REHABILITATION WILDLIFE COUNCIL

WILDLIFE JOURNAL

Journal of the Wildlife Rehabilitation Council Summer 1985

Sample



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Conference Announcement

Wildlife Rehabilitation Today

Basics to State of the Art

Key-Note Speaker
Dr. William Threlfall

Memorial University of Newfoundland, Canada

Sponsored by the

International Wildlife Rehabilitation Council

January 31 - February 2, I986

Amfac Hotel

Burlingame, California

The I986 conference will cover the many different facets of wildlife rehabilitation. Section titles include: Longterm Nutrition of Reptiles, Pre and Post Anesthesia Care of Raptors, Drug Dosages for Small Mammals, Criteria for Fluid Therapy in Mammals, Basic Parasitology of Vertebrates, Fund Raising and Building a Better Board, Housing For Songbirds, Zoonotic Diseases and Hygiene, Advanced Avian Hematology, Radiological Techniques for Diagnosis of Raptor Problems, Chemical Restraint, and Herp Medicine. One afternoon will be devoted to workshops, some offering hands-on experience. Titles include : Imping Feathers, Hummingbird Care, Necropsy Techniques, Setting Up a Basic Vet Lab., Marketing and Promoting Your Wildlife Center, Raptor Body Wraps and Splints. This is just a partial listing of some of the topics offered. Sunday morning will be split into two sessions, one section will be for the basic rehabilitator and the other half geared to the veterinarian and advanced rehabilitator.

All IWRC members will be receiving a brochure in the mail. Non-members may write to IWRC P.O. Box 3007, Walnut Creek, CA 94598 for more information on this informative conference

REHABILITATION WILDLIFE COUNCIL

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Vol. 8, No. 2 Summer 1985

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MARKETING & ADVERTISING SALES
WRC Journal - ADS
Rt. 1, Box 110
Fairfield, CA 94533

Printed by Platypus Press
Oakland, California

Cover Photo: Young Fox Squirrel. Photo by Jan Wild.

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*This article available as a reprint.

● The WRC Journal is designed so you can use a 3-hole punch and store back issues in a binder for easy reference.

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EDITORIAL . . . .

Name Change for the Wildlife Council

On August 11, 1985 the Board of Directors of the Wildlife Rehabilitation Council voted to change the name of the organization to the International Wildlife Rehabilitation Council. This decision was based on service trends within the organization and the field of rehabilitation. A few years ago, WRC was approached by rehabilitators in another state who wanted to organize a communication and information network within their own state. They wished to name their council the same as ours with the state name in front. Subsequently, we noticed that some rehabilitators have assumed that WRC is also a state council.

WRC was founded 15 years ago in California and grew rapidly in response to the need for shared information in the field. As early leaders in rehabilitation, individuals and organizations from nearly all of California's 52 counties joined and still form one-third of our membership. However, response to WRC's literature, conferences, and information-sharing forums has resulted in an international membership as well, representing six nations in all, with the remaining two-thirds of our members residing throughout the United States.

With the formation of NWRA (National Wildlife Rehabilitator Assn.) we tried to delinate the different functions of the two organizations. WRC was founded to develop and distribute information on wildlife rehabilitation and to further training efforts for people in the field. With our journal, annual conference, and skills seminars we feel we are providing services to people both near and far. NWRA was founded as an organization for the rehabilitator and one with an advocacy role in the field. They are especially interested in national lobbying for rehabilitators. They hold an annual symposium and produce proceedings from them. Both organizations have joint efforts together in the area of standards and accreditations.

With the exception of the Board Representive from the National Wildlife Rehabilitator's Association, members of our Board of Directors do continue to be Californians. This enables us to conduct ten meetings per year and maintain close communication. The concensus gained assures that material is uniformly presented and contains information that we all feel is current. Of course, we must frequently go outside the Board to consult other experts in the field for assistance. We are pleased to be able to continue expanding the programs we offer our membership.

Since 1984 we have been considering expanding the scope of the *Wildlife Journal* to include articles on wildlife rehabilitation outside of the United States. We have been able to welcome international speakers to our annual conference to address efforts in their homelands. Our membership in foreign countries has increased, and we are seeing increasing demand from Societ bloc countries for informational literature. After updating the format of the Journal in 1983-1984, we began to entertain the notion of soliciting articles about wildlife rehabilitation in other countries. We are confident that including such items concerning "non-native" species will not displace the information that readers in the United States look forward to. I think it will be interesting reading to see how foreign rehabilitators cope with the problems they encounter!

It is not likely that we will be holding our annual conference in a foreign country in the foreseeable future. However, WRC has begun to travel with our Skills Seminars. The Basic Wildlife Rehabilitation 1AB class is now available to groups both in the U.S. and abroad with careful budget considerations. These classes do not require the large attendance that a conference would in order to meet expenses.

As the field becomes older, more established, and in demand by the public, we are receiving increasing contact from wildlife care groups in areas where none has existed before. We look forward to serving more and more of these new out-of-state and international members.

Jan White

REHABILITATION WILDLIFE COUNCIL

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Mourning Dove *(Zenaida macroura)* Natural History and Care in Captivity

Susan Brain
Wildlife Rescue, Inc.
Palo Alto, California

Photos by Samuel Brain.

INTRODUCTION

Mourning Doves are classified in the order Columbiformes and family Columbidae. Synonyms for this bird include the Carolina Dove, Grayson's Dove and simply wild dove. Its species name is *macroura* and means "long-tailed" in Greek. The name mourning dove is derived from the cooing sounds made which are clear and melodious but have a somewhat sad tone.

Probably the most typical bird in the United States, it is truly American since it nests in every state of the continental U.S. This gentle, unobtrusive bird is so adaptable it is equally at home in wooded areas of the East, in open prairies, and in the Western mountain regions. Two sub-species are recognized: an Eastern and a Western. It ranges in size from 11 to 13 inches (28 to 33 cm). Approximate weights are as follows: nestlings range from 10 to 49 g.; fledglings from 50 to 79 g.; juveniles from 80 to 99 g.; and adults from 100 to 130 g.

The range of this dove covers North and Central America from Southern Canada to Panama. It is a summer resident in the more northern part of its range. During the winter months, they concentrate in the southern half of the United States.

Favored habitat for this species is open woodland, cultivated country with some trees or bushes, farmland, weedy fields, arid areas, semi-desert areas within reach of water, as well as parks and suburban gardens.

DESCRIPTION

Adult: The adults of both sexes look similar. They are small-headed, short-legged, swift-flying birds with pointed wings and long, tapered tails. Their slender body is buffy-brown with darker wings. Black markings occur on wing coverts and scapulars. Primaries are blackish with narrow pale edgings to the outer web. The central tail feathers are drab, and outermost white. The breast has deep vinous pink shading into buff on the lower breast and belly as well as under the tail. A patch of pink, purplish pink and/or bronze iridescence is found on the sides of the neck. There is a dab of black below the ear. ring is light blue or greenish blue and the irides are dark brown. The bill is blackish and the legs as well as the feet are dull red or purplish red. The female is rather paler and duller with less iridescence on the side of the neck and little or none of the rich buff and pink hues on the head and breast. Her tail is also slightly shorter.

Juvenile: The juvenile is like the adult female but duller without the iridescence and with only a faint black spot before the ear.

Mourning Doves can be recognized by the sound of their wing beats whistling as they fly or their distinctive "cooing" notes. They throw their tails up just after alighting as a flight-intention movement.

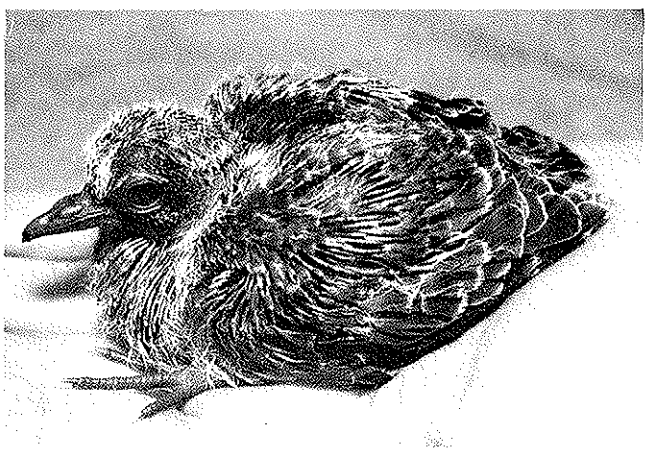
The post-juvenal molt is completed during the months of June through October. Adults complete their post-nuptial molts between June and November.[14]

The life span can be quite long, up to 17 years in captivity and records show individuals living 10 years in the wild. However, in their first year, mortality rates have been shown to be about 70% due to hunting and other causes. Adult mortality rate is about 55% annually. The estimated annual kill by hunters is 30 million with a population of about 400 million.

These birds are believed to mate for life.

NATURAL DIET

About 98% of the natural diet are seeds. Food chiefly consists of various annual weeds such as Turkey mullein, Fiddleneck, California Poppy, Starthistle, Redmaids, mustard, foxtail grasses, and Yellow wood sorrel. They



Young Mourning Dove

also will eat cultivated grains such as wheat, corn, rye, oats, barley, buckwheat, and millet. The insect portion of their diet includes small snails. They feed on the ground and instead of hopping around like other birds, doves walk about as they feed, their tiny heads constantly bobbing up and down. They are found in pairs, small loose-knit parties and single birds (whose mates are incubating or brooding). Watering places are visited frequently.

BIRTH AND YOUNG

Courtship: Mourning doves are noted for their tender "billing and cooing" during the spring breeding season. The advertising coo consist of a faint di-syllabic coo followed by two or three much louder coos. During the bowing display, the male doves characteristically run toward or after the female with head held low and body raised on the tips of the toes. He then stops, just behind her, with lifted head and thickened neck, stands quite still and coos. The display flight consists or towering upwards, often with noisy wing beats, and then gliding downward or in sweeping curves on wide-spread wings. Copulation is preceded by billing and displacement preening behind the wings.

Nesting: The nest consists of a frail platform of twigs, sometimes with finer twigs as a lining, placed at a moderate height in a tree, bush, cactus, stump, fence, or low ledge. Where trees are scarce, they may place nests on the ground. The nest measures 7-9 inches across and is so frail it quickly blows away during storms or high winds. Nestlings do fall out of them.

The breeding season is very prolonged. It begins in December to February in the southern United States to late April in the northern part of the country. It ends in August or September, depending on latitude. These birds may have 2 to 5 broods a year again depending on latitude and climate. They lay 1-4 eggs, usually 2, and they are pure white, elliptical to oval, or abruptly pointed. The surface is smooth and slightly glossy. Incubation is 14-15½ days with brooding by both sexes.

The birds, being altricial, hatch out naked, blind and helpless. The nestling has down which is sparse, stringy and off white/yellowish in color with blackish skin showing through. The base of the bill is swollen and sensitive during this time. They hatch with an egg-tooth on their upper beak. The egg-tooth is a small, hard, white spot (excrescence) used to make a small "pip" or break in the shell when hatching. The egg-tooth drops off within a few days of hatching.

Doves usually feed their young within an hour or two of hatching. Nestling doves do not gape, instead the parent takes the nestling's soft bill into his or her own mouth and regurgitates "pigeon's milk" from the crop. It consists of cells from the lining of the crop and digestive juices containing enzymes from the stomach. It looks and smells like cheese or curd and contains 13-18% protein, 7-13% fat, and is rich in vitamins.[2] The nestling, when its bill is taken by the parent pushes further until it reaches well into the parent's mouth. The latter disgorges pigeon's milk and any soft foods or small seeds the adults have eaten. By the time they are half-fledged they are getting whatever the parents have eaten and just a trace of pigeon's milk. They fledge at 13-15 days of age. They may return to the nest to roost for a few nights but within a week are on their own. During this period, the male takes charge of them while the female is incubating another clutch.

CARE IN CAPTIVITY

Housing:

Very young nestlings: (no feathers yet)

At this age, they like humid conditions in the nest. A small babyfood jar or container filled with cotton balls moistened with warm water works well. Make sure the birds don't get wet. Place the container with the nest in it on a heating pad. Place one layer of toweling between the two and set on low. This set up can be inserted into a pet carrier or stronger caging if there is any possibility of disturbance by a cat. Temperature in the nest should be about 90 degrees F for unfeatherd birds. This temperature can be decreased as soon as the feathers start to appear. At night, if the room gets too cold, put on a medium setting. Use good judgement. If the birds are panting and have their wings splayed out, they are too hot. Temperature should be monitored with a thermometer.

Nestlings: (up to 14 days)

Birds can be housed in a variety of man-made nests. Shallow cereal bowls, plastic margarine bowls, and kleenex-lined berry baskets are some of the items that have been used successfully. Make sure that the nestlings are sitting high enough in the container so that they can dump their droppings over the edge of the "nest", just as they would do in the wild. Change the nest lining as often as it is required.

Fledgling: (14 days and older)

Once the bird's legs and toes are strong enough to allow it to perch, move into larger quarters. Cardboard boxes are regularly used with success. The top and one side of the box are replaced with fiberglass screening. They are attached with duct tape or small binder clips. Be sure to make an access door. Line the base of the box with aluminum foil to stop the bottom from becoming damp due to water spillage. Then cover the bottom with newspapers and finally a layer (or layers) of paper toweling to absorb droppings and spilled food and allow the bird's feed some traction. The birds must be encouraged to perch whenever possible. Using a smooth-surfaced, natural branch, span the length of the box. The perch should be high enough so that the bird can walk under it and yet high enough to accommodate their long tails. They sometimes are a little slow learning to fly up to perch. It may be necessary to place them on the perch for the first few days to give them the general idea. Doing this just before dusk will keep them on the perch for the night. Place wild bird seed and water in untippable containers (i.e., weighted bowls). If you use unweighted bowls (i.e., tuna cans or jar lids), weigh them down with a few pebbles. Water levels should be deep since doves submerge much of their beaks in order to drink. Do not place food and water under perches.

Juvenile: (3 weeks and older)

Increase box size to as much as is practical. Use stereo or TV boxes. Place the box by a window and depending on the local climate, open the window to begin the process of acclimatization. Obviously, the window must have a screen to keep out local predators. *Natural* sunlight is required by birds in order to produce Vitamin D_3 unless it is provided by the use of avianized vitamins. Sunlight coming through a glass window will not enable the production of Vitamin D_3. Once the birds have been

self-feeding for at least one week they can be moved into an aviary.

Aviaries should be at least 6' x 8' x 6'. A larger aviary is desirable. The aviary should have a covered area near the top or highest perch where the birds can "hide" or seek shelter. Perches should be natural, about ½-¾" in diameter and placed away from the food area. Doves will scatter their seeds around the seed dish. Make fresh water, lots of bird seed, and grit available.

These birds can severely damage their feathers on aviary wire. Covering the walls with fiberglass screening is a good way to prevent such damage. The enclosure can also be made with solid siding to prevent feather damage. Additionally, they will bang their heads on aviary ceilings and can become bald quickly. To prevent this, drape a well secured sheet along the ceiling so that they hit the sheet and air space instead of the solid ceiling. Another common cage injury is wrist trauma again from hitting wire or solid siding. Placement of sheets along the inside of any wire surfaces can help alleviate this problem. However, when the birds are being caught, they will bang around. The use of towels to catch and handle them is advisable. It may also be wise to attempt any "round-ups" at night. The same concept can be used when removing birds from boxes, i.e., darken the box with a towel before attempting to catch the bird.

Feeding:

Table I

Basic Nestling Diet Used for Doves

1 jar (3½ oz.) Strained Baby Meats (Gerbers or Beechnut) - not liver or pork
1 cup of dry Feline Science Diet Maintenance Formula finely powdered in blender
½ teaspoon of Super Preen vitamins
½ teaspoon of Brewers' Yeast (not baking yeast)
Add enough water to the mixture to make it the consistency of apple sauce.

or

Alternate Dove Diet

¾ cup of ground up Science Growth Diet
¼ cup of Hi-Protein Baby Cereal
1 tablespoon of Brewers' Yeast
1 tablespoon of Vionate
1 jar of baby egg yolk or 4 oz. of egg yolks
1 tablespoon of unflavored yogurt
Add water to make a gruel-like consistency

Nutritional Data

Basic Nestling Diet	Alternate Dove Diet
% Protein (wet) — 10	9.6
Ca/P ratio — 1.36:1.0	1.2:1.0
Kcal/gram — 1.1	1.2

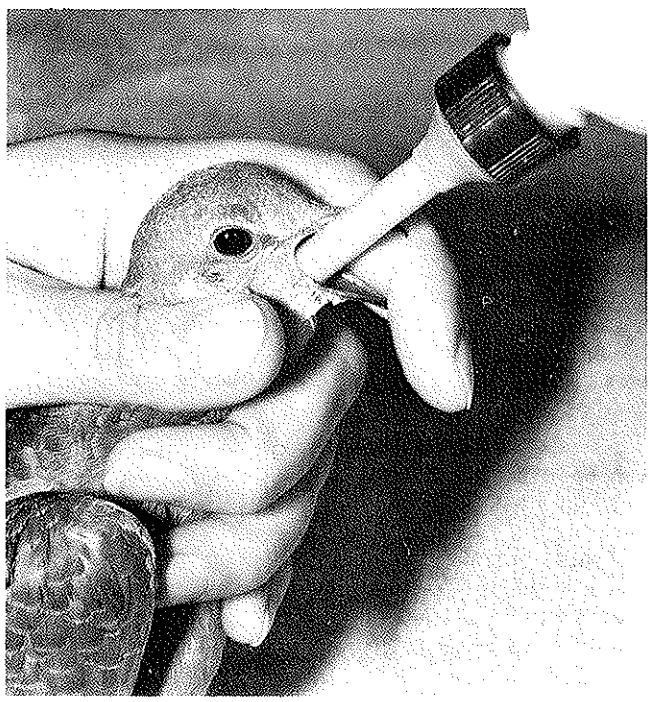
Young columbiformes require special diets and feeding methods. They do not "gape" for food as many other birds do, but instead depend upon "sucking" as their sole means of natural feeding. Consequently, they must be fed in a particular fashion that is consistent with their natural history.

Nestlings: (up to 14 days)

For birds this age, the most common method of feeding is with a plastic eyedropper or a dental irrigating syringe. The eyedropper should have a tapered smooth end. Feed the formula as presented by warming the portion to be fed to the bird(s). Locate the glottis opening in the base of the tongue. Feed formula, avoiding this airway and take care not to over fill the bird's crop, or in any other way cause aspiration. These birds tend to struggle and squirm about and care must be taken to handle them gently or bruising and/or swelling can occur. This is done by firmly prying open the bill using the thumb or fingernail while holding the head upward and neck extended. The dropper is then inserted on the right side of the mouth past the glottis.

When using the dental syringe method, a Monoject 412 has been found to work well. The syringe tip must be cut to a length of about 2 centimeters and then filed smooth. It is then filled with food and used in the same manner as the eyedropper. This method is a clean one and it allows for food intake to be measured accurately. It has been found to work well with young nestlings.

The food should reach the crop which in this species is located at the base of the neck in front of the chest. The amounts fed depend on the size of the bird and how empty the crop is at feeding time. See Table II. While the crop is a pouch-like extension of the esophagus that can store temporarily a lot of food, it should never be overfilled. Overfeeding can result in regurgitation (along with the possibility of aspiration of food) or the crop tissue becoming too full or swollen. If the nestling formula is too thick and dehydration results, food may stay in the crop resulting in further complicating the medical condition of the bird. If this occurs, feed the bird only fluids until the dehydration is alleviated and the crop is able to move food in the GI tract once again. *Note:* the level of dehydration can be monitored in nestling birds



Dove being fed using modified pet nurser.

generally by observing the skin over their abdomen area. When they are dehydrated, the skin will be wrinkled. As they return to a normal hydration state, it will regain the normal smooth appearance.

Fecal Droppings: The feces should be frequent and of consistency like the food being fed. The color is brown with a white patch (urinary waste products). Always check the vent from which the droppings leave the body to see that it is clean and unclogged. If the bird cannot urinate and defecate, it will die. In general, green droppings indicate starvation or illness. Loose stools may indicate digestive problems. If the bird has abnormal droppings, seek further assistance.

Fledgling: (14 days and older)

As the bird becomes older, the time between feedings will lenghten from one to two hours as the amount taken at each feeding increases. The bird feedings are gradually spaced up to every four or five hours and then to three times a day. At this stage feeding may be easier if a "pet nurser" bottle (2 oz.) with an eyedropper attached to the top is used. Seeds can be added to the diet by cutting more off the end of the eyedropper (to enlarge the opening) and adding *hulled millet* to the nestling diet. After one week, decrease feedings to twice a day. Offer seed and observe for signs of self-feeding. Then try to drop the morning feeding and if the bird begins to self-feed continue weaning them off formula gradually. If the droppings are too green and/or sparse, go back to one feeding. Doves are variable when it comes to the age that they will begin to self-feed. If an older fledgling absolutely refuses to self-feed (this tends to occur with the tamer birds), put in a juvenile to show the way. Adults generally cannot be used because the fledglings pester them by constantly begging for food.

Juvenile (3 weeks and older)

During this time, the birds will go through their first molt (June-October). They should be self-feeding and eating wild bird seed. Wild bird seed contains about 8-9% protein. Canary seed can be added to this mixture to increase the protein to 14%. Since doves go through their first molt soon after they become self-feeding, it is important that essential vitamins and amino acids be included in the diet for feather production. A good avianized bird vitamin such as Super Preen can be added or a more complete supplement, such as Gevral Powder. Grit should be provided as an aid to grinding and digesting the seeds that are eaten. Fine oyster shell and quartz are ideal and can be obtained in pet shops. Oyster shell is also a source of calcium for the birds.

Birds should be provided with water in a sturdy dish at all times. Avianized vitamins can and should be added if for any reason the bird is in an indoor facility and does not receive natural sunlight on a regular basis. The water should be changed daily or if it becomes soiled.

Natural foods are an excellent way to introduce the birds to the foods they will eat in the wild. Depending on locale, find out what seeds in the area can be collected and put into aviaries for them. It is important that seeds and plants not be collected randomly, some are poisonous to humans and could be accidently obtained by children, etc.

Handling: This species of bird is particularly prone to feather damage by handling (usually done while feeding). The wing coverts are often displaced and by the time they fledge they can look pretty scrawny. Damaged

Table 2

Feeding Chart for Hand Rearing Mourning Doves

Age	*Amount*	*Time Interval*	*Feedings/Day*
Newborns	2-5 ml	3-4 hours	5
Nestlings	5-10 ml	4 hours	5
Fledglings	up to 15 ml	4	4*

* Wean to three feedings daily after five days on this schedule. After five additional days, wean to twice daily feedings (am & pm).

feathers will often preclude waterproofing and decrease insulation. When holding to feed, it is recommended that handlers use light weight cotton gloves, such as the ones used by photographers when handling negatives, to prevent transference of sweat and oils. Using a lightweight towel to wrap up the bird while handling will also accomplish this objective.

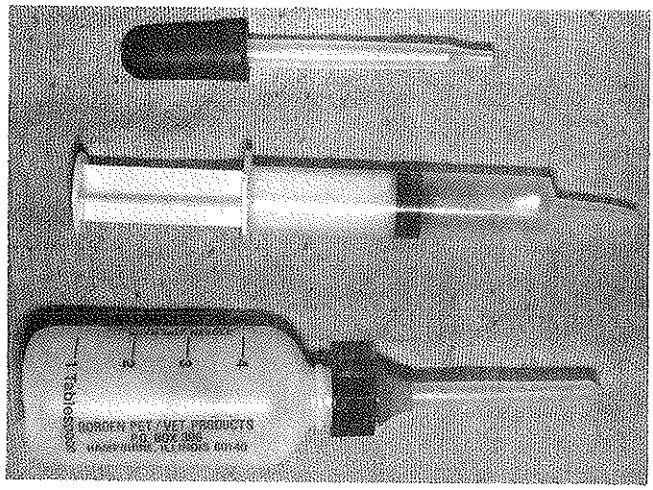
This species will tend to bolt when being handled. They do this with explosive energy and that is when the feathers tend to fly. Make sure the handler has a secure grip and is prepared for such an action. In the event of one of these episodes, never hold the base of the tail as the bird bolts or all the tail feathers may come out.

RELEASE

Proper release is a function of timing, location, and weather. The bird should be fully acclimated which can be accomplished by 1-2 weeks in an outside aviary. It should be self-feeding and at a good weight for its age (90g and up). It should fly well and therefore have a normal packed cell volume of at least 45%. (Anemic birds will not have the stamina for sustained flight.) It should have good feather structure, i.e., few or no broken primaries or rectrices. Doves brought in with their tail feathers missing for whatever reason should be held. If they have come out at the base, they will regrow in 10 to 14 days. The bird should be waterproof.

Hand raising doves requires that they have regular contact with people when they are very young. As they

(continued on page 10)



Feeding Equipment: Plastic eye dropper, dental irrigating syringe, and modified pet nurser.

Rehabilitation Notes: Fox Squirrel *(Sciurus niger)*

Bill Stone and Sandy Fender
Alexander Lindsay Junior Museum, Walnut Creek, California

INTRODUCTION

The fox squirrel was originally described by Linnaeus in 1758 from a black specimen found either in Georgia or the Carolinas, hence the *niger* in its scientific name. Fox squirrels are members of the order Rodentia and family Sciuridae. There are currently 10 subspecies recognized.

Fox squirrels were once found over most of the eastern United States but are now primarily found in the mid-atlantic states, the south, towards the midwest and up into Michigan. Populations of introduced squirrels occur in the West (California, Washington, Oregon, Montana,) and British Columbia, Great Britain, South Africa, and Australia.

Fox Squirrels prefer open stands of hardwoods or open pines such as the longleaf pines of the south. Outside of its normal range, the squirrel appears to be able to adapt well to its surroundings and to humans, often appearing to be quite tame and becoming a nuisance.

DESCRIPTION

- *Adult:* Total length is 17.7 to 27.5" (45 to 70 cm) with a tail length of 7.8 to 13.0" (20 to 33 cm) and a hind foot measurement of .19 to .13").5 to .8 cm). Weights range from 696 g (1.53 lbs.) to 1233 g (2.72 lbs.) with an average of 800 g (1.76 lbs.).
- Fox squirrels are the largest of the tree squirrels. There are not pelage or size differences between sexes. There are, however, variations among species ranging from all black, silver gray upper body with white underside to a grizzled rusty brown above and orange below. Their short, thick, rounded ears distinguish them from gray squirrels, and the long, bushy tail is an important unsulating device.
- The basilar length of the skull is approximately 66 mm (.26"), with well-developed postorbital processes. Due to the accumulation of uroporphyrin in teeth, bones and soft tissues, fox squirrel bones and teeth have a pink tint and fluoresce bright red under long-wave ultraviolet light. This accumulation makes the species unique among mammals. The dental formula is 1/1, 0/0, 1/1, 3/3 = 20.
- Molting in fox squirrels is twice annually. The spring molt generally begins starting with the head and progressing posteriorly. Mid-September marks the start of the fall molt, beginning with the flanks and moving anteriorly. Females with young molt after the young are weaned, and the young themselves begin to molt when they are approximately three months old.
- Longevity in the wild is about 4.5 to 6.5 years, with a mortality rate similar to the gray squirrel (about 50% annually). In captivity, they have lived as long as 13 years. Age in the wild can sometimes be determined as follows: males with pigmented, descended scrotums are 11 months or older, females with pigmented teats (indicating pregnancy) are 11 months or older.
- Fox squirrels are diurnal. They spend more of their time on the ground than the gray squirrel and are not as agile in trees as the gray. They are able to swim well.
- Enemies: Man, great horned owl, hawk, coyote, fox, dogs, and cats.
- Normal Body Temperatures: 102.8° F (40.6° C).
- Vocalizations: Clucking sound, grunt, cough, churring and chattering.
- Senses: Excellent hearing and eyesight; has color vision with good acuity; keen sense of smell.

NATURAL DIET

The list of natural food items for fox squirrels is long and varied, and they can readily adapt to unusual food items. Food varies with geography and the time of the year. This species, however, generally depends on most crops such as acorns, beechnuts, hickory nuts, walnuts, corn, and soybeans. They readily eat fruits, berries, buds, seeds, and some bark.

Photo by Jan Wild.



Four week old squirrel nursing from a pet nurser.

The fox squirrel will also eat some adult and larval insects, as well as occasional soil, apparently for mineral content. For further specific lists, time and nutritional contents, see Flyer (1982); Nixon, et al. (1968); Nixon (1980); Short & Duke (1971); Short (1976); Havera et al. (1976); Havera (1977), (1978), (1979); Havera & Smith (1979); Havera & Nixon (1980); Reichard (1976); Harty & Stains (1976); and Husband (1976).

BIRTH AND YOUNG

- *Gestation:* Approximately 44-45 days. Females come into estrus in mid-December or early January and again in June. The young are born in mid-March and July. Yearling females usually have only one litter, while adult females normally have two litters a year. Females attain sexual maturity at 10 to 11 months of age and usually produce their first litter at 1 year.
- *Litter Size:* Average litter size is three but varies with season and food conditions.
- *Birth Weights:* 14 to 18 grams (Uhlig 1955).
- *Birth Length:* 50 to 60 mm (.19" to .24") (Allen 1942).
- *Appearance:* Hairless, blind, ears closed; pink tinge on purplish skin; no teeth, claws well developed; vibbrissae on the chin and nose.
- *Development:* slow compared to other rodents. Eyes open at 4 to 5 weeks; ears open at about 6 weeks. Lower incisors erupt at 3 weeks, upper incisors at 5 weeks. Hair begins to appear on the dorsal surface at 8 to 10 days. (Brown & Heager 1945).
- *Age Weaned in the Wild:* 8 to 9 weeks of age; not self-supporting until 12 weeks old.
- *Parenting:* Female is devoted and solicitous to young. Male is not allowed to be around young during rearing because he is often a threat to their welfare.

DIET

- Newly received infant: Should be warm and free of any external parasites. Check for dehydration by carefully pulling up the skin between the shoulders. If the skin stays up for several seconds before returning to its normal position, treat for dehydration. First feeding should be one of an electrolyte solution for all newly received infants. Dehydrated squirrel babies may require multiple feedings of electrolyte solutions. Solutions such as Pedialyte, Lactated or Acetated Ringers, can be given orally. A homemade solution can be made by mixing 1 teaspoon salt, 1 tablespoon table sugar, and 1 quart warm water. Formula is then introduced by mixing fractions with the solution (¼, ½ and onward).
- Formula: Currently, the formula being used is Esbilac or Unilac mixed as directed by the manufacturer. Use either a 1cc syringe because it reduces the risk of aspiration, or a pet nurser nipple attached to a syringe for the best control of flow and amount. Some young will strongly suck on the syring; others may lap.
- Wash syringes thoroughly between each feeding. Clean the infants of any misplaced formula.

WEANING PROTOCOL & DIET

- As the squirrel eats more, lengthen the time between formula feedings in order to wean. Solid foods can be introduced when the eyes are open. While natural foods for this species are fairly easy to acquire, the calcium phosphorus ratio in fruits and nuts can soon cause metabolic bone disease in the squirrel. If the diet is to be a variety of natural foods, the proportions and types of food should be examined to ensure adequate amounts of calcium and a proper ratio of calcium to phosphorus. Foods fed to them at this stage include corn on the cob, squash, broccoli, carrots, apples, grapes, bananas, fruit tree leaves. Cracked nuts: walnuts, acorns, pines, etc. can be offered. Nuts must be raw and unsalted. Lab blocs made for rodents are balanced and provide a hard surface for them to chew on. They can be given as a staple with natural foods in lesser proprotions (less than 15%) if the rehabilitator prefers not to analyze the diet. High quality puppy or cat kibble have also been used as a stable diet item.
- In preparation for release, foods found in the area should be offered. Once the squirrel is eating well on its own, is stripping bark off branches and getting nut meats out, it needs to be able to crack a walnut. According to Havera (1968), a critical period for opening walnuts occurs at 16 weeks of age, after which they may not learn how. The animal should be able to crack hard nuts such as walnuts on a regular basis prior to release.

STIMULATION AND ELIMINATION

- Young squirrels, as with other young mammals, need manual stimulation prior to each feeding in order to facilitate urination and defecation. Moisten a soft tissue, cloth, or cotton ball with warm water and stroke the genital region. This practice can be discontinued as it becomes apparent that they are passing waste products on their own. These products will be seen with regularity (most will urinate after each feeding and defecate 1-2 times daily). If not, seek further assistance.

HOUSING

- *Newborn to five weeks:* These animals can be housed in an incubator, aquarium, a cardboard

FEEDING REGIMEN

Age	*Amount*	*Frequency*	**Nite Feeding*
Birth to 1 week	½ cc to 2cc's	every 2 hours	one
1-2 weeks	2cc's to 4cc's	every 2 hours	maybe
2-3 weeks	4cc's to 6cc's	avery 3 hours	no
3-4 weeks	8cc's to 10cc's	every 3-4 hours	no
4-6 weeks	10cc's to 15cc's	every 4 hours	no
6-8 weeks	15cc's to 18cc's	every 6-8 hours	no

*Nite feedings are defined as a feeding given after 11 p.m. Morning feedings begin at sunrise or within an hour later.

These are just guidelines. Some infants will take more, some less. With infants under two weeks, milk can be visualized in the stomach as it gets full. Weigh the animals daily. After an initial weight loss, they should show a fairly steady gain. Keep records, don't rely on memory.

box, or cardboard pet carrier with the bottom holes taped. A heating pad, set on low, should be placed under the container covering a portion of the nest area and wrapped in a towel if too much heat penetrates the housing unit. Too much heat can cause skin and hair problems as well as hyperthermia. Example of nesting material include cloth diapers, T-shirts, receiving blankets and soft facial tissues (the latter can be "built" into a nest form and replaced easily as soiled).

- At five weeks, squirrels can be transferred to a cage. At this time the cage should be small enough to be kept warm by using a heating pad in the manner previously discussed. The animal may be frightened at first and hide or cling to the sides. Place a lightweight towel over the cage to afford privacy and to keep drafts out. Sturdy branches can be added for play, eating, and hiding. Transfer part or all of the old nest from the previous cage. A hanging nest can be made by tying four corners of a small towel through the top of the cage. When the squirrel starts using this as its bed regularly, remove the other nest.
- Squirrels like to hide food in the cage. Caching behavior usually develops when they are 7.5 weeks old. At this time, provide a container of dirt large enough to allow the animal to take dust baths and hide foods in it. The dirt should be pesticide free and be changed daily as it will contain spoiled food as well as excrement. Leave nuts or other foods that do not spoil.
- Squirrels can learn to use lab animal water bottles which is nice for the rehabilitator since bowls of water tend to frequently get spilled and soil the cage. If bowls are used, heavy ceramic or weighted bowls work best.
- Increase the size of the cage as the animal grows and becomes agile. It can be housed outside in a sheltered area at about 8 weeks of age. Additional branches and hollow logs will create a more natural environment. A wooden nest box with hinged or removable front end will allow for cleaning. The entrance should be off-center to provide privacy. It should be placed on a platform up off the bottom of the cage. Height can be considerable as long as they are climbing well.

SPECIAL CARE PROBLEMS

- As with any small mammal, aspiration can occur if the animal takes in too much formula. Select nipples with smaller holes in them should formula come out the nose. By applying a firm hold on the syringe plunger, one can control how much formula the animal takes to some limited degree. When very hungry, they are more likely to really pull hard on the nipple. If aspiration occurs, remove the feeding apparatus, wipe formula from the nose (so it will not be inhaled). Observe to see if the animal is breathing comfortably. If it seems that more formula is still in the nostrils, take a small bulb syringe, squeezing it only half way, and place it on one nostril at a time. Repeat this two or three times until nose is clear. If any breathing problems develop (i.e., heavy or raspy), contact a veterinarian.
- Genital sucking can be a real problem for young squirrels. If bruises begin to appear on hairless squirrels, littermates are probably sucking on them. Be attentive when raising male squirrels; genital sucking can cause swelling and sometimes blockage. If this occurs, temporarily separate the squirrels involved. If the problem continues, the male is sucking on himself. Determine that he is able to urinate. Sometimes this behavior occurs as a result of insufficient formula per feeding, an inadequate number of feedings or lack of enough sucking during the feedings. A rubber pacifier or standard baby nipple may be helpful.
- Diarrhea may occur as a result of overfeeding or changes in the formula. Substitute rehydrating solution for the next two feedings, then reintroduce the formula gradually by adding it to the rehydrating solution. Kaopectate has also been used with some success in this species.
- Stringy towels or towels with holes in them can cause strangulation or inhibit circulation. Towels should be free of human hair which can cause the same problems as well as intestinal disorders if ingested.
- Eyes that swell before they open should be seen by a veterinarian who will determine the course of treatment. Generally, the lids will be opened, the area cleaned, and instructions for further care given to the rehabilitator.
- An infant will sometimes make a high-pitched scream when frightened or when first using its voice.
- Metabolic bone disease is common when diets deficient in calcium or diets that have improper calcium:phosphorus ratios are fed. Young growing animals need adequate sources of these minerals which nuts and fruits do not provide.

RELEASE

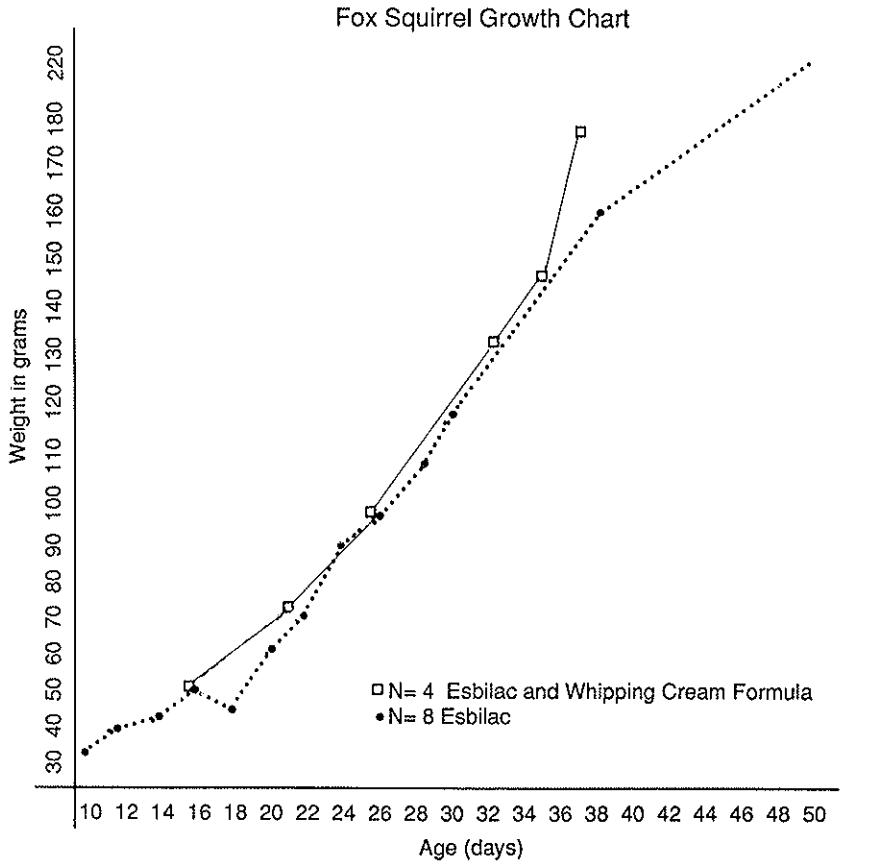
- Fox squirrels are territorial and resident squirrels will often chase away new squirrels, so this is a prime consideration when selecting a release site. Other considerations include: seasonal food supply, water, proximity to commercial crops which could result in the animal being trapped, shot, or poisoned. Care should be taken *not* to introduce this species into areas where the western gray tree squirrel is the normal resident squirrel and where fox squirrels do not currently reside.
- The squirrel should be fully acclimated, eating natural foods, and shy of people. It should be capable of cracking a whole walnut. Squirrels raised by rehabilitators and left alone after weaning should develop a shyness for people, especially for people who were not involved in the hand feeding process. It is important to raise them in groups rather then singly to promote normal behavior development and encourage interdependence rather than animal-human interactions. Fox squirrels will play with each other and engage in activities that are common to juveniles in the wild. Continued handling by humans will be detrimental to the release conditioning. Adequate exercise in captivity will ensure that the squirrel is able to climb a tree and flee from a predator. It goes without saying that prey species, such as fox squirrels should not be raised with positive interactions between them and domestic predators (dogs, cats).
- The release weights vary somewhat but are generally over

350 grams.

- The packed cell volumes are approximately 40% with total protein readings of 5.0 in young fox squirrels.
- Diurnal; release during the day.

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(continued from page 6)

mature, it is important that the contact be reduced to a minimum to allow them time to develop fear of humans and their sounds. By placing the birds in an outside aviary, they acclimate not only to the weather, but also to the sounds that are "normal" in the outside environment. By the end of two weeks, they should flee at the sight of anyone coming to the aviary whether to feed them or not. They should also show alarm at the approach of domestic predators (i.e., cats).

Columbiformes are social birds and spend a great deal of their time with birds of their own species. It is important that they be released in an area frequented by mourning doves so they may join a flock. It is a good idea to release them in pairs, especially if they cannot be released directly into a flock. Bird watchers, with their backyard feeding stations, are often good release helpers providing the other location factors are acceptable. These birds are best released early in the day during a period of sustained good weather.

SPECIAL PROBLEMS

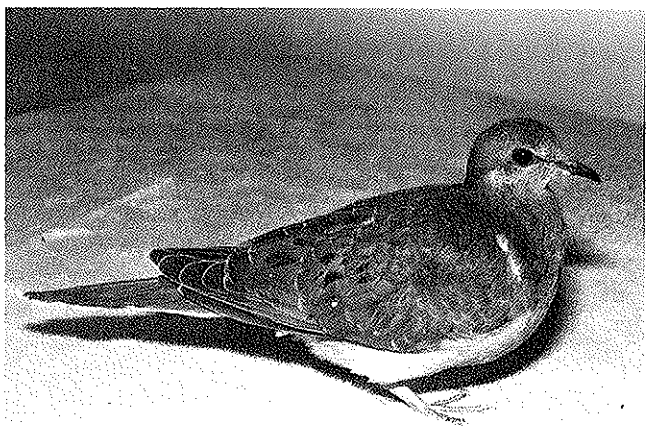
Doves can be and commonly are affected by Trichomoniasis. This protozoic infection manifests itself as a cheesy-looking, yellowish lesion(s) in the crop, or inner mouth. A foul odor may be present in advanced cases. It is contagious and should be attended to medically as soon as possible. More information on this problem can be obtained from your veterinarian. It was also featured in the *Wildlife Journal* (Volume 7, Number 4).

Avian Pox is a viral disease that causes scabby incrustations on skin in a number of locations including the beak, feet, or wings. This disease is vector transmitted by biting insects (i.e., mosquitoes). It may debilitate the bird to the point of death, or it may recover after a period of time. More information can be obtained from a veterinary doctor. This problem was presented in the *Wildlife Journal* in Vol. 5, Number 4.

Another common medical problem in this species is trauma, usually induced by cats, dogs, or cars. It is especially advisable to use broad spectrum antibiotics in the event of puncture wounds. Treatment of shock and dehydration are the same as for other species.

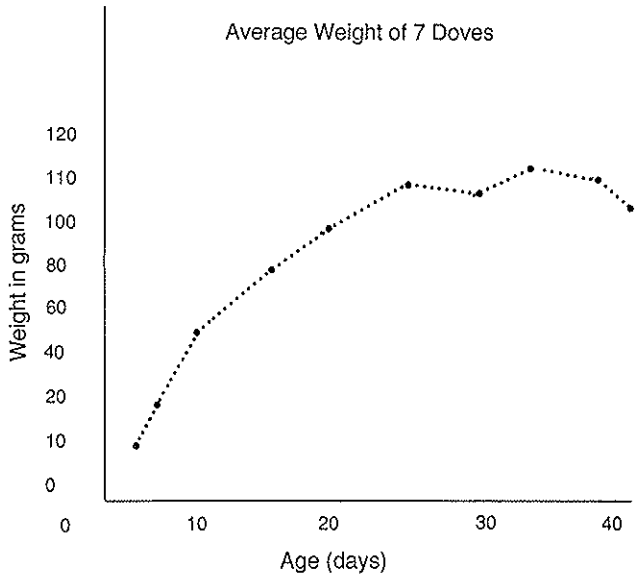
Back-up Statistical Data on Diet and Care Regimen

This article is based on the care of hundreds of Mourning Doves. In 1984 alone, 343 individual mourning doves were received for rehabilitation. The overall release rate was 40%. Fifty-three percent (53%) were nestlings and fledglings. The release rate for all nestlings and fledglings was 52%. Twenty-nine percent (29%) of the total nestlings and fledglings were animal caught and their release rate was 32%. Of the 71% of nestlings and fledglings that were not *animal caught, 60% were released.*



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Veterinary Corner

Zoonoses: Cryptosporidiosis

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Etiologic Agent

The protozoan parasite *Cryptosporidia sp.* is an intracellular member of this true Coccidia. The oocysts or eggs of the organism are nearly impervious to environmental factor, commonly used disinfectants and anti-protozoal drugs. Iodophores, sodium hypochlorite (bleach), benzylkonium chloride, sodium hydroxide, and some aldehyde-based disinfectants do not effect the egg viability while ammonia, 10% formalin, freeze drying and temperatures greater than 65° C for 30 minutes will destroy the oocyst's infectivity. Oocysts may be kept infective at 4° C for 2-6 months or at room temperature in airtight containers for 8-9 months.

Animals Involved

Cryptosporidiosis is an emerging zoonosis with more species of animals being reported as new hosts each year. To date, man, other primates, dogs, cats, Australian dingos, raccoons, skunks, foxes, deer and other exotic ungulates, domestic cows, sheep, goats, pigs, gray squirrels, chipmunks, mice, rats, guinea pigs, wild and domestic rabbits, muskrats, chickens, psittacine birds, turkeys, peafowl, horses, turtles, snakes and arthropods have been reported to be infected but not in all cases has clinical disease been present. Originally, cryptosporidia were thought to be species specific; however, recent experimental work indicates that isolates from some species such as humans, cows, pigs, sheep, and goats can be transmitted to a wide variety of other species. Differences have been found to support the concept of strains, although experimental passage through animals does not appear to affect their virulence.

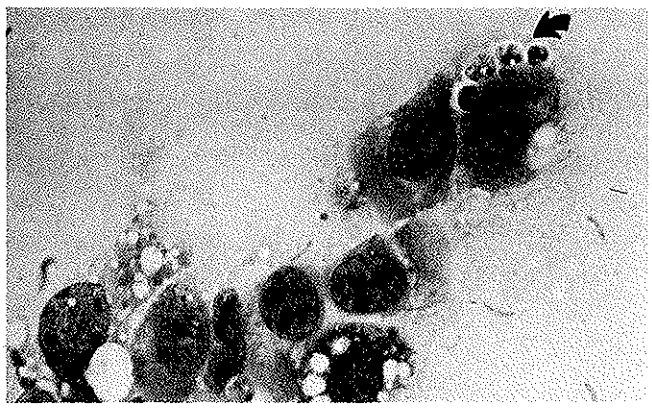
Mode of Transmission

Either direct or indirect fecal to oral transmission appears to be the most common mode. Infection of the upper respiratory membranes can occur in birds apparently by inhalation of aerosols contaminated with infected oocysts.

Clinical Disease in Animals

Following ingestion of sporulated or infective oocysts, sporozoites are released and attached to the brush border of the small and large bowel mucosa, as well as the common bile duct, gall bladder, major pancreatic ducts, and duodenal submucosal glands in mammals and the nasal, tracheal and bronchial mucosa in some birds. The parasites are encompassed by a unit membrane apparently derived from microvillar fusion. Asexual and sexual reproductive cycles follow with the release of oocysts in the feces. The exact details of this life cycle are not completely known. The reproductive cycle results in destruction of the microvilli and eventually the absorptive epithelium with subsequent retraction atrophy and fusing of the villi. Varying degrees of non-suppurative mucosal and submucosal inflammation may also be seen. The villi become repopulated by immature epithelium from the crypts which result in varying degrees of restricted nutrient, water and electrolyte absorption, and diarrhea.

The prepatent period may be as short as 24 hours and the patent period usually lasts 7-14 days. Death may result from water and electrolyte loss, especially in very young animals or those that have concurrent bacterial or viral infections or immunosuppressive conditions. As with other coccidia, the intensity of the infection usually dictates the severity of clinical signs observed. However, moderate to severe infections have been found in apparently asymptomatic animals. It now appears from recent serological studies that the majority of infected animals exhibit sub-clinical, self-limiting disease. Recurrent infections have been reported in ruminants, though. Cryptosporidiosis appears to be a disease of young suckling animals with bovine species between 1-4



Cryptosporidium (arrow) on jejunal epithelial cell from impression smear of a white-tailed deer.



Cryptosporidium sp. imbedded in the brush border of villi of racoon jejunum.

weeks of age, lambs and goats between 5-15 days of age and carnivores between 2-8 weeks being very susceptible. However, older young animals and adults can be infected clinically especially following stress such as pregnancy (rabbits), capture and transport from the wild (rabbits, raccoons, etc.), seasonal weather changes (dogs), concurrent immunosuppressive disease (distemper in raccoons, skunks and foxes, as well as adenovirus enteritis in foals), and old age immune deficiency.

Chronic, mild to moderate clinical disease is seen especially in laboratory rodents and is characterized by chronic loose stools or mild diarrhea and wasting syndrome. In these cases, frequently only microvillus obliteration and mild villus atrophy is seen. In young turkeys and peacocks, similar infections and destruction of the tracheal, nasal and bronchial epithelium and non-suppurative tracheitis have been reported. Subsequent clinical signs include gurgling breathing, respiratory sounds, sneezing, serous oculonasal discharge and coughing. Mortality and morbidity were moderate in the turkeys and moderate to mild, respectivé, in the peacocks and chickens. Infections of the cloaca of psittacine birds have also been reported. Severe chronic hypertrophic gastritis has been reported in snakes infected with cryptosporidia. Although not yet documented, the fact that young carnivores such as dogs, cats, raccoons, foxes and skunks, etc. can be readily infected with these protozoa warrant a word of caution concerning their zoonotic potential as well as the potential of an infected human transmitting the disease to young animals.

Clinical Disease in Man

The pathogenesis and clinical syndrome in many appears to be very similar to that seen in animals. However, in a large number of case reports, cryptosporidia appears to be concurrent, if not secondary, to prolonged immunosuppressive disease such as acquired immune deficiency syndrome (AIDS), congenital hypogamaglobulinemia, immunosuppressive drug therapy or following direct contact with animals suffering from cryptosporidial enteritis. In the cases with immunosuppression, diarrhea was usually prolonged (up to 2 years) and accompanied by a wasting syndrome with persistent abdominal pain, cramps, low grade fever, nausea, and frequently death.

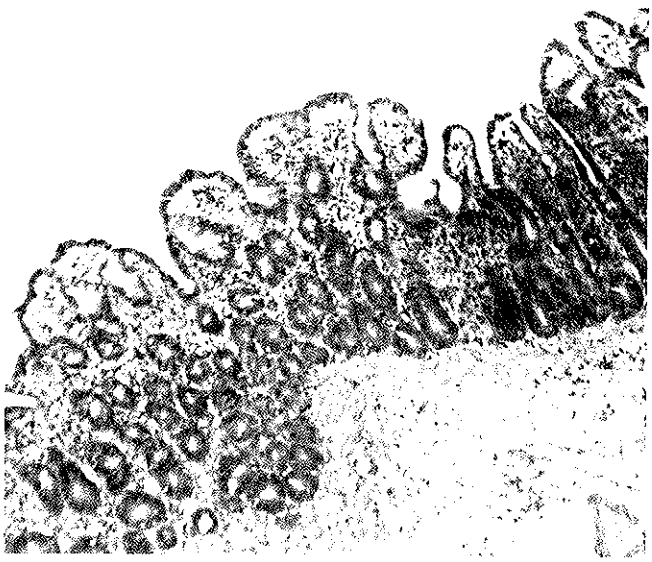
In those patients (veterinary students and animal handlers) that were healthy and had direct contact with ill animals, clinical signs developed 5-21 days after exposure and consisted of nausea, mild fever, abdominal pain, generalized body aching, chills, sweating and watery diarrhea followed by constipation during recovery. Usually by 9-14 days, the patient showed definite recovery which preceded uneventually unless they attempted normal activity too early in which case recurrence of clinical signs occured. As in animals, serological data and case report studies on small, localized outbreaks reveal asymptomatic infections are very common. Young children, adolescents and elderly patients as well as those with depressed immune function are most a risk.

Diagnosis

Demonstration of characteristic oocysts in the stool or microscopic examination of biopsy material is sufficient for a diagnosis. A variety of new methods to accomplish this have appeared in the last year. The most common uses 10% formalin as a collection media to avoid laboratory exposure. Formalinized feces are then concentrated by fecal floatation or sedimentation and strained with a hot, acid-fast method." Fluorescent antibody serology has recently been studied in man and found to be effective in diagnosing cryptosporidiosis. Little, if any, cross reactivity with other coccidia found.

Treatment and Control

More than 50 coccidiostats, anti-protozoal compounds, anti-helminths, antibiotics and other anti-microbial drugs have been tested against Cryptosporidia *in vivo* and *in vitro* and none have been found safe and



Severe villus atrophy secondary to cryptosporidiosis in skunk jejunum.

effective. Fortunately, most infections in man and animals, except those with underlying immunosuppressive disease, are self-limiting and require only supportive therapy.

Glossary

adenovirus:	any of a large group of viruses causing disease of the upper respiratory tract and conjunctiva.
asymptomatic:	showing or causing no symptoms.
atrophy:	a wasting away, a diminution in the size of a cell, tissue, organ, or part.
epithelium:	the cellular covering of the internal and external body surfaces.
hypertrophic:	enlargement or overgrowth of an organ or part due to increase in size of its constituent cells.
hypogamaglobulinemia:	an immunological deficiency state marked by abnormally low levels of generally all classes of serum gamma globulins, with heightened susceptibility to diseases.
oocysts:	the encysted or encapsulated fertilized parasite egg.
patent:	apparent, evident.
serous:	producing or containing serum.
suppurative:	formation or discharge of pus.
tracheitis:	inflammation of the trachea.
virulence:	the degree of pathogenicity of a microorganism as indicated by the case fatality rates and/or its ability to invade the tissues of the host.

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Letter to the Editor . . .

Dear Friends:

I recently noticed that my killdeer were growing at a rate faster than the growth chart listed in the *Wildlife Journal* (Vol. 6, No. 1). I called Walnut Creek and was asked to drop WRC a note on it.

After bringing so many killdeer to that stage where you were sure they were going to make it, and then having them go down on their "knees" and die, this is what I did.

I grew my mealworms in dry powdered milk granules. This is in addition to providing chick starter and freeze dried blood worms every day for variety. The blood worms were given in limited quantities. Additionally, the mealworms were powdered with Vionate daily.

As a result of this my Killdeer were 70.8 grams by 4 weeks old and flying, and 85.0 grams by the 5th week. I attribute this to the milk fed mealworms.

Sincerely,
Delores "Dee" Brandon

Dear Delores:

Thank you for taking the time to write us. It is nice to know that our readers are using the growth data we compile. You didn't tell me how many killdeer you were raising so I am unsure of your sample size. I compared it to the chart and your animal or animals were about 15 g heavier than the average at 4 weeks and 5 weeks. The chart was composed of two samples with different diets and five animals in each. It was done in late 1982 with data from 1978-1982. I pulled a couple of 1985 killdeer records to see how they compared. KD 432 weighed 71 g at 4 weeks and KD 491 weighed 69 g. These weights are significantly higher and if these animals continue to grow in this way, the will curve will shift higher. We at WRC need more weight/diet data submitted on animals so that our curves are based on the averages of many individuals. Please send us your diet, and the dates and weights of the animal while in captivity. We will then put that into the computer and revise the curves as more information becomes available. We hope to soon offer our Rehabilitation Notes (with growth data) in a special notebook with annual supplements.

Thank you for sharing your information with us. I will look forward to getting more specific growth data from you.

Jan White, Editor

ERRATA

In the Rehabilitation Notes: Anna's Hummingbird in Vol. 8, No. 1 (Spring 1985) we mistakenly omitted a 1 from the amount of water to be used in the hummingbird formula. It should be 14 ounces of warm water, not 4 as listed. Additionally, an asterisk was omitted from the listing of Thorovita 27 vitamins. It is this product that is available from Palos Verdes Bird Farm as listed. We hope none of our readers were inconvenienced by these errors.

1985 BASIC WILDLIFE REHABILITATION 1AB OREGON GRADUATES

On September 14-15, 1985, WRC conducted the Basic Wildlife Rehabilitation 1AB skills seminar in Portland, Oregon. Hosted by the Portland Audubon Society and the Washington Park Zoo, WRC offered the class to northwestern rehabilitators. All individuals listed below have received a passing score of 70% or better on the WRC Basic Wildlife Care Exam and have completed two sets of homework on nutrition and calculating drug dosages. Additionally, all participants have successfully demonstrated adequate skills in wildlife care and handling in a supervised lab session. These individuals are certified in Basic Wildlife Rehabilitation.

Elayne Barclay
Tigard, Oregon

Shirley Brown
Tigard, Oregon

Linda Busse
Portland, Oregon

Anne Chalmers-Henrichs
Beaverton, Oregon

Curt Clumpner
Lynnwood, Washington

Suzanne Dodson
Tillamook, Oregon

Elizabeth Dodge
Snohomish, Washington

Jane Dotter-Sarault
Portland, Oregon

Jay Dumont
Portland, Oregon

Susan Flett-Pomeroy
Vancover, Washington

Linda Fullop
Estacada, Oregon

Ed Gallegos
Clackamas, Oregon

Becky Garrett
Tigard, Oregon

Jeanne Galick
Portland, Oregon

Diance Gould
Portland, Oregon

Judy Halson
Portland, Oregon

Lori Hanousek
Lake Oswego, Oregon

Janice Hudson
Portland, Oregon

Jere Jacques
Beaverton, Oregon

Mary Joyce
Hillsboro, Oregon

Suraj Khalsa
Portland, Oregon

Mavis Kvernvik
Netarts, Oregon

Jim Lillibridge
Princeton, Oregon

Susan Linstedt
Princeton, Oregon

Kathy McCausland
Beaverton, Oregon

Jonolyn McCusker
Hillsboro, Oregon

Ray & Kathleen Merritt
Warrenton, Oregon

Scott & Diane Mulligan
West Lynn, Oregon

Susan Nolte-Grunes
Aloha, Oregon

Maureen O'Mara
Portland, Oregon

Carol Patch
Beaverton, Oregon

Joan Rabottini
Portland, Oregon

Michelle Schroeder
Mc Minniville, Oregon

Judi Schaeffer
Portland, Oregon

Patsy Shaffer-Cooper
Portland, Oregon

Bernice Tannenbaum
Portland, Oregon

Phyllis Thurston
Portland, Oregon

Novia Weiman
Beaverton, Oregon

Melanie Westerfield
Milwaukie, Oregon

Janet Wright
Gresham, Oregon

BASIC WILDLIFE REHABILITATION 1AB SCHEDULES FOR SEATTLE, WASHINGTON ON DECEMBER 14-15, 1985

Hosted by PAWS (the Progressive Animal Welfare Society), WRC will hold our entire two day course in Seattle, Washington to certify rehabilitators there. WRC members and licensed rehabilitators in that state will be notified. For further information, contact Curt Clumpner at P.O. Box 5574, Lynnwood, Washington or call him at (206) 743-3845.

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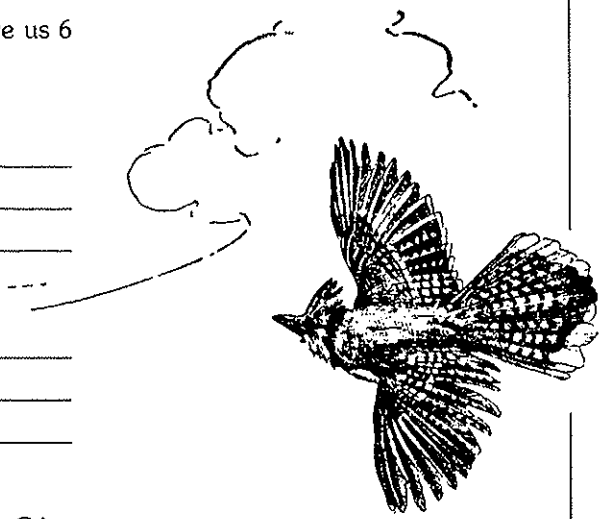
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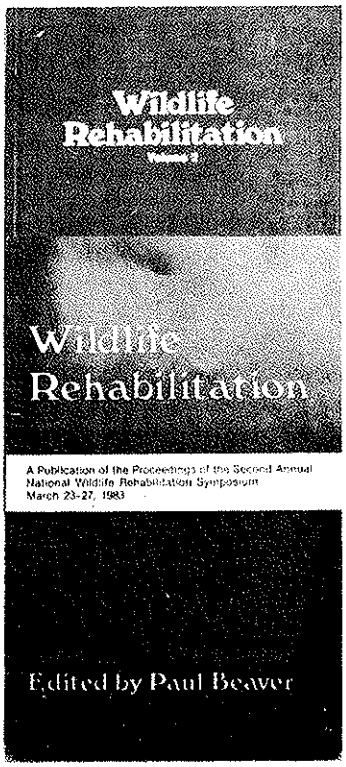
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Edited by Paul Beaver

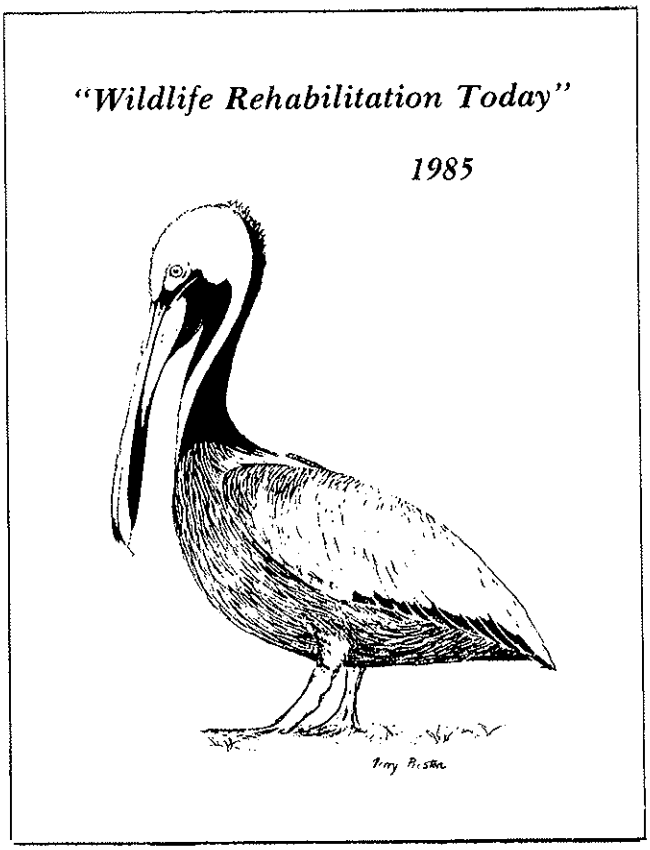


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