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The Probe
ISSUE 108
MARCH 1991

Control of Rabies in Wildlife by Oral Vaccination

Samuel B. Linhart, Southeastern Cooperative Wildlife Disease Study, Univesity of Georgia, Athens, Georgia
Jean S. Smith, USPHS, Centers for Disease Control, Rabies Laboratory, Atlanta, Georgia

Rabies in wildlife is found throughout much of the world. Mongooses, jackals, wolves, desert, red, and arctic foxes are the major carriers in Africa, Asia, and Europe. Skunks, raccoons, red, gray, and arctic foxes, and various bat species are the main problems in North America. Vampire bats and mongooses are the principal species of concern in South America and the Carribbean islands, respectively. The distribution and incidence of the disease are poorly documented in much of the world, especially in third world counties where urban dog rabies and human exposures, not wildlife rabies are the major concerns. Identification of different strains of rabies virus is now possible and has greatly increased our understanding of the epizootiology of rabies in wildlife. The technique involves determining the reaction of a given virus isolate to a panel of monoclonal antibodies specific for non-overlapping antigenic sites on the viral N protein. Patterns of positive and negative reaction to individual antibodies in the panel distinguish viruses from different enzootic areas. This research has shown that five strains of rabies virus are present in terrestrial wildlife with the contiguous United States; one in arctic and red foxes in Alaska and in red foxes in New York, one in raccoons in mid-Atlantic and southeastern states, one in gray foxes in Arizona, and two in skunks, one in the south central states and another in the north central states and California. Several additional strains have been characterized for bats and identify species-defined enzootics in the lasiurine group and in *Eptesicus*, and *Tadarida* spp. Although sporadic cases of rabies transmission from bat to terrestrial animal have been identified, rabies apparently cycles independently in bats and terrestrial animals and rabid bats do not contribute to enzootic maintenance of rabies in skunks, raccoons, or foxes in the United States.

New rabies vaccine technology and progress in developing bait and appropriate baiting strategies for several species has indicated a high potential for oral rabies vaccination of wildlife. The approach has several advantages not shared by population reduction techniques. These include maintenance of more stable vector populations by immunization as compared to increased population turnover, higher reproductive rates, greater movement and more transient individuals that normally result from intense efforts to reduce the number of individuals in a susceptible population.

The first attempt to orally immunize wildlife was in 1971 when captive red fox were successfully immunized by investigators at the Centers for Disease Control. Shortly thereafter, European collaborators began similar studies and Switzerland (1978) and Germany (1983) became the first two countries to successfully suppress fox rabies with an orally effective live rabies vaccine. Rabies in red foxes and raccoons in Ontario have resulted in intense efforts by the Canadians to develop orally effective vaccines, baits and aerial baiting techniques. The mid-Atlantic raccoon rabies outbreak resulted in field studies by the National Park Service and the state of Virginia to determine the feasibility of orally vaccinating raccoons. Both involved distributing baits containing a biomarker and the subsequent capture of raccoons to determine the percent that ingested baits. Other agencies that are exploring the concept are the Centers for Disease Control, USPHS, the Southeastern Cooperative Wildlife Disease Study, University of Georgia, and until recently, the Denver Wildlife Research Center, APHIS.

The distinctively marked raccoon, *Procyon lotor*, is a common host of rabies in the mid-Atlantic states.

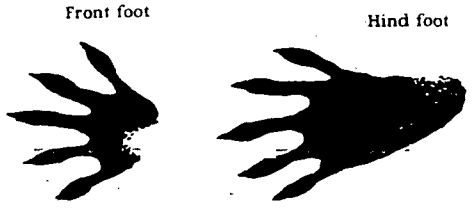
The Wistar Institute in Philadelphia, based upon extensive laboratory and field research efforts, sought and received state and APHIS approval to conduct a

Continued from page 1

Oral Rabies Vaccine Tested

field test on an offshore barrier island located in Virginia. The ongoing test to orally vaccinate raccoons has shown promise and the results are encouraging so far, but initially generated some controversy because the experimental vaccine was a recombinant or genetically engineered vaccine. Concerns about recombinant vaccines center about the difficult in controlling the spread of a virus once it is introduced into the environment, its potential pathogencity for humans and non-target animals, and the possibility of enhanced virulence through mutation, after its introduction into the environment. However, in the case of the Wistar field test, none of these problems has as yet surfaced since vaccine baits were placed on the Virginia island in August 1990. The Institute has therefore requested approval to conduct a mainland test in Sullivan County, Pennsylvania.

Development of recombinant vaccines involves the replacement of a non-essential gene in a parent vaccine virus with a foreign viral gene. In the Wistar Institute studies, for example, the thymidine kinase gene of Vaccinia virus (a small-pox vaccine virus) was replaced with a copy of the gene encoding the rabies glycoprotein (the rabies protein which elicits virus neutralizing antibody).



The 5 long rear toes and the "hand-like" front print are characteristic of raccoon tracks. Except in soft mud or sand, the "heel" of the hind foot seldom shows.

Although research conducted to date has indicated a high potential for orally effective rabies vaccines, much more remains to be done. An effective and inexpensive vaccine, baits readily accepted by target species, baiting strategies that selectively reach a high proportion of the target population, acceptable safety considerations, and favorable cost-benefit analyses are all required before the widespread use of oral rabies vaccines becomes a reality. In addition to rabies, oral vaccination may also have potential for controlling several other wildlife diseases, or wildlife disease that are transmitted from wildlife to livestock and poultry.

The Probe is the newsletter of the National Animal Damage Control Association, published 10 times per year.

Editors: Robert H. Schmidt and Robert M. Timm
Editorial Assistant: Pamela J. Tinnin

Your contributions to *The Probe* are welcome. Please send news clippings, new techniques, publications, and meeting notices to *The Probe*, c/o Hopland Field Station, 4070 University Road, Hopland, CA 95449. If you prefer to FAX material, our FAX number is (707) 744-1040. The deadline for submitting material is the 15th of each month.

IN MEMORIAM— Richard "Dick" Winters

It is sad to report the passing of a real friend, a gentleman, and an arch supporter of animal damage control. Richard "Dick" Winters died of cancer on November 19, 1990 at his home in Buckhannon, West Virginia. He is survived by his wife Mary.

Dick joined the Federal ADC Program in Ohio in 1969. His specialty was controlling blackbird damage to corn. He served as Ohio State Director of ADC from 1971 to 1977. He also served in several capacities on assignments in East Lansing, Michigan, and the Regional Office in Twin Cities, Minnesota. He was in the Washington office during that turbulent year when ADC was transferred from USDI to USDA. During that year Dick along with Gary Simmons stood like two islands of hope in a sea of despair. Before his retirement he was on the Washington Operational Support Staff.

In a letter I received from Dick in August 1990 he said, "I have felt like jumping off a cliff in ADC many times but miss all of you guys."

He went on to reminisce on how he and I first met at an apple/pine mouse meeting in the early 1970's and went on to say, "maybe we never did get ahead of the pine mouse problem but we were sure working on it." He also told what a good job Phil Mastrangelo is doing with his program in West Virginia.

That about summarizes Dick Winters. He always gave credit where credit was due. He never let things get him down or if it did, he didn't let it show. He was a strong supporter of ADC in general and the Federal program in particular.

Richard "Dick" Winters will be greatly missed by me and I know he will be greatly missed by many, many others in the ADC family.

—Jim Forbes

NADCA Member Invents New Device

A new, patented tension device which excludes unwanted animals from leg hold traps has been invented by a new NADCA member, Ed Medvetz. Named the **Paws-I-Trip II®**, the device can be readily attached to a conventional leg hold trap. For more information contact Ed Medvetz, M-Y Enterprises, 200 Lincoln Street, Homer City, PA 15748 or phone 412-479-9422.

—Animal Damage Control in the News—

HUMANE SOCIETY OFFICAL ASKS SACRAMENTO CITY COUNCIL TO BAN STEEL-JAWED TRAPS

After a Sacramento, California house cat owned by U.S. Humane Society investigator Kurt Lapham was injured by a steel-jawed trap, Lapham began pushing for a law banning the traps. According to an article in the January 11, 1991 *Sacramento Bee*, Lapham was joined in his efforts by Sacramento City Councilwoman Heather Fargo. Lapham stated that he was shocked that the traps were used outside of rural areas. The City's chief animal control officer responded that property owners generally use the traps to protect their property from rats. SPCA spokesman Mike Winters disagreed with him, saying that people use the traps to keep away stray cats. Councilwoman Fargo maintains that the traps are a danger not only to domestic pets, but to children as well. If the trap ban passes, it will become a misdemeanor to use steel-jaw leg-hold traps in the Sacramento city limits.

DEER INVADE NORTH CAROLINA AIRPORT

A deer was hit by an aircraft at the Raleigh-Durham International Airport in North Carolina after as many as 14 deer jumped or crawled through a four-mile-long, six-foot-high, six-strand electric fence bordering the runway. According to the January 8 Weekly Activity Report from the Animal and Plant Health Inspection Service, ADC officials have suggested ways to improve airport protection.

MOUNTAIN LION ACTIVITY MONITORED AT UC DAVIS

University of California, Davis, and California state officials are monitoring the activities of one or more mountain lions after a research deer was attacked and partially eaten at a campus research site. The kill occurred in a remote area of the campus and has raised concerns regarding the safety of the campus farm animals. According to a report in the *UC Davis Dateline*, the attack occurred sometime January 30 when the mountain lion apparently jumped an 8-foot fence surrounding the 7-acre enclosure that houses a research herd of deer. To prevent further damage, the herd was removed to a campus barn. According to Bernard Shanks of the UC Davis Office of Environmental Health and Safety, "It is inappropriate to hunt the lion at this time." There have been three or four mountain lion sightings on the campus since July.

The editors of The Probe *thank contributors to this issue: Sam Linhart, Jim Forbes, Wes Jones, Mike Fall, Ron Thompson, and Greg Harper. Send your contributions to* The Probe, *4070 University Road, Hopland, CA 95449.*

YELLOWSTONE WOLF COMMITTEE APPOINTED

According to the January issue of WLFA-gram (published by The Wildlife Legislative Fund of America), Ron Somerville, WLFA's National Affairs Director, has been named to the federal Yellowstone Wolf Study Committee. The 10-member committee has been appointed to develop an acceptable wolf re-introduction plan for Yellowstone National Park. The committee was established by a provision in the Interior Appropriations Bill for 1991. Sommerville was chosen to represent the views of the hunting community. Other committee members are from state fish and game agencies, the U.S. Forest Service, the National Park Service, the U.S. Fish & Wildlife Service, livestock interests, the National Wildlife Federation and the Defenders of Wildlife.

Where Are They Now?

Where Are They Now *is intended to keep track of retired NADCA members. This month it features William C. Hickling.*

Bill Hickling was the Regional Supervisor of the Federal ADC Program headquartered in Boston, Massachusetts. In those days, it was called The Division of Wildlife Services in the U.S. Fish and Wildlife Service. Bill's job was to ride herd on the likes of ADC State supervisors like John Peterson, Frank Gramlich, Ed Ladd, Al Godin, and Rene Bollengier.

Before coming to the northeast Bill worked in the Minneapolis Regional Office and also field offices in Minnesota. He got his start with the North Dakota Department of Fish and Game—he was a big game biologist. He was also a very big man—tall (Magic Johnson class). I've been told that when they did big game surveys on horseback, the other biologists would get Bill the shortest horse they could find—just to see his feet drag on the ground.

Bill is very gregarious person who will talk with anyone...for hours. He is also noted for his unusual ability to recall the name of every person he ever met. It was a pleasure to work for Bill. He was a good supervisor.

He has made several trips to Alaska this past year. He and his wife Helen love it up there. In a note he said, "When we drove back from Alaska we were about 20 miles away from Shell Lake, Wisconsin, where Wes Jones lives. We would have stopped if we had known. Next time."

Bill is a newly joined member of NADCA. He's retired and living at 87 West View Court, Fletcher, NC 28732. He and Helen would like his old friends in ADC to stop in when they are in the area.

—*Jim Forbes*

The author would like to hear from other retired NADCA members, especially trappers, PCOs, and Extension people. Please write: Jim Forbes, RD 3, Box 33, Averill Park, NY 12018.

PREVENTION AND CONTROL TIPS

This month's information is revised from Prevention and Control of Wildlife Damage *(1983), published by Nebraska Cooperative Extension Service, Lincoln, Nebraska.*

MOLES

EXCLUSION
Generally not practical, except in very small, high value areas where an aboveground and underground barrier (sheet metal, brick, wooden, etc.) might restrict moles.

CULTURAL METHODS
Packing soil destroys burrows. Reduction in soil moisture and food source removal by the use of insecticides discourages moles and generally results in lower populations, but damage may increase before moles leave area. Value of earthworms and other soil organisms should be considered.

REPELLENTS
Thiram

TOXICANTS (Generally low effectiveness)
Strychnine baits
Zinc phosphide baits

FUMIGANTS
Aluminum phosphide
Gas cartridges
Carbon tetrachloride

TRAPS (Most effective control method)
Out O' Sight® Trap
Bayonet trap or harpoon trap (Victor® Mole Trap)
Nash (choker type) mole trap

Eastern mole, *Scalopus aquaticus*

SHOOTING
Not practical

OTHER METHODS
None tested have proved to be effective

Author: F. Robert Henderson. Illustration by Charles Schwartz.

Readers are reminded that the status of registrations for pesticides differ among states and are constantly changing.

"Human Use of Wildlife" Position Statement Adopted by TWS

In a new Position Statement, "Responsible Human Use of Wildlife," adopted by The Wildlife Society in October 1990, several wildlife management issues are addressed. According to the statement, "All humans and human societies use wildlife directly and/or indirectly." The Wildlife Society also emphasized individual, responsible use by stating "Participation in or support of wildlife-related activities that do not have long-term detrimental impacts to wildlife populations or their habitats should be a matter of personal choice."

The document also states "The policy of The Wildlife Society is to: ...support and promote the philosophy that it is equally appropriate for humans to manage wildlife in ways to sustain and enhance wildlife populations, species, and habitats for human benefits, while responsibly protecting property and other resources and preventing health and safety hazards."

Renew Your Membership Today!

Many NADCA memberships expired end of December 1990. Please check the mailing label on your *PROBE*—if it says, "12/90," your membership is expired, unless you have renewed it within the last several weeks.

Membership renewals have been coming in very slowly. Perhaps you missed the renewal reminder in the December issue (#106). If so, here is your last chance!

—Wes Jones, Treasurer

Membership Application

NATIONAL ANIMAL DAMAGE CONTROL ASSOCIATION

Mail to: Wes Jones, Treasurer, Route 1 Box 37, Shell Lake, WI 54871

Name: _____ Phone: _____

Address: _____

City: _____ State: _____ ZIP _____

Dues $ _____ Donation $: _____ Total $: _____ Date: _____

(Underline: Student $7.50, Active $15, Sponsor $30, Patron $100)

Check or Money Order payable to NADCA

Select one type of occupation or principal interest:

[ ] Agriculture
[ ] USDA - APHIS - ADC
[ ] Federal - other than APHIS
[ ] Foreign
[ ] ADC Equipment/Supplies
[ ] Other (describe) _____
[ ] Pest Control Operator
[ ] Retired
[ ] State Agency
[ ] Trapper
[ ] University

CALENDAR OF UPCOMING EVENTS

April 13-14, 199: Columbian Black-tailed Deer Workshop, Kelseyville and Hopland, California. Includes sessions on Deer Population Trends in North Coastal California, Managing People to Manage Deer, and When There Are Too Many Deer: Controlling Damage. Preregistration deadline: April 1, 1991. For more information, contact Robert Schmidt or Robert Timm, Hopland Field Station, 4070 University Road, Hopland, CA 95449. Phone (707) 744-1424.

April 15-18, 1991: 10th Great Plains Wildlife Damage Control Workshop, Lincoln, Nebraska. Includes a full-day field trip to view waterfowl on the Platte River Basins, an urban crow roost, prairie dog research site, and an on-site ADC predator control program. Subject sessions include 37 papers on predators, rodents, birds, programs, and professionalism. There will also be a general session on "Wildlife Damage Management and the Public" with a keynote address by Gary San Julian and presentations by Jim Miller and Bobby Acord. Registration Fees: Before March 25, $65 regular, $40 student; after March 25, $75 regular, $50 student. Contact: Scott Hygnstrom, Dept. of Forestry, Fisheries & Wildlife, 202 Natural Resources Hall, University of Nebraska, Lincoln, NE 68583-0819. Phone (402) 472-6822.

The NADCA will hold both an Executive and General Meeting in conjunction with the Great Plains Workshop. The Executive Meeting is scheduled for Tuesday, April 16, 6-7:30 p.m. The General Meeting will be Wednesday, April 17, 4:30-6 p.m. (agenda follows).

Agenda for NADCA Business Meeting
April 17, 1991, 4:30-6:00 p.m.
Cornhusker Hotel, Lincoln, Nebraska

- Call to Order
- Secretary's Report
- Treasurer's Report
- Regional Directors' Reports
- Committee Reports
  - Finance
  - Awards
  - Membership
  - Public Affairs
  - Publications
- Unfinished Business
  - Constitution and bylaws
  - *Probe* (status and feedback)
  - Awards
- New Business
  - Initiatives from Executive Council
  - Initiatives from membership
  - Logo
- Announcements
  - New Utah State programs in ADC
  - Special ADC session at **57th North American Wildlife & Natural Resources Conference** (1992, Charlotte, NC)
  - Overview of **Eastern Wildlife Damage Control Conference** (Oct. 6-9, 1991, Ithaca, NY) & of **Vertebrate Pest Conference** (March 2-5, 1992, Newport Beach, CA)

April 23-25, 1991: International Canada Goose Symposium, Milwaukee, Wisconsin. Includes sessions on Urban Goose Problems and on Foraging, Habitat Use, and Crop Depredations. For more information contact the International Canada Goose Symposium, U.S. Fish and Wildlife Service, Wisconsin Cooperative Wildlife Research Unit, 226 Russell Labs, UW Campus, Madison, WI 537006.

April 24-26, 1991: Mountain Lion-Human Interaction Symposium and Workshop, Denver, Colorado. Topics include: Case Histories of Mountain Lion/Human Interactions—A Search for Patterns; Clues to Aggressive Lion Behavior; Relationships Between Human Density, Prey Density, and Mountain Lion Density; Responsibilities of Agencies, Communities, and Individuals; and Needs for Research and Management Studies. For more information contact Robert Tully, Colorado Division of Wildlife, 6060 Broadway, Denver, CO 80216.

May 16-June 20, 1991: International Course on Vertebrate Pest Management, Bowling Green, Ohio. Course topics include Major Vertebrate Pests; History of Disease and Population Outbreaks, Famine, Drought, Human Ecology; Crop Losses, Damage, and Contamination; Control/Management Methods; and Sustainable Agriculture. Registration deadline is March 15, 1991. Contact Dr. Reginald D. Noble, Chair, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403-0212. Telephone (419) 372-2332.

July 29-31, 1991: "Wildlife 2001: Populations", Oakland, California. For researchers and agency personnel interested in the science, conservation, and management of vertebrate animal populations. For further information or to submit an abstract to give a paper, contact: Dale McCullough or Reg Barrett, Dept. of Forestry and Resource Mgmt., 145 Mulford Hall, UC Berkeley, Berkeley, CA 94720.

August 4-22, 1991: 3rd International Short Course on Vertebrate Pest Problems and Solutions in Developing Countries, Colorado State University, Fort Collins, Colorado. Topics include Wildlife Diseases Symposium; Problem Identification; and Management Concerns and Panel Discussion. For more information, contact Vertebrate Pest Management Short Course, Office of Conference Services, Colorado State University, Fort Collins, CO 80523.

October 6-9, 1991: 5th Eastern Wildlife Damage Control Conference, Ithaca, New York. Contact: Carol Rundle, Cornell Coop. Extension, Dept. of Nat. Resources, Rm. 108 Fernow Hall, Cornell Univ., Ithaca, NY 14853-3001.

PRESIDENT'S CORNER

Indications are that there will be an excellent attendance at NADCA's business meeting on April 17, 1991 in Nebraska. We continue to grow and develop our long-range plans. If you can't attend but would like to provide input for this meeting, contact your NADCA Regional Director or myself. And keep contributing materials for *The Probe*!

—Terrell P. Salmon, President

Terrell P. Salmon
DANR-North Region
University of California
Davis, CA 95616

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LATE BREAKING NEWS BULLETIN ! ! !

The NADCA received a pledge for a substantial contribution from the Reed-Joseph International Co., Greenville, MS, to recruit new members. It is sincerely appreciated. We will discuss at the Great Plains Wildlife Damage Control Workshop, Lincoln, Nebraska, the best way to use these funds.

Membership Application

NATIONAL ANIMAL DAMAGE CONTROL ASSOCIATION

Mail to: Wes Jones, Treasurer, Route 1 Box 37, Shell Lake, WI 54871

Name: _____ Phone: _____

Address: _____

City: _____ State: _____ ZIP _____

Dues $ _____ Donation $: _____ Total $: _____ Date: _____

(Underline: Student $7.50, Active $15, Sponsor $30, Patron $100)

Check or Money Order payable to NADCA

Select one type of occupation or principal interest:

[ ] Agriculture
[ ] USDA - APHIS - ADC
[ ] Federal - other than APHIS
[ ] Foreign
[ ] ADC Equipment/Supplies
[ ] Other (describe) _____
[ ] Pest Control Operator
[ ] Retired
[ ] State Agency
[ ] Trapper
[ ] University

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