Herons can eat as many as four smelt per feeding, but some do not. Offer fish by hand or throw pieces at their feet to encourage them. It appears that when they take the first fish, it is in the form of attacking whatever is placed in their area. This will usually get them started on self-feeding.

Food is normally placed in a wading dish such as a clear Pyrex™ loaf pan. Herons vary in the amount of time it takes them to catch on to this feeding system. Live fish can be added to stimulate self-feeding. Water should be changed frequently, especially during hot weather. Ice cubes can be added to the water to help preserve fish a little longer. It should be noted that fish should be changed every 3-4 hours depending on the air temperature where kept. Additionally, thawed fish should not be re-frozen as the potential for food poisoning exists.

Diseases & Parasites

Fish eating birds such as Green-backed Herons are subject to parasitism of a number of worms such as Eustrongyloides and some flukes. The nematode Eustrongyloides is found in the esophagus, proventriculus and intestine. They are a small measuring about 30 mm long. These may present a problem in a bird that is already injured or otherwise ill. They also are known to contract the round worms Contracecum and Porrocecum.

It is presumed that these birds can also contract aspergillosis and botulism under the appropriate conditions. They also can carry Chlamydia.

Release

Birds should be self-feeding, acclimatized, possess normal flight skills, and be waterproof before release. Juvenile birds generally released at the age of 6-8 weeks.

These are diurnal birds and should be released during the daylight hours. They should be returned to habitat where food and cover are available. The weather should be good with no threat of storm or extreme wind for at least three to five days. In areas, where the birds do not normally winter, due consideration should be given for birds held during that time for rehabilitation.

Birds should have a PCV of 40% or better and a plasma protein value of greater than 3.0 g/dl. They should weigh about 350 g. (Shaw, 1988). These are hearty birds and are not particularly difficult to rehabilitate.

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Euthanasia

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Introduction

Euthanasia means painless death intentionally induced. As a rehabilitator, it may be our greatest gift to a badly injured animal. Humane death is possible only when immediate insensitivity to pain is achieved by depression of the central nervous system (CNS). The CNS includes the brain and spinal cord.

There is no one perfect euthanasia technique appropriate to all situations. In choosing a technique, consider the following factors:

- Does it present a risk to human health and safety?
- Does it induce immediate CNS depression?
- Does it require stressful capture and restraint?
- Is it appropriate for this size or type of animal?
- Will it interfere with diagnostic tests?
- Is specialized equipment or training required?
- Will this technique offend the casual observer?
- Is it time- and cost-effective?

Euthanasia methods may be chemical or physical. Physical euthanasia mechanically destroys the CNS. Chemical euthanasia introduces a toxic agent into the body by injection or inhalation.

Physical euthanasia may be induced by:

- Cervical dislocation
- Decapitation
- Stunning & exsanguination (bleeding out)
- Shooting

Chemical euthanasia may be induced by:

- Lethal injection of an anesthetic or toxic agent
- Inhalation of an anesthetic gas
- Inhalation of a toxic gas

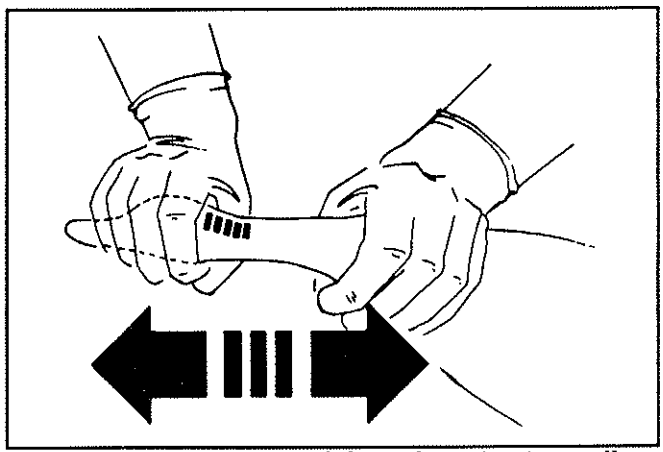
Physical Euthanasia

Cervical Dislocation:

Immediate CNS depression occurs when the brain is separated from the spine. The separation must take place at the base of the brain or within the upper-third of the neck (cervical spine). Separation is induced in small- to medium-sized birds and in small mammals by grasping the base of the skull in one hand and the body (usually at the base of the neck) in the other hand. Pulling rapidly and firmly in opposite directions will separate the cord.

In duck-sized birds, grasp the base of the skull and swing or twirl the bird in a circular, snapping motion three or four times. Be sure to feel the separation of bones and cord but do not attempt this technique without training! This technique is effective, quick, inexpensive, requires no special equipment, and only minimally affects diagnostic testing.

Cervical dislocation may upset the casual observer because animals, especially birds, convulse for several seconds to minutes after death. These movements are due to spinal reflexes and pain is not involved.



The brain can be separated from the spine in small- to medium-sized animals by grasping the animal as shown and pulling rapidly & firmly in opposite directions. Larger birds can be twirled with a circular snapping motion. See text for additional information.

Decapitation:

Severing the head from the body, like cervical dislocation, induces immediate CNS depression. It is especially useful for geese, swans, or other birds too large for cervical dislocation. A heavy knife, machete, hatchet, or bolt cutters should be used to ensure that the spinal cord, encased in the neck bones, is severed. Emasculatomes, available from veterinary supply houses, crush the cord without cutting, thereby reducing blood loss. The same uncontrolled movement seen after cervical dislocation will follow decapitation. Protect yourself, as always, from contamination as the blood may contain toxic or infectious agents.

Stunning & Exsanguination (Bleeding Out):

A forceful blow to the center of the skull will produce massive brain hemorrhage and immediate CNS depression in birds and small mammals. To ensure death, cut the major blood vessels in the neck and allow the animal to bleed out. This technique should not be used if the brain is required for diagnostic tests such as rabies, or if the euthanasia must be performed in public.

Shooting:

Central nervous system depression and death can be induced by shooting an animal at close range in the brain or high in the cervical spinal cord. The type and caliber of firearm is dependent of the size of the animal to be killed. The brain is the preferred site for euthanasia, but the cervical spine may be used if the brain is required for diagnostic tests. Training and experience are required to ensure a humane death and also to reduce the human safety hazards.

Chemical Euthanasia

Lethal Injection:

To administer lethal injections, personnel must be trained in injection techniques as well as in the safe handling and disposal of needles, syringes, and drugs.

Special preparations are available which, when injected into the blood, cause immediate CNS depression followed shortly by a cessation of breathing and heartbeat.

Use of these preparations for wildlife euthanasia is limited. They produce an esthetically acceptable euthanasia, but the animal must first be captured and restrained, causing anxiety to the animal and risking injury to the handler. Dangerous animals should be sedated or stunned first to allow for proper administration of the drug. If large animals (>100 pounds) or many animals must be killed, lethal injection can be time-consuming and expensive.

Sleepaway (Ft. Dodge Laboratories, Inc., Ft. Dodge, Iowa) and Beuthanasia-D Special (Burns-Biotic Laboratories, Inc., Omaha, Nebraska) are concentrated barbiturate solutions plus additives. The solutions are inexpensive but, due to the potential for human abuse, require licensing by the Federal Drug Enforcement Administration (DEA) for purchase, use, and storage. The DEA requires considerable record-keeping. T-61 Euthanasia Solution (American Hoechst Corp., Somerville, New Jersey) does not require DEA licensing. This advantage is countered by its increased cost. The effective dosage and administration technique for T-61 are printed on the product label. All of these solutions are toxic if accidentally or intentionally self-administered.

Lethal injections may not be appropriate in certain instances since drug residues interfere with some tests. Check first with your diagnostic laboratory to see if the proposed euthanasia technique is compatible with the testing to be performed.

Strychnine or paralytic drugs such as nicotine sulfate or succinylcholine are not approved for use as euthanasia agents.

Anesthetic Gas:

Inhalation of certain products (halothane, methoxyflurane, and nitrous oxide) are routinely used in clinical medicine to produce and maintain anesthesia. Ether and chloroform, used routinely in the past, have been replaced by these safer agents. Ether is explosive and chloroform is toxic to humans. An overdose of any of these agents is fatal.

Halothane is the gas of choice. Methoxyflurane vaporizes slowly and therefore takes longer to induce anesthesia. Nitrous oxide has a low potency and is available only in gas form (others are purchased as a liquid, vaporizing at room temperature and normal air pressure). There is limited field application for these latter two agents. Animals that are difficult to handle may be rendered unconscious with gas, then killed with another method. For example, a raccoon in a small cage may be exposed to a gas to induce anesthesia. The raccoon could then be euthanized with a lethal injection. Smaller animals can be euthanized with an overdose of gas only.

An animal exposed to anesthetic gas may pass

through an "excitation phase" before becoming unconscious. The animal may vocalize and appear to struggle for a short time. This behavior may be distressing to the casual observer and can be dangerous for the animal handler. Reptiles and some marine mammals may hold their breath when exposed to the gas and might not receive an effective dose.

It is important to be sure that the animal is dead - not just unconscious - before shipment, necropsy, or disposition. After removal from the gas environment, the animal may wake up quickly, with little warning. Remember this when working with raptors or carnivores.

To administer the gas, confine the animal in a cage or crate and cover with plastic. Pump in gas or soak a cloth with the liquid and place it inside the plastic. Cold temperatures will decrease the rate at which the liquid becomes gas. Wait at least 15 minutes before checking for death.

Since all of these gases constitute a human health hazard, including the potential for causing spontaneous abortion and congenital abnormalities, the workplace must be well ventilated.

Toxic Gas:

Toxic gas such as carbon monoxide (CO) or carbon dioxide (CO2) may be useful when many small animals must be killed. It must be borne in mind, however, that a 1% concentration of carbon monoxide is lethal and represents a substantial human safety hazard. As with anesthetic gas, all work with this gas must be conducted in an open area.

The least expensive source of carbon monoxide is an internal combustion engine. An automotive four-cycle engine at idle speed works best. Two-cycle engines should not be used, and smog-control devices must be bypassed. This is most easily done by disconnecting the exhaust system from the manifold at the engine and attaching the hose to the exhaust system at this point. Adjusting the carburetor to burn richer will increase the amount of CO. The preferred fuel is unleaded regular gasoline without additives. The engine should not be burning oil and should be warmed up before use. To avoid discomfort to the animals, the carbon monoxide must be cooled and filtered before use. It may be bubbled through water or, preferably, through a filter "scrubber," which can be built. The American Humane Association has published Carbon Monoxide Chamber, Suggestions on Construction and Operating Instructions. This model can be adapted for field use if the principles of cooling and filtering are maintained.

Carbon dioxide may be purchased in cylinders, or it may be obtained in smaller quantities from CO2 fire extinguishers or in solid state (dry ice). Animals must be protected from contact with the dry ice. The gas should be warmed to ambient temperature before exposing animals. This is accomplished by passing it through hoses surrounded by warm water. This gas is heavier than air. A deep layer must be built up in the killing chamber so the animal will be unable to reach higher, more oxygenated air.

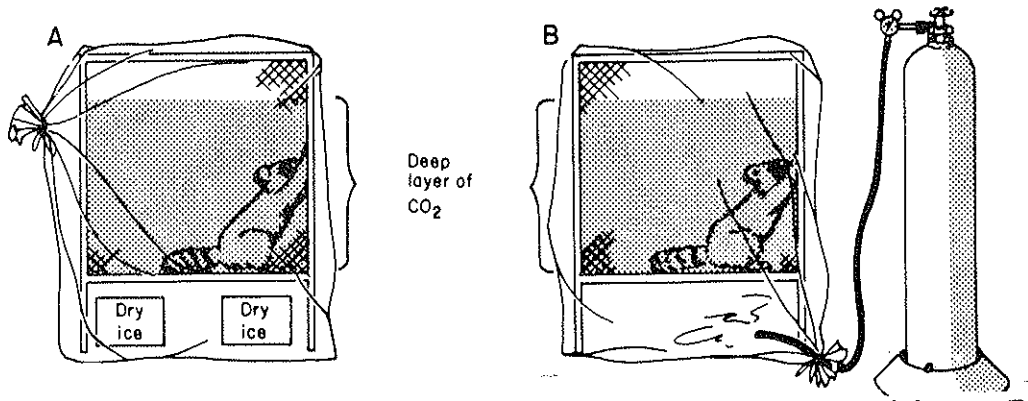
Cages covered with plastic bags or plastic garbage cans can be used as killing chambers. Leave the animal in the chamber until breathing and heartbeat have ceased.

Supplementary Reading:

AMERICAN HUMANE ASSOCIATION. Carbon Monoxide Chamber: Suggestions on Construction and Operating Instructions. Information series. The American Humane Association, P.O. Box 1266, Denver, Colorado 80201

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This manuscript was adapted from a Field Guide To Wildlife Diseases published by the National Wildlife Health Center, U.S. Fish and Wildlife Service; edited by Milton Friend; technical editor Cynthia J. Laitman; illustrated by Randy Stothard Kampen.



Use of carbon dioxide for euthanasia of animals. (A) Evaporation of dry ice within a plastic -shrouded cage. (B) Direct application of carbon dioxide in a gas form. Because this gas is heavier than air, a deep layer of gas must be built up so that the animals being euthanized cannot get above the gas. The chamber containing the animals must not be airtight or gas buildup may result in an explosion. Openings should be at the top of the chamber.

DateBook

1989 Midwest Regional Wildlife Rehabilitation Symposium

The Midwest Regional Wildlife Rehabilitation Symposium, scheduled for April 14-15, 1989, will be held on the University of Wisconsin-Madison campus. The sponsors are The Raptor Education and Rehabilitation Association, Minnesota Wildlife Assistance Cooperative, The Iowa Wildlife Rehabilitators Association, and the Zoology and Wildlife Ecology Departments of the UW-Madison.

The focus of this conference is on improved follow-up and on public relations. The format includes lecture, discussion, lab sessions, and field trips. Speakers include Pat Redig, DVM, Ph.D.(U. of Minn.), John Tautin (UWS Banding Lab), Brint Spencer, (Minneapolis Zoo), Sally Joosten (MCCD Wildlife Center), David Thompson (Int. Crane Foundation), Nancy Thomas, DVM (National Wildlife Health Research Center), Josh Dein DVM (USFWS), Dan Ludwig Ph.D. (Forest Preserve District), Laura Johnson DVM (Gr. River Wildlife Center), George Bates DVM (Wild ARC), Robert Horwich, Ph.D. (ICF), Julie Langenberg DVM (UW-Vet Med), Frank Iwen, Curator (UW-Zoological Medicine) Linda Wolf DVM, Mark Zens DVM and more.

The cost is $30 per person. Registration information can obtained from Betty Bunger, 481 Togsted Glen, Madison, WI, 53711. Checks should be made payable to RERA.

Let us know about your regional meetings and events and we will let our members know!

Humane Solutions to Problems with Urban Wildlife

The Humane Society of the United States (HSUS) is sponsoring three seminars on Humane Solutions to problems with Urban Wildlife. These seminars are designed to familiarize the audience with progressive tactics for dealing with troublesome wild animals in the urban environment. They are designed specifically for wildlife rehabilitators, animal control officers, and park naturalists.

Topics to be covered in the seminar include studies of problems caused by urban wildlife, human phobias about wildlife, laws governing the control of nuisance wildlife, wildlife population dynamics, and harmless tactics for resolving citizen complaints.

A western seminar will be offered on March 3rd at the Plaza International Hotel in San Diego, California. Program information and registration information can be obtained from the HSUS West Coast Regional Office, 1713 J Street, Suite 211, Sacramento, CA. 95814

An eastern seminar will be held on April 13th at the Holiday Inn-Fair Oaks in Fairfax, Virginia. Information on this seminar can be obtained by contacting the Department of Data & Information Services, The Humane Society of the United States, 2100 L St., N.W., Washington, D.C. (202) 452-1100.

A mid-western seminar will be held at the Americana Hotel in Kansas City, Missouri. Program and registration information can be obtained from the HSUS Midwest Regional Office, Argyle Building, 306 East 12th Street, Suite 625, Kansas City, MO 64106 (816) 474-0888.

The cost of the seminars are $40.00/per person for non-profit agencies and $50.00/person for commerical businesses and private individuals.

Start Planning Now for the 1990 IWRC National Conference!

We are planning a Capital Excursion in Washington D.C. in November, 1990. Join us for the latest information on wildlife rehabilitation and great fellowship.

More definitive information could be gotten from a controlled study. Looking at the effect of an induced parasitemia in a population of stressed birds and comparing the disease problems seen with a population of birds subject to the same stresses, but without the parasitemia, could tell us a lot. A controlled study may be difficult to achieve, but just the collection of data on birds that we are handling and treating for other disease problems could provide a lot of information.

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Scientific Reviewers for the Volume 11 Series

We would like to extend our appreciation for the willingness of these people to review materials submitted to the *Wildlife Journal*. While the Journal Committee has always worked with authors to review, edit and clarify articles, the scientific reviewers bring to the publication their specialty knowledge which we think has helped in our continuing efforts to publish the most accurate, up-to-date information in the field of wildlife rehabilitation. We thank them for taking the time to assist us.

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Book Review

Quaisey, A Nantucket Quail

Barbara L. Loucka
Vantage Press, Inc.
516 West 34th St., NY, New York
73 pp. 1987. $7.95

Quaisey, A Nantucket Quail is the story about a wild animal raised in a "pet environment". Stories such as this tend to make rehabilitation a harder road to pave As the manager of a regional junior museum with a book store, this is not a book that would be chosen as stock to sell to the public. This because the urban wildlife problems exist a plenty without compounding it by encouraging the incorporation of wildlife as pets. This tale was better than most as the author had knowledgeable animal expertise.

Mrs. Loucka does begin in a very professional manner and lays the groundwork with specific details on why they undertook their quail adventure. She stresses their initial reluctance to take a wild quail into their breeding operation and she carefully completes the setting up process of the cage by stating that the jar lid of water had a "layer of pebbles" to keep the infant quail from "drowning in half-inch of water". This very thoughtful data is characteristic of the book. The author accesses that the ease with which the quail accepted captivity was related to a late hatch and being disturbed by the hikers, that the quail eventually followed.

Quaisey, was raised in the house with domestic animals and was not afraid of the family Yorkshire terrier. This does put wild animals in jeopardy. There are observations of quaisey that reflect on his quail character: such as his dust baths, and even his sleeping habits. From these observations the reader can learn about quail behavior. Other observations such as walking in syrup, stealing cigarettes, and trying to eat dress maker pins that belie his wildness. The statement that they raise "jumbo Bobwhites" and release them to interbreed with the native quail does disturb my natural sense of being. Mrs. Loucka felt that Quaisey might have been one of those crossbreeds.

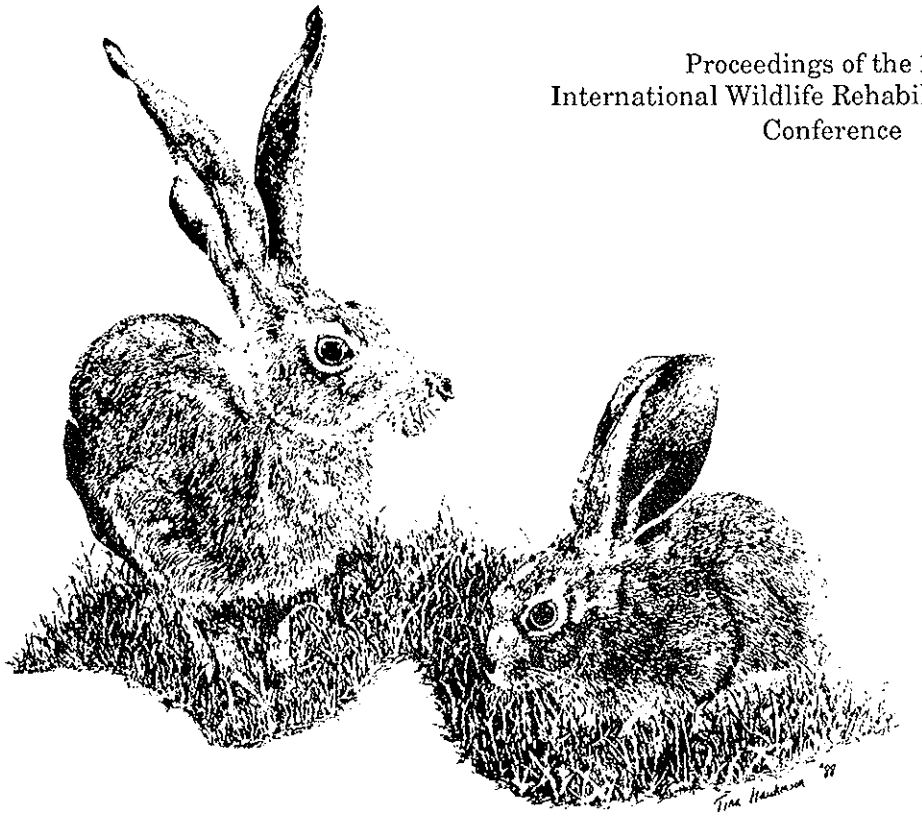
The book gives vivid descriptions of the area of Nantucket. I could quite understand even with the bitter winters why they chose to make Nantucket their permanent home instead of a summer residence. There are moors and the Harbor Seals and the "oceans power" that seems "most impressive when we have gone surf casting on a day when there is no wind at all". You could feel the cold and smell the sea.

It is the dichotomy of the book that makes an assessment of the life of Quaisey difficult. They had excellent knowledge on care of animals and the area in which they live. They obviously loved the quail and he hacked back out with his own kind. The danger is in the message that it can really work like this every time. My experience has taught me that naming an animal, feeding it at the table, raising it with domestic predators, and raising it alone without conspecifics makes it non-releasable. The appeal of this book is in the humaness that the animal adopts from us; would that we could allow the animal to exist with us through his own animalness that draws us to them in the first place.

Diana Granados
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