

# The Wild Life

A NEWSLETTER FOR THE WILDLIFE REHABILITATORS OF COLORADO

SPRING 2007



Excerpts from

## RACCOON ROUNDWORM: ARE YOU AT RISK?

By Michelle H. Brown, B.S, M.S.

**B**aylisascaris procyonis, a ubiquitous roundworm of raccoons, is increasingly being recognized as a human health concern. Often the impact on the primary host is relatively minor so raccoons may be asymptomatic and infections may not be suspected. However, when accidental or aberrant hosts, including humans, become infected with *B. procyonis*, the larvae migrate throughout the liver, brain, spinal cord, and other organs causing severe central nervous system disorders and other tissue damage that eventually results in death. Parasitic infection is also difficult to detect in aberrant hosts and, even if infection with *B. procyonis* is suspected, there is no proven effective therapy or existing vaccine. There are two main categories of humans that are at risk for this disease: those who accidentally come in contact with raccoon feces in their neighborhoods and those who work directly with raccoons. Fortunately, preventative measures can decrease the risk to these groups and include discouraging raccoon's visitation near homes by removing food and shelter sources and implementation of proper cleaning methods for raccoon enclosures.

*B. procyonis* is an endoparasitic nematode whose primary host is the raccoon: prevalence in some US raccoon populations may be >80%. Raccoons can become infected in one of two main ways. Generally, young raccoons become infected by ingesting the eggs during feeding and grooming activities. Alternatively, adult raccoons can become infected by ingesting the larva-containing flesh of other mammals and birds which have become infected with *B. procyonis*.

When raccoons ingest infective eggs, the larvae hatch, enter the wall of the small intestine, and subsequently develop to adult worms in the small bowel. Adult rac-

coons can shed millions of unembryonated eggs in feces each day. Within as little as two weeks the eggs can mature to infective larvae. Once infective, eggs can remain viable in the environment for years, even during harsh winters or in dry conditions, and are resistant to most typical decontamination methods.

Transmission to accidental hosts, which can include humans, is a principal concern. Eggs ingested by aberrant and paratenic hosts (*paratenic* describes an intermediate host which is not needed for the development of the parasite, but nonetheless serves to maintain the life cycle of the parasite) immediately hatch into active larvae that migrate in the tissues and organs of the host. This larval migration may then produce extensive tissue damage leading to various clinical diseases, behavioral abnormalities, and possibly death.

Infection in humans is linked to the defecation habits of raccoons. Presumably for communication or territorial reasons, raccoons habitually defecate in focal areas called "latrines," where large amounts of feces and *B. procyonis* eggs accumulate. Raccoon latrines are found on the tops of fences, on roofs, decks, and stored firewood; and in outbuildings, attics, and various other locations. Homeowners are often unaware that there are latrines on their property, thus increasing the risk of exposure to raccoon feces.

So why is there a growing health concern about raccoon roundworm? The increasing prevalence of raccoons among human communities is



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Dear Friend of Wildlife:

By all accounts, our 2007 Education Symposium held in February was a roaring success! Of the 71 attendees (including speakers) 60% completed the evaluation survey and gave an overall "A" rating for the degree of effectiveness of the whole event. Individual comments included ..."very educational and inspiring to be around like-minded people who love helping animals"..."symposium was very well organized. Speakers offered pertinent information"..."Awesome!"... "excellent food and drinks." Continental breakfast, hot & cold lunches together with snacks and beverages were provided both days and from the positive feedback, were much appreciated.



**Deirdre Butler**

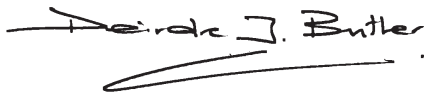
Kathy Konishi, CDOW Special Licensing Unit, walked us through the wealth of information posted on the CDOW web site regarding the new guidelines for wildlife rehab licensing. Whether you are a volunteer, provisional or potential sponsor — this information is essential reading. These guidelines are in effect now. Raising the bar is a good thing — we all want the best for the animals.

Everyone had fun in the drawings for donated door-prizes: some of the lucky winners are shown right. Many thanks for the generous donations from Don McFann, Susan Silberberg and the NWRA. A number of businesses including ACE Hardware, Citizen Printing, HeatMax, Inc., Safeway-Windsor and Windsor Discount Liquor, kindly supported our symposium with donations of products, gift-cards and wine!

Finally, I'd like to extend a personal thank you to Beth, Brenda, CJ, Erin, Joyce, Kathy and Raegan for their fine work "behind the scenes" making everything happen smoothly and on schedule from breakfast to lunch to unlimited supplies of coffee, tea and iced water. It wouldn't have happened without your help and hard work — thank you!

If you have something to share please e-mail to [ccwr\\_4\\_members@msn.com](mailto:ccwr_4_members@msn.com). You are also most welcome to contact me, Deirdre Butler, directly via [deirdre@cogico.com](mailto:deirdre@cogico.com) or 303-823-8649.

Best wishes,



Deirdre Butler  
President, CCWR

**It's time to renew your CCWR membership! Please see the membership form on p. 8 for details.**



*CCWR President Deirdre Butler presents Stormy Roberts with a framed photo door prize at the Friday night reception.*



*Delegates at the symposium.*



*Nancy Kelly was the lucky winner of the framed fox photo, donated by Don McFann of Wild Critter Photography.*

one reason. Another reason is the lethal manner by which raccoon roundworms manifest themselves in aberrant or paratenic hosts. After infective eggs are swallowed, they hatch into larvae that migrate extensively through the liver, brain, spinal cord, and other organs. Migration of large numbers of larvae in animals such as mice, woodchucks, squirrels, rabbits and birds may cause liver and lung damage. Larvae may also cause eye disorders by migrating through the ocular tissues. In these hosts, the affected animal will initially exhibit a head tilt and an inability to walk and/or climb properly due to damage caused to the brain and spinal cord by the larvae. As the illness progresses, the animal may lose its fear of humans, circle, roll on the ground, fall over, lie on its side and paddle its feet, become totally recumbent, comatose, and finally die. In humans, *B. procyonis* larvae have a tendency to invade the eyes, spinal cord, and brain, causing inflammatory reactions and tissue damage, resulting in blindness, neurological damage, and even death.

Diagnosis of *B. procyonis* in raccoons is fortunately fairly easy due to the relatively large size of the egg (80 µm x 70 µm) and of the worm (12-23 cm). In raccoons, infection with *B. procyonis* can be confirmed by recovering and identifying the adult worms (postmortem examination) or by fecal flotation (live animal) to identify their eggs in the feces. Occasionally, sub-adult worms are passed in the feces or vomitus. However, since humans and other animals are dead-end hosts for *B. procyonis*, no eggs, larvae or adult worms will be found in human stool specimens. Results obtained from complete blood count and cerebrospinal fluid examinations are usually consistent with a parasitic infection but may not be profound. In cases of ocular larva migrans (OLM), ophthalmologic examinations revealing chorioretinal lesions, larval tracks, or migrating larvae can support a diagnosis of *B. procyonis*. However, the “gold standard” of diagnosis is to perform a post-mortem tissue biopsy (particularly of the brain, heart, lungs and eyes) that demonstrates characteristic *B. procyonis* larvae in the tissue.

Raccoons can be successfully treated with several different anthelmintics such as piperazine, fenbendazole, pyrantel pamoate, levamisole, and organophosphates such as dichlorvos to kill the adult worms. However, there are currently no drugs that can effectively kill the migrating larvae in the human body. Laser surgery has been successfully performed to kill larvae present in the retina of the eye but the damage caused by the migrating larvae is irreversible. A contributing factor to the lack of therapeutic success in human infections is no doubt the fact that the larvae continue to migrate unimpeded in body tissues, because infection with *B. procyonis* is usually not diagnosed until late in the course of the disease. However, various anthelmintic agents have been employed for treat-

## Raccoon Roundworm *Baylisascaris procyonis*

### General Points:

A single raccoon can shed nearly 45,000,000 *B. procyonis* eggs in its feces on a daily basis.

Juvenile raccoons tend to shed greater numbers of eggs than adult raccoons.

*B. procyonis* eggs tend to be sticky and adhere to animal fur, surfaces, and objects, including children's toys. They are extremely hardy and can remain viable and potentially infective in the external environment for many years.

*B. procyonis* eggs require 2-4 weeks of incubation in the external environment to develop into infective agents i.e. embryonated eggs containing larvae.

Eggs ingested prior to proper embryonation will not develop into larval form in a paratenic host.

Human infection typically occurs in infants after eating dirt contaminated with raccoon feces (infectious dose is believed to be about 5,000 eggs).

In humans, there is no effective treatment — prevention of infection remains paramount.

### Key points for Rehabilitators:

Removal (and appropriate disposal) of raccoon feces on a daily basis will help to minimize the build-up of infective, embryonated *B. procyonis* eggs.

Heat is the best method of killing *B. procyonis* eggs e.g. direct flames from a propane flame-gun.

Chemical disinfection, in general, is rarely effective.

Eggs are resistant to most common disinfectants; 20% bleach (1% sodium hypochlorite) will wash away sticky eggs but does not kill them.

A relatively common treatment protocol for *B. procyonis* in raccoons in rehabilitation is Panacur (50 mg/kg) or Strongid-T (1ml/10 lbs) every 2 – 3 weeks. Check with your veterinarian for more information.

ment in humans. Currently the drug of choice is albendazole, because it has been shown to have good distribution into the brain and central nervous system, especially when

Continued on p. 4

used in conjunction with dexamethasone.

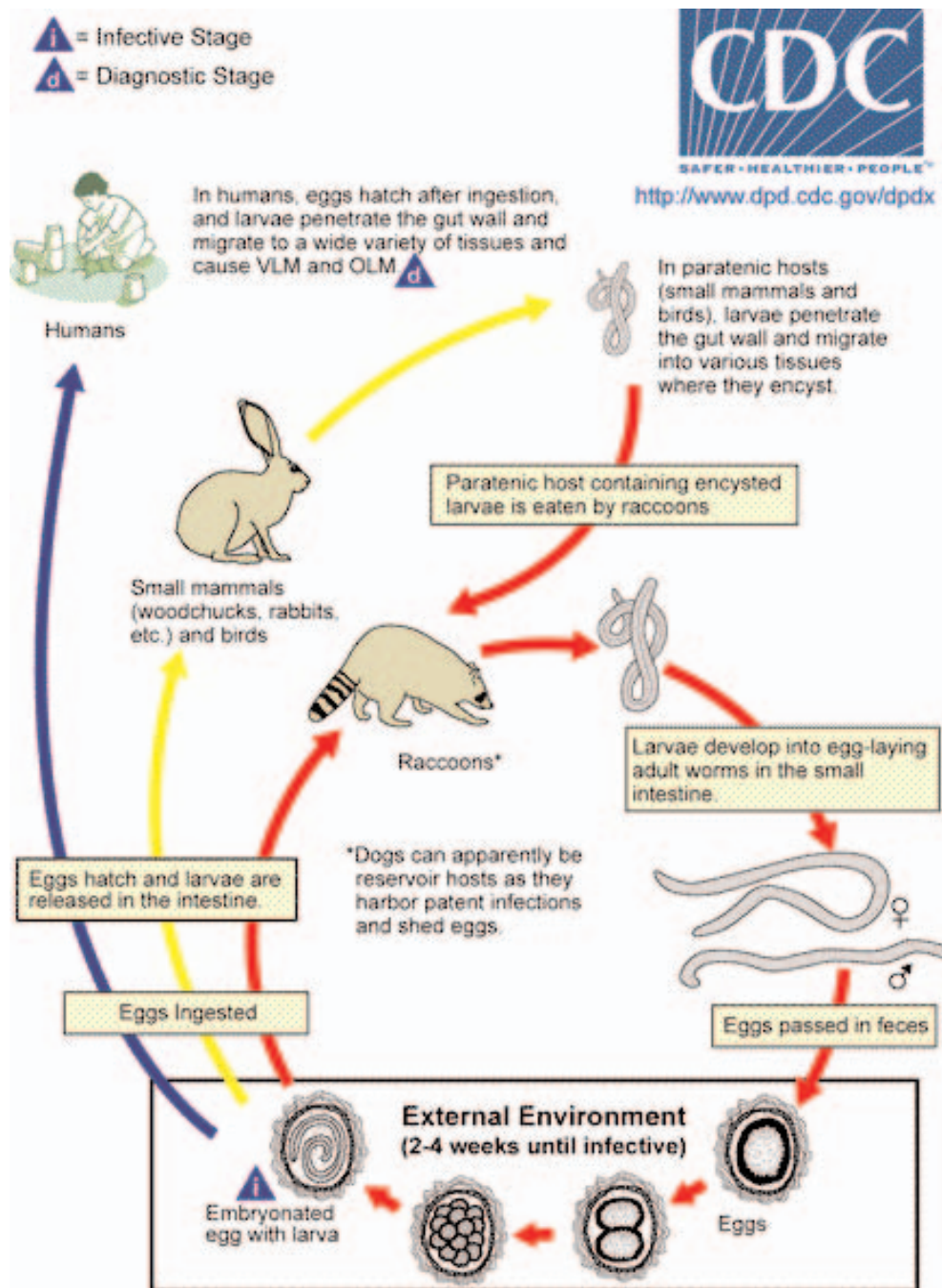
All of this chilling information about raccoon roundworm infection begs the question that also prompted the title of this paper: Are you at risk? There are specific human populations that are most at risk for this disease and that fall in two main categories: those who accidentally come in contact with raccoon feces and those who work directly with raccoons.

Wildlife rehabilitators are in the high risk category.

For rehabbers, daily removal of raccoon feces in raccoon enclosures often and then burning or burying it, or taking the waste immediately to a land-fill, is a major prevention measure. Prompt cleaning of cages to remove and destroy feces before the eggs become infectious (about 30 days after shedding) can reduce the risk of transmission. Heat is by far the best method of killing Baylisascaris eggs e.g. boiling water, a propane flame torch. Using gloves and a face mask when working around raccoons, washing hands immediately after being around raccoons, and decontaminating surfaces with a propane torch, boiling water or boiling Lysol are other measures that should be considered as standard operating procedures for any enterprise where contact with raccoons, or any wildlife species for that matter, occurs. Separate, dedicated cages are also recommended for raccoons, coupled with frequent fecal screens, and

newly admitted raccoons should be quarantined until appropriate anthelmintic treatment is completed and fecal parasite examinations are negative. ❖

Michelle Brown is a vet tech, CCWR member and has worked with raccoons and other critters at WildKind in Ft. Collins. For complete text and sources for this article, see our website, [www.ccwr-co.org](http://www.ccwr-co.org)





## NEW WILDLIFE REHABILITATION GUIDELINES NEED YOUR ATTENTION

By Kathy Konishi, Special Licensing

By now, all permitted wildlife rehabilitators and provisional wildlife rehabilitators in Colorado have been notified of the new CDOW guidelines and forms on sponsoring and provisional activities in their renewal notices and with the 2007 licenses that were renewed. I have personally communicated with many of you about this, as well as presented on this at the CCWR Symposium in February. These materials were developed to clarify the process and expectations regarding sponsorship responsibilities and provisional activities in order to provide direction to provisional license holders, wildlife rehabilitation sponsors, and the CDOW.

The foundation of these guidelines is drawn from several sources. First and foremost, the primary source for the development of these policy guidelines is *Chapter 14 – Wildlife Rehabilitation*. Second, the CDOW's general experience with sponsorship and provisional processes and results was incorporated. Third, I used my eighteen years of observations and experience with wildlife rehabilitators, the development of new rehabilitators (including both sponsors and provisionals) in the Special Licenses Unit. Fourth, the guidelines reflect processes used successfully by some rehabilitators.

The objectives of these guidelines are to help clarify processes and expectations involving the development of new rehabilitators — and ultimately to improve wildlife rehabilitation activities by helping wildlife and rehabilitators. Another objective was to address some of the issues that were routinely surfacing.

I strongly encourage each of you to review the materials since these will be affecting sponsors and provisionals — and rehabilitation in general. Here are a couple of examples:

- The Application Flow Chart shows the steps for people to get their provisional and full wildlife rehabilitation licenses. It provides an easy to use diagram of the licensing process, including state (Chapter 14) and federal regulations. Both CDOW and USFWS officers have expressed concern about some rehabilitators not understanding or following the regulations.

- Sponsors are encouraged to limit the number of provisionals that they sponsor to three or less in order to provide closer supervision. This will help the sponsor to have more time to train and supervise their provisionals, and help the provisional get more support. A few rehabilitators have tried to sponsor too many people at a time in the last few years, resulting in provisionals with less oversight and training – and impacts on wildlife, rehabilitators, and field officers' time.

- Sponsors and provisionals are strongly encouraged to limit the number of species and animals that the provisional rehabilitator admits for care. This can help the provisional develop more knowledge and skill, and provide better care for the animals. Both the CDOW and rehabilitators have expressed serious concerns with provisionals admitting too many animals in the last few years. This needs to be addressed by the sponsors and provisionals.

- Sponsors are encouraged to personally inspect the provisional applicant's facility using the wildlife rehabilitation facility inspection form prior to the District Wildlife Manager's inspection.

- Specific detailed learning plans should be developed for each provisional (examples are provided). This learning plan helps guide the provisional's training and experience, as well as help record accomplishments. A copy of the learning plan should accompany the provisional's license application.

Documentation from the sponsor about the provisional's rehabilitation knowledge and experience is required for provisional to be upgraded to wildlife rehabilitation status. A copy of the sponsor referral form and example of a completed form are provided. The CDOW considers this form to be more complete and effective than the letters that some sponsors have previously tried to use.

As I mentioned earlier, these materials were offered to help improve understanding and to avoid problems. Unfortunately, the CDOW has found that some rehabilitators do not seem to be using these guidelines or taking them seriously. They are still trying to sponsor too many provisionals and are not providing adequate training and supervision. As a result, there seems to be an increasing number of problems. I sincerely hope that rehabilitators will give more attention to these materials and work to improve wildlife rehabilitation for all involved. ❖

## Cedar Waxwing • *Bombycilla cedrorum*

### Order PASSERIFORMES - Family BOMBYCILLIDAE

The Cedar Waxwing is one of the most frugivorous (fruit eater) birds in North America. The name “waxwing” comes from the waxy red appendages found in variable numbers on the tips of the secondaries of some birds. The exact function of these tips is not known but might assist in mate selection.

It is 16.5 cm in length and weighs 32 g. It is smaller and browner than its close relative, the Bohemian Waxwing, which breeds further north and west. The tail is tipped with yellow or orange depending on diet. Adults have a pale yellow belly. Immature birds are streaked on the throat and flanks, and often do not have the black mask of the adults.

The Cedar Waxwing’s primary diet consists of berries, flower petals and insects. During the summer, food includes elm leaf beetles, weevils, carpenter ants, sawfly larvae, flies, cicadas, scale insects, and caterpillars. Ripe berries provide food in the fall and winter. It can survive on fruit alone for several months but is vulnerable to alcohol intoxication and death after eating fermented fruit. Unlike many birds that regurgitate seeds from fruit they eat, the Cedar Waxwing defecates fruit seeds.

Preferred habitat consists of trees at the edge of wooded areas, or “open” forests, especially those that provide access to berry sources as well as water. Waxwings are attracted to the sound of running water, and love to bathe and drink from shallow creeks.

In rehab, you might consider offering a Cedar Waxwing fleshy fruit (chopped or sliced apples, raisins or currants), meal worms and wax worms.



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## About *The Wild Life*

*The Wild Life* is a quarterly newsletter for members of CCWR. We encourage you to share this newsletter with volunteers, staff, and colleagues. We hope you enjoy the publication.

We strive to publish well-researched information that is up-to-date, interesting and helpful. However, information in *The Wild Life* is provided only as a service to our members and is not intended to be directive, nor applicable in all circumstances. Members are always advised to seek counsel from their veterinarian and DOW officials on matters applicable to their locale.

Suggestions and contributions are welcome. To submit an article or other contribution for consideration, please send it to:

CCWR\_4\_Members@msn.com

or

Raegan Morgan, CCWR Outreach Chair, 1913 Glenview Drive, Berthoud, CO 80513.

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## COULD YOU HELP?

There are several committees within CCWR that could use your expertise! If you would like to be more involved, call Deirdre Butler, President, (303) 823-8649 or e-mail us at: [ccwr\\_4\\_members@msn.com](mailto:ccwr_4_members@msn.com) for more information.

Also, *The Wild Life* is always looking for informative articles and tips that are helpful to rehabilitators. If you would like to share a story, case study or helpful tips, please do so!

# Zoonoses Alerts Around Colorado

## Zoonoses Alert #1 — Plague; Squirrel; Denver

Plague has been positively confirmed in the carcass of a dead fox squirrel found in the Park Hill area of Denver, near City Park. The state Department of Health is monitoring the situation. Contact CO-HELP (Colorado Health Education Line for the Public) at 1-877-462-2911 to report a dead rodent or rabbit. See the Colorado Department of Public Health and Environment for more information at: <http://www.cdph.state.co.us/release/2007/042507b.html>

As of April 27, the Department of Public Health and Environment have asked Denver metropolitan area residents to report dead squirrels, prairie dogs, other rodents and rabbits by calling the hotline above. The request comes after state laboratory results confirmed plague in a dead squirrel found near City Park in Denver.

We understand plague has also been found in a rabbit in the same Denver area.

## Alert #2 — Leptospirosis; Dogs; Castle Rock

*There have been 5 suspected and 3 confirmed cases of leptospirosis in dogs in Castle Rock. A number of veterinary practices in the Denver area have been seeing cases of leptospirosis with death occurring in patients (dogs) prior to receiving test results.*

Leptospirosis is a bacterial disease that affects humans and other mammals. It is caused by bacteria of the genus *Leptospira*. The bacteria are endemic to rat populations of numerous species across the world. Other wild species including squirrels and raccoons may also be affected.

In humans it causes a wide range of symptoms, and some infected persons may have no symptoms at all. Symptoms of leptospirosis include high fever, severe headache, chills, muscle aches, and vomiting, and may include jaundice (yellow skin and eyes), red eyes, abdominal pain, diarrhea, or a rash. If the disease is not treated, the patient could develop kidney damage, meningitis (inflammation of the membrane around the brain and spinal cord), liver failure, and respiratory distress. In rare cases death occurs.

Many of these symptoms can be mistaken for other diseases. Leptospirosis is confirmed by laboratory testing of a blood or urine sample. Leptospirosis ceased to be a

nationally notifiable disease in the USA in 1995; hence no recent data is available.

Outbreaks of leptospirosis are usually caused by exposure to water contaminated with the urine of infected animals and must enter the body via ingestion or direct blood contact via an open wound or cut. Together with urine, transfer of the bacteria can also occur via blood, feces, milk and through the placenta to an unborn infant.

Almost every 'routine' disinfection method will kill the bacteria (bleach, acids, alkalis, chlorines, domestic disinfectants, UV filtration, steam-cleaning, irradiation and desiccation). Any surface or object that has been desiccated (dried out completely for over an hour) will be safe, even if it gets wet once more.

What might this mean to wildlife rehabbers? First of all, talk to your veterinarian for advice. Secondly, pay close attention to proper hygiene and the use of gloves and masks. Urine is generally considered to be sterile but even newborns might be shedding the leptospira bacteria. Handling laundry contaminated with urine? Consider wearing gloves. Cleaning out a raccoon cage? Consider wearing gloves and a mask and to protect against urine being splashed on to the face. Again, contact your veterinarian to find out if she/ he have seen cases of leptospirosis in your area.

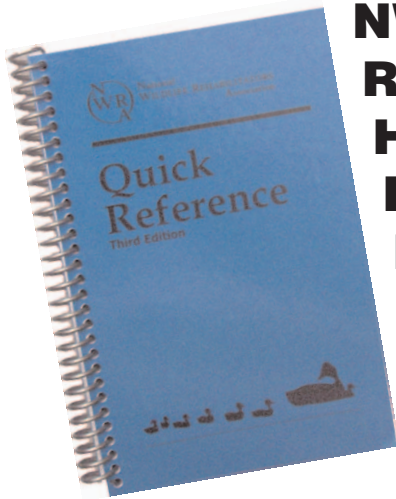
More information on leptospirosis can be found at a number of web sites including: [http://www.cdc.gov/ncidod/dbmd/diseaseinfo/leptospirosis\\_g\\_pet.htm](http://www.cdc.gov/ncidod/dbmd/diseaseinfo/leptospirosis_g_pet.htm)

<http://www.leptospirosis.org/>

### USEFUL TIP: Skunk Odor Remover Formula!

4 cups hydrogen peroxide  
1/4 cup baking soda  
1 tablespoon to 1/4 cup dish soap

The above when mixed, is said to be chemically unstable and must be used immediacy. This formula apparently works wonderfully!



## NWRA's Quick Reference is Handy to Have on Hand

Price \$9.50 (member)  
\$11.50 (non-member)

3rd Edition. Edited by E. A. Miller, DVM 2006 148 pages.

This book includes commonly used medical, anatomical and physiological information in a handy format.

### Contents include:

#### TABLES

- Nesting Bird Identification
- Development of Young Birds
- Mammal Age Determination
- Juvenile Raccoon Tooth Eruption
- Mammal Breeding Information
- Unit Measure Conversion
- Clinical Signs of Dehydration
- Fluid Requirements
- Energy Requirements
- Normal Temperatures and Pulse Rates
- Emergency Drugs
- Interpreting Avian Blood Values

#### CALCULATIONS

- Fluid Therapy
- Energy Requirements
- Drug Dosing

#### ANATOMY

- Anatomy Roadmaps
- Avian Skeletal System
- Mammalian Skeletal System
- Fracture Types
- Wing Fractures
- Gavage Diagram
- Parasite Ova

Visit <http://www.nwrawildlife.org/pubs.asp> to order your copy.

## It's time to renew your CCWR membership!

Continue to receive CCWR's quarterly newsletter, e-mail alerts and updates, an ever-expanding website, and other benefits!

### CCWR 2007-08 Membership Application/Renewal

(For membership through 3/31/08).

Check one:  New or  Renewal Individual Membership \$15  
or:  New Organization Membership \$20

Name: \_\_\_\_\_

Organization  
(if applicable): \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Phone (best place to reach you): \_\_\_\_\_

E-mail: \_\_\_\_\_

*In an effort to save resources, e-mail is CCWR's primary method of communicating. We promise not to share your e-mail address outside the organization. Thank you.*

Are you a licensed rehabilitator? Y N If Yes, how long? \_\_\_\_\_

Areas of expertise: \_\_\_\_\_

Other areas of interest: \_\_\_\_\_

I would like to be nominated to the Board.

I wish to help with the following sub-committee(s):

Newsletter  Education/Seminars/Symposium

Grants/Awards  Outreach

Nominating  Video/Library Maintenance

Other ways I can help: \_\_\_\_\_  
\_\_\_\_\_

Please send with check (payable to CCWR) to: CCWR Membership,  
c/o Raegan Morgan, PO Box 68, Hygiene, CO 80533-0068