The Rabies Reporter

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Inside this issue:

The Rabies Reporter, a scientific newsletter about current issues in rabies research and control, is a joint effort of the Rabies Research Unit of the Ontario Ministry of Natural Resources; the Rabies Laboratory at the Animal Diseases Research Institute of the Canadian Food Inspection Agency; the Ontario Ministry of Health; and the Geographic Information Systems Laboratory at Queens University, Kingston. Articles for future issues will be welcomed by the editor. The Rabies Reporter is not refereed, and should not be cited in papers intended for refereed journals. Send contributions, letters and inquiries to:

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Rabies during the Second Quarter

The incidence of rabies cases during the last three months have been somewhat surprising. Not all of the news has been bad however.

The best news is that the last confirmed case of a rabid raccoon in Ontario was in June 2003. Ontario has now gone thirteen months without a case of raccoon rabies. Although it is typically believed that only about ten per cent of rabid animals are actually submitted for testing, this is an exceedingly long period without a single case being detected if there are still remnant cases. We had expected some cases to occur during the last quarter as it is the traditional peak period for terrestrial cases. During the second quarter of 2003, there were nine cases of raccoon strain rabies.

As a result of this success, the RRDU have modified their rabies control programs. There will not be a Trap-Vaccinate-Release program in the St. Lawrence region this year. Instead, aerial and hand baiting are the only planned control method at this time.

The number of rabid bats is also much lower than in 2003 with only ten cases so far compared to 20 during this period last year. The cooler, wetter weather that was atypical for this time of year may have had an influence on the number of rabid bats discovered even though the incidence of rabies may not have decreased. During April, May and June, people tend to spend a lot of time outdoors where they are more apt to encounter bats which are behaving abnormally e.g. unable to fly. This year, however, most people did not spend as much time outdoors due to the extremely wet weather and may not have discovered as many abnormally behaving bats. (It would be interesting to know how many of the submitted bats are submitted from houses or other indoor areas and how many are traditionally submitted from outdoor areas.)

Perhaps most surprising with the rabies cases this year is the number of rabid livestock. There have been 13 confirmed cases and seven clinical cases. (Clinical cases are animals which are exhibiting symptoms of rabies and which the district veterinarian believes are rabid but they are not actually submitted for testing.)

During 2004, there have been 41 rabid animals in Ontario (including clinical animals) and 20 of these cases have been in livestock. This is a whopping 49% of all cases. From 1996 to 2003, livestock cases only comprised an average of 9% of all cases in Ontario.

Why the substantial increase? Part of this may be due to multiple rabid animals from a single farm. During the first quarter of 2004, there were seven positive cows from a single farm in Simcoe county. There were also three positive cows from a single farm in Grey county and two positive cows from another nearby farm in Grey county.

Even if you consider each of these multiple cases on an individual farm as a single case per farm, there are still seven different locations of rabid livestock in southwestern Ontario which is unusually high. Geographically, these cases are mostly in a narrow band along the eastern edge of Grey county and the western edge of Simcoe county.

Interestingly, there have been no rabid companion animals in Ontario during the first six months of this year. One would expect that if livestock were infected with rabies, that there is a good possibility that any dogs or cats living on the same farm may also encounter the same wildlife and become infected with rabies. This may be an indication of how effective and important mandatory vaccination of companion animals really is.

Beverly Stevenson
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An Unusual Occurrence of Human Rabies Fatalities

Part 1. Investigation of Rabies Infections in Organ Donor and Transplant Recipients --- Alabama, Arkansas, Oklahoma, and Texas, 2004

On June 30, 2004, CDC confirmed diagnoses of rabies in three recipients of transplanted organs and in their common donor, who was found subsequently to have serologic evidence of rabies infection. The transplant recipients had encephalitis of unknown etiology after transplantation and subsequently died. Specimens were sent to CDC for diagnostic evaluation. This report provides a brief summary of the ongoing investigation and information on exposure risks and postexposure measures.

Organ Donor

The organ donor was an Arkansas man who visited two hospitals in Texas with severe mental status changes and a low-grade fever. Neurologic imaging indicated findings consistent with a subarachnoid hemorrhage, which expanded rapidly in the 48 hours after admission, leading to cerebral herniation and death. Donor eligibility screening and testing did not reveal any contraindications to transplantation, and the patient's family agreed to organ donation. Lungs, kidneys, and liver were recovered. No other organs or tissues were recovered from the donor, and the donor did not receive any blood products before death. The liver and kidneys were transplanted into three recipients on May 4 at a transplant center in Texas. The lungs were transplanted in an Alabama hospital into a patient who died of intraoperative complications.

Liver Recipient

The liver recipient was a man with end-stage liver disease. The patient did well immediately after transplantation and was discharged home on postoperative day 5. Twenty-one days after transplant, the patient was readmitted with tremors, lethargy, and anorexia; he was afebrile. The patient's neurologic status deteriorated rapidly during the next 24 hours; he required intubation and critical care support. A lumbar puncture indicated a mild lymphocytic pleocytosis (25 white blood cells/ mm^3) and a mildly elevated protein. Magnetic resonance imaging (MRI) of the brain indicated increased signal in the cerebrospinal fluid. His neurologic status continued to deteriorate. Six days after admission, a repeat MRI indicated diffuse encephalitis. The patient subsequently died.

Female Kidney Recipient

The first kidney recipient was a woman with end-stage renal disease caused by hypertension and diabetes. She had no postoperative complications and was discharged home on postoperative day 7. Twenty-five days after transplant, she was readmitted with right-side flank pain and underwent an appendectomy. Two days after this procedure, she had diffuse twitching and was noted to be increasingly lethargic. Neurologic imaging with computed tomography and MRI indicated no abnormality. During the next 24-48 hours, the patient had worsening mental status, seizures, hypotension, and respiratory failure requiring intubation. Her mental status continued to deteriorate, and cerebral imaging 2 weeks after admission indicated severe cerebral edema. The patient subsequently died.

Male Kidney Recipient

The second renal recipient was a man with end-stage renal disease caused by focal, segmental glomerulosclerosis. His posttransplant course was complicated briefly by occlusions of an arterial graft leading to infarction of the lower pole of the transplanted kidney. The patient was discharged home 12 days after transplantation. Twenty-seven days after transplantation, he visited a hospital emergency department and was then transferred to the transplant center with myoclonic jerks and altered mental status; he was afebrile. An MRI of the brain performed on admission revealed no abnormalities. His mental status deteriorated rapidly during the next 24 hours. A lumbar puncture revealed mild lymphocytic pleocytosis (16 white blood cells/mm^3) and a mildly elevated protein. His mental status continued to deteriorate, leading to respiratory failure requiring intubation. A repeat MRI performed 10 days after admission indicated diffuse edema. The patient subsequently died.

Laboratory Investigation

In all three patients, histopathologic examination of central nervous system (CNS) tissues at CDC revealed an encephalitis with viral inclusions suggestive of Negri bodies; the diagnosis of rabies in all three recipients was confirmed by immunohistochemical testing and by the detection of rabies virus antigen in fixed brain tissue by direct fluorescent antibody tests (Figure 1* *(figure not included due to space limitations)*) . Electron microscopy of CNS tissue of one of the renal transplant recipients also identified characteristic rhabdovirus inclusions and viral particles (Figure 2* *(Figure not included due to space limitations)*).

Suckling mice inoculated intracranially and intraperitoneally with brain tissue from one kidney recipient died 7-9 days after injection. Thin-section electron microscopy of CNS tissue of the mice had visible rhabdovirus particles, and immunohistochemical testing detected rabies viral antigens. Antigenic typing performed upon brain tissue from one recipient was compatible with a rabies virus variant associated with bats. Rabies virus antibodies were demonstrated in blood from two of the three recipients and the donor. Detecting rabies antibodies in the donor suggests that he was the likely source of rabies transmission to the organ recipients. Testing of additional donor specimens is ongoing.

Reported by: Univ of Alabama at Birmingham Hospital; Jefferson County Health Dept, Birmingham; Alabama Dept of Public Health. Arkansas State Dept of Health. Oklahoma State Dept of Health. Regional and local health depts; Texas Dept of Health. Div of Healthcare Quality Promotion; Div of Viral and Rickettsial Diseases, National Center for Infectious Diseases, CDC.

Editorial Note:

Rabies is an acute fatal encephalitis caused by neurotropic viruses in the genus Lyssavirus, family Rhabdoviridae (1). The majority of rabies cases are caused by bites by rabid mammals (1,2). Nonbite exposures, including scratches, contamination of an open wound, or direct mucous membrane contact with infectious material (e.g., saliva or neuronal tissue from rabid animals), rarely cause rabies. After an incubation period of several weeks to months, the virus passes via the peripheral nervous system and replicates in the central nervous system. Rabies virus can then be disseminated to salivary glands and other organs via neural innervation (3). Rabies can be prevented by administration of rabies postexposure prophylaxis (PEP) (4), which is highly effective in preventing rabies when administered before onset of clinical signs.

Although transmission of rabies has occurred previously among eight recipients of transplanted corneas in five countries (4), this report describes the first documented cases of rabies virus transmission among solid organ transplant recipients. Infection with rabies virus likely occurred via neuronal tissue contained in the transplanted organs, as rabies virus is not spread hematologically. In collaboration with CDC, state and local health departments in Alabama, Arkansas, Oklahoma, and Texas have initiated investigations to identify a potential source of exposure for the donor and to identify contacts of patients among health-care providers or domestic contacts who might need rabies PEP.

The risk for health-care-associated transmission of rabies is extremely low; transmission of rabies virus from infected patients to health-care providers has not been documented (5). The use of Standard Precautions (6) for contact with blood and body fluids (e. g., gloves, gown, mask, goggles, or face shield as indicated for the type of patient contact) prevents exposure to the rabies virus. No laboratory-confirmed cases of human-to-human transmission of rabies among household contacts have been reported (4). No cases of rabies have been reported in association with transmission by fomites or environmental surfaces.

Routes of possible exposure include percutaneous and mucocutaneous entry of the rabies virus through a wound, nonintact skin, or mucous membrane contact. Intact skin contact with infectious materials is not considered an exposure to the rabies virus. Persons with exposure as defined above to saliva, nerve tissue, or cerebral spinal fluid from any of the four infected patients should receive rabies PEP. Types of exposures in domestic settings for which administration of PEP would be appropriate include bites, sexual activity, exchanging kisses on the mouth or other direct mucous membrane contact with saliva, and sharing eating or drinking utensils or cigarettes. In health-care settings, additional opportunities that can lead to contamination of mucous membranes or nonintact skin with oral secretions include procedures such as intubation or suctioning of respiratory secretions or injuries with sharp instruments (e.g., needlesticks or scalpel cuts). Percutaneous injuries (e.g., needlesticks) are considered exposures because of potential contact with nervous tissue. Contact with patient fluids (e.g., blood, urine, or feces) does not pose a risk for rabies exposure (4).

All potential organ donors in the United States are screened and tested to identify if the donor might present an infectious risk. Organ procurement organizations are responsible for evaluating organ donor suitability, consistent with minimum procurement standards (7). Donor eligibility is determined through a series of questions posed to family and contacts, physical examination, and blood testing for evidence of organ dysfunction and selected bloodborne viral pathogens and syphilis. Laboratory testing for rabies is not performed. In the case reported here, the donor's death was attributed to noninfectious causes. The role of organ donor deferral is to optimize successful transplantation in the recipient, including minimizing risk of infectious disease transmission to the lowest level reasonably achievable without unduly decreasing the availability of this life-saving resource. The benefits from transplanted organs outweigh the risk for transmission of infectious diseases from screened donors. CDC is working with federal and organ procurement agencies to review donor screening practices.

Additional information about ra-

bies and its prevention is available from CDC, telephone 404-639-1050, or at http://www.cdc.gov/ncidod/dvrd/rabies. Additional information about organ transplantation is available at http://www.optn.org/about/donation .

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** Note: The figures have not been included in this article but can be viewed at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5326a6.htm*

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Part 2. Update: Investigation of Rabies Infections in Organ Donor and Transplant Recipients --- Alabama, Arkansas, Oklahoma, and Texas, 2004

On July 1, 2004, CDC reported laboratory confirmation of rabies as the cause of encephalitis in an organ donor and three organ recipients at Baylor University Medical Center (BUMC) in Dallas, Texas (*1*). Hospital and public health officials in Alabama, Arkansas, Oklahoma, and Texas initiated public health investigations to identify donor and recipient contacts, assess exposure risks, and provide rabies postexposure prophylaxis (PEP). As of July 9, PEP had been initiated in approximately 174 (19%) of 916 persons who had been assessed for exposures to the organ recipients or the donor. As a result of its public health investigation, the Arkansas Department of Health determined that the donor had reported being bitten by a bat (Frank Wilson, M.D., Arkansas Department of Health, personal communication, 2004).

On July 7, CDC was notified of an additional organ transplant patient at BUMC who had died of encephalopathy of unknown origin in early June. This case was detected as part of an ongoing review of transplant-patient autopsies. The patient, who had end-stage liver disease, had received a liver transplant at BUMC in early May 2004. The patient remained hospitalized with transplant-related complications and began having neurologic abnormalities in early June, progressing to seizure, coma, and death. On July 7, pathologists at BUMC identified intracytoplasmic inclusions, suggestive of rabies, in neurons in multiple areas of the brain.

Specimens from the recipient were sent to CDC on July 7, and direct fluorescent antibody and immunohistochemical staining procedures confirmed the presence of rabies viral antigens in multiple areas of the brain, including the hippocampus, midbrain, pons, medulla, and cerebellum. Similar to the findings with the three previously known rabies-infected transplant recipients, preliminary antigenic characterization of the agent was consistent with a rabies virus variant associated with insectivorous bats. On July 8, CDC laboratory testing of tissues and serum from the donor who provided the liver yielded no evidence of infection with rabies virus.

Review of surgical procedures at BUMC determined that a segment of iliac artery recovered from the donor subsequently determined to have rabies had been stored at the facility for future use in liver transplants. This artery segment subsequently was used in the transplantation of the liver in the most recently identified rabies-infected recipient. Investigation of rabies transmission sources is ongoing, although current evidence suggests that the artery segment originating from the rabies-infected donor likely is the source of the latest rabies infection. Identification of contacts of this liver recipient is under way, and initiation of PEP when indicated or as appropriate is in progress.

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Florida ORV Program 2004

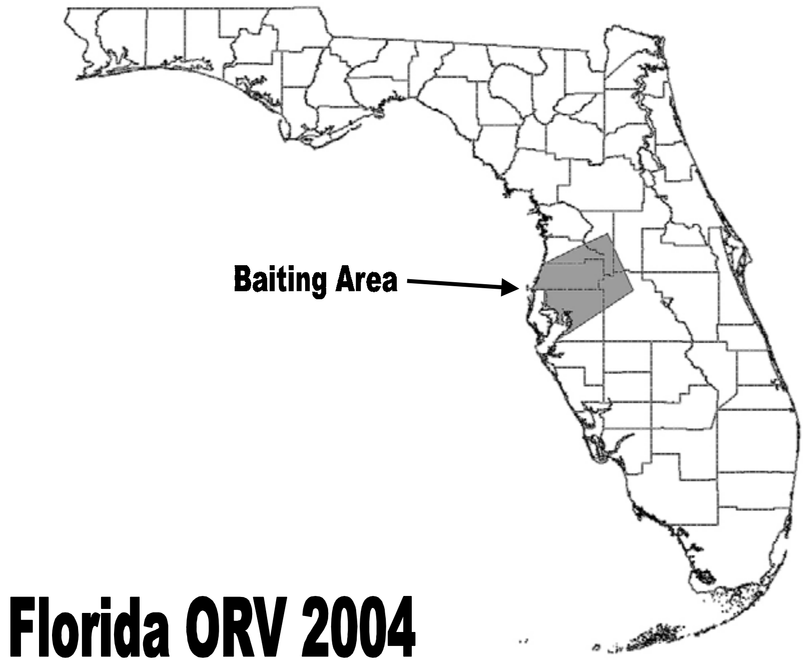

Figure 1. Baited area in Florida. Baits contained VRG vaccine to control the raccoon strain of rabies.

On February 22, 2004, MNR Twin Otters OPG and OGB departed Ontario to assist Florida with the aerial distribution of rabies vaccine baits to help control the mid-Atlantic strain of raccoon rabies. MNR staff included pilots Garry Stewart, Al Quinn, Jeff McClain and Dean Gill, aircraft engineers Joe Spence and Bob Everatt, and RRDU technicians Andrew Silver and Kim Bennett.

The baiting project began on February 23rd. The weather was warm and the winds were strong, making it a rough first day for the passengers. Flights were cancelled for the next two days due to tornado warnings and heavy rains. The remainder of the flights were completed by February 29th and the MNR team began their journey back to Ontario on March 1st.

In total, 421,320 fishmeal polymer baits containing VRG vaccine were distributed using two MNR Twin Otters. Flight line spacing was 0.5 km and the baiting density was 150 baits/km² north of I-75 and 75 baits/km² southeast of I-75 (Figures 1 and 2).

All 24 flights were flown out of Bartow Airport in Polk County. The baiting area covered over 2,400 square miles, including all or parts of Hernando, Sumter, Lake, Polk, Hillsborough and Pasco Counties.

The baits were also aerially distributed using helicopter and hand distributed by vehicle and by foot. The long term plan is to expand on this area in succeeding years and to completely eliminate the mid-Atlantic raccoon strain of rabies from Florida.

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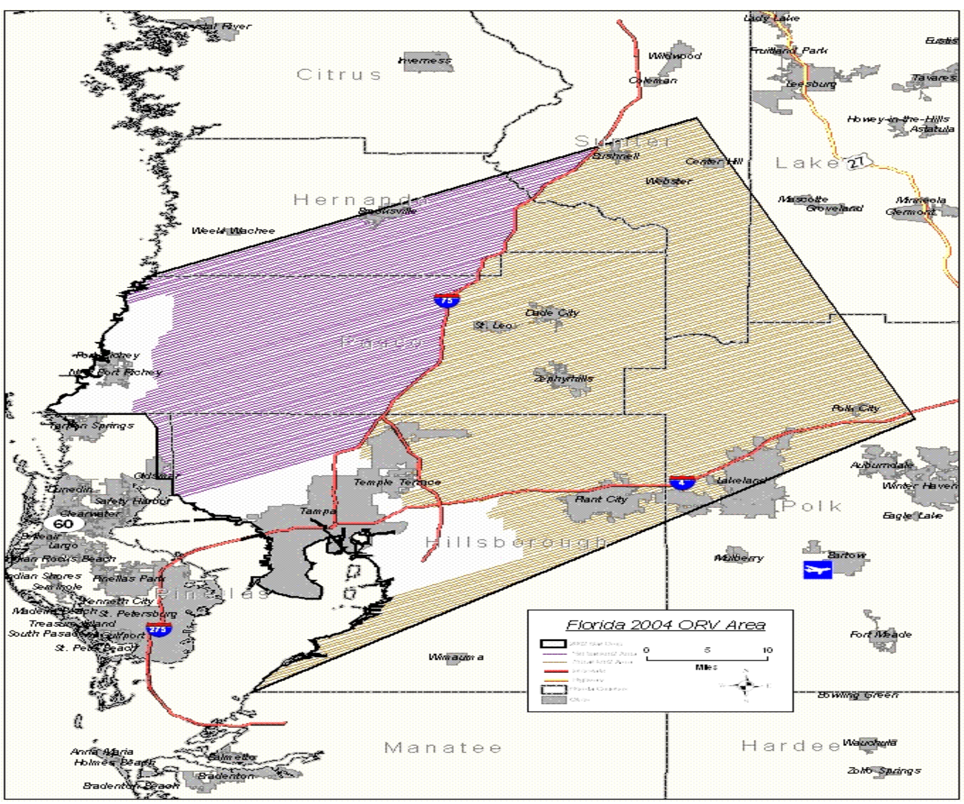

Figure 2. Enlargement of baited area in Florida. Baits contained VRG vaccine to control the raccoon strain of rabies.

Analysis of the Mechanisms Leading to the Spread of Raccoon Rabies

On November 1, 2002, Dr. Bradley White, a Canada Research Chair in Conservation Genetics and Biodiversity at Trent University and several collaborators (including the OMNR) were awarded a four year Natural Sciences and Engineering Research Council of Canada (NSERC) Strategic Grant to investigate the spread of raccoon rabies using genetic means. The overall objective of this research is to identify mechanisms involved in the origin of infection foci and spread of raccoon rabies in North America through the use of molecular markers, associated field-studies, and the integration of molecular and field data into a predictive rabies model. Specifically, this project will work to assess the origin of the Ontario raccoon rabies outbreaks from northern New York State and other areas of North America using RNA/DNA profiles from both the rabies virus and raccoons.

Although infected northern New York raccoons may have been the source of rabid raccoons in Ontario by crossing the St Lawrence River, there is evidence to suggest that alternative mechanisms may also exist, such as “hitch-hiking” on trucks and deliberate translocation of raccoons. In order to implement effective control strategies to eradicate this disease it is essential to understand the movement and dispersal of both raccoons and the virus. The genotype of the raccoon will identify the population of origin of the infected animal and the rabies virus genotype will be used to monitor the source and spread of the disease. Incorporating genetic profiles into a geographic information system (GIS) platform will further identify the specific landscape variables that are influencing or limiting the spread of rabies. Furthermore, a rabies model will be developed that incorporates molecular information. This new generation of disease model will be used as a predictive management tool for future rabies outbreaks and spread.

A significant amount of progress towards meetings the objectives outlined in the grant has been made to date, including the development of an automated DNA extraction protocol and the creation of a database (AutoLIMS) to track the thousands of samples processed and that houses the genetic profile information.

Raccoon Profiling Progress

(conducted by C. Cullingham, Ph.D. candidate, Trent University).

A major emphasis of the first two years of the project has been to obtain raccoon samples in close collaboration with our partners: Rabies Research and Development Unit (RRDU), OMNR, Fur Harvesters in North Bay, Dr. Bigler (Cornell University), and Dr. Slate and Mr. Chipman (USDA).

To date, over 20,000 samples have been collected and are present in the AutoLIMS database and over 1000 samples have been extracted using the newly developed automated magnetic bead procedure. To analyze these samples we wanted high-resolution tetranucleotide repeat microsatellite markers, however, no markers had been developed for raccoons specifically. As such, we have isolated tetra-nucleotide (GATA) microsatellites through cloning using an enrichment procedure adapted from Hamilton *et al.* (1999) and Refseth *et al.* (1997). Forty-three microsatellite clones have been obtained with satisfactory 5’ and 3’ flanking regions for primer design; eleven of these are being tested for polymorphism and more will be added as necessary. In addition to microsatellite markers, mitochondrial DNA (mtDNA) sequencing is underway. Initially the entire control region was sequenced and examined for variation, and from this the first 500bp is being sequenced from all animals. From the extracted samples, over 300 have been sequenced from Canada (Ontario (with 11 haplotypes, 8 of which are unique), Quebec (3 haplotypes), Prince Edward Island (2 haplotypes), Nova Scotia (2 haplotypes, 1 unique), and New Brunswick (2 haplotypes)) and the United States (Florida (5 unique haplotypes), New York (4 haplotypes, 1 unique), Ohio (5 haplotypes, 3 unique), Wisconsin (6 haplotypes, 2 unique), and Wyoming (3 haplotypes, 1 unique)) yielding 31 haplotypes from 24 variable sites. A preliminary assessment of the data suggests that significant genetic structuring of the mitochondrial haplotypes exists both within southern Ontario and between all provinces and states tested to date. Samples from Georgia, Indiana, Maryland, Michigan, Missouri, Pennsylvania, Virginia, West Virginia, have also been sequenced and are now being analyzed.

Viral Genotyping Progress

(conducted by A. Szanto, Ph.D. candidate, Trent University)

Thus far, half of the raccoon rabies genome has been sequenced (~5500 bp), including 4 of 5 protein coding regions (N, P, M and G). RNA from all the Canadian samples (n=185) from our partners at the CFIA and all presently available U.S. samples (n=163 from New York State, kindly provided by R. Rudd and the Wadsworth Centre and n=115 from Dr. C. Rupprecht, Centres of Disease Control) have been extracted.

Beyond viral profiling, a TaqMan assay has been optimized that is able to detect minute amounts of the raccoon rabies virus strain. The raccoon brain-derived neurotrophic factor mRNA was used as a negative RNA extraction control in each sample. Furthermore, we have also acquired 721 brain samples from the OMNR, to test for the rabies virus in raccoons found to be negative by conventional fluorescent antibody tests (FAT).

Spatial Epidemiology and Modelling Progress

(conducted by E. Rees, Ph.D candidate, Trent University)

A relational database design has been developed to update the current AutoLIMS Raccoon Project database format so it can accommodate sample data from the OMNR Rabies Unit and from genetic research. Furthermore, sensitivity analysis of the demographic and disease parameters in the Ontario Rabies Model (ORM) has been completed. Sensitivity analysis confirms that the model is functioning properly, identified key parameters requiring the most precise estimates, and has provided support that the current model is parsimonious. Rabies incidence data for Pennsylvania is available for use from the Queen's GIS lab for future investigation of the spatial-temporal spread of the disease.

Field Progress

(conducted by S. Proceviat, Ph.D. candidate, Trent University)

To date, 45 VHF collars have been placed on Ontario raccoons in the rabies epizootic areas of Ventnor and Athens/Newbliss, where rabies control activities have been implemented, as well as the rabies free areas of Kingston/Brockville, where control activities have been implemented and Napanee, where no control activities have been implemented.

Thirty more VHF collars will be placed on animals by late August / early September, 2004. This number primarily consists of juvenile animals, who cannot be collared until they are a certain size and mass. Seven GPS collars will be received within the summer months that will be placed on selected animals within the study area. Collared animals are "tracked" at least once a week, both during daytime and night-time hours as to determine locations of the animals visually or through triangulation methodology. Tracking will continue until the battery life of the collars subsides.

Overall, this project has been making significant progress towards its stated goals and will provide insight into mechanisms leading to the spread of raccoon rabies, hence aiding in the management and control of the disease.

For further information on topics related to the genetics of raccoon strain of rabies, please contact Dr. Kyle at:
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Peggy Hauschildt Moves Onward and Upward

The Queen's GIS Lab has lost one of its best in Peggy Hauschildt. Peggy has accepted a position as the Departmental Manager for Physics, one of the largest and most prestigious departments at Queen's University. Those in the rabies community will know Peggy as the person responsible for the maps and database behind the Rabies Reporter and the author of several articles on the Ontario's rabies research program.

At the time of leaving, Peggy was working on two articles detailing the history of rabies testing in Canada and the problems and concerns of collecting rabies data. Peggy's duties with the Rabies Reporter have been transferred to David Ball in the GIS Lab and her research duties assigned to two research assistants.

Peggy's move to Physics reflects the respect Queen's has for Peggy's skills in administration, curriculum development and research. As a faculty member at Queen's, I have known about those skills for over twenty years. Peggy was a student in my statistics class when I first met her and I was so impressed that I hired her as an undergraduate research assistant. She went on to do an MSc. in micro-climatology at Queen's then left to pursue several other opportunities in administration, teaching and computing. She came back to the Lab nine years ago and soon became manager of most of the lab's operations. Aside from her work in rabies and other interests, Peggy was instrumental in developing the Queen's program in Geographic Information Management Studies (GIMS), a program unique among Canadian universities for its interdisciplinary focus.

Peggy's new position is, in many ways, the logical extension of the her work in the GIS Lab but at a much larger scale. While we are delighted for her career advancement, we will miss her very much. Peggy maintains an active interest in "rabies affairs" and she can be reached at: ph@physics.queensu.ca.

Roly Tinline
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Editorial Note: Peggy has been an integral part of the Rabies Reporter and she will be greatly missed by the RRDU staff. We wish her well with her new career choice and hope she continues to maintain an active interest in rabies.

RRDU Surveillance Summary 2003-2004

The 2003-2004 Surveillance Program was conducted to evaluate the success of the aerial baiting programs for both foxes and raccoons, to determine the prevalence of rabies in the animal population in southern Ontario, and to assess population factors of vector species. Specimens collected were cadavers of animals harvested by licensed hunters and trappers (fur harvesters). The surveillance program began on October 15, 2003 and concluded February 13, 2004.

MNR field staff collected the specimens from fur harvesters on a monthly basis (or weekly if necessary) from October 2003 to February 2004. The collection in south western Ontario (SWONT) and central Ontario (CONT) focused on collecting fox carcasses from within the area baited during September 2003. The baits distributed in this area contained ERA vaccine. The baiting area covered approximately 31,500 km^2 from the Bruce Peninsula to Lake Erie and from Lake Huron to Lake Simcoe.

The collection in south eastern Ontario (SEONT) focused on collecting raccoon specimens from a limited area (1,800 km^2) within the zone previously baited (August 2003) with baits containing V-RG. The collection area included all or parts of the following townships: South Sherbrooke, Bathurst, Drummond, Beckwith, Goulbourn, North Burgess, North Elmsley, Montague and Marlborough. Serology and biomarker results from the animals collected from this area will be used in the 'Matching Industrial Initiatives' (MII) project comparing the efficacy of 2 baits, the Ontario Slim (OS) and the Fishmeal Polymer (FP). The FP study area was located in New York State as part of the New York ORV.

Sixty-four fur harvesters (13 from SEONT, 39 from SWONT, and 12 from CONT) participated in this year's program. A total of 127 foxes and 276 raccoons were collected by the fur harvesters and later processed (post-mortem) by MNR staff. Out of the 276 raccoons submitted, 37 were previously ear tagged from TVR.

The samples collected from the specimens are as follows:

- brain tissue for genetic assay
- reproductive evaluation of female specimens to evaluate fecundity and population dynamics information
- upper canine teeth and 2nd premolars for tetracycline assay to determine bait ingestion and age
- blood tissue for rabies antibody determination via ELISA by CFIA-OLF
- brain tissue for rabies status via fluorescent antibody test (FAT) by CFIA-OLF

FAT analysis of 403 brain samples are complete. With the exception of one fox, all samples were rabies negative. The rabid fox was from Logan Township, Perth County in SWONT. This male fox was a road-kill from November 2003 and had mange. Preparation and assay of tooth samples is in progress. Sero-assays are also in progress.

Thanks to all of those who contributed in the 2003-2004 Surveillance Program, including the fur harvesters that provided the specimens, MNR staff that collected and processed the specimens and CFIA-OLF that did the ELISA and FAT analysis.

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Taking Data Into the 21st Century

At the end of every field season, the project leaders look forward to celebrating the successful completion of another year and returning to the office to catch up on their normal workload which has been accumulating on the backburner. The sense of accomplishment from completing another field season without any major catastrophes is exhilarating until someone mentions that nasty four letter word – DATA.

The sense of accomplishment quickly disappears as the biologist begins asking when all of the data will be entered and ready to analyze. At the same time, the scientists and managers are asking the biologist how soon the analysis will be complete so they can make decisions about future programs.

In order to combat this perennial problem, the Rabies Research and Development Unit purchased a new software program. This software program is specifically designed for creating forms to be used in the field to record the data and then electronically capturing the data and exporting it into the appropriate database.

After the data has been recorded in the field, the forms are collected by the supervisor and brought to a central processing site where they are scanned. This amazing software program interprets the data from the scanned forms and automatically exports it to the existing database. In addition, the person scanning the forms is given the opportunity to review the data for any errors. After the forms have been scanned, the software will display the image for each field on the screen. It will also display the values which it interpreted directly below the scanned image. At this time, the person who is scanning the forms can correct any values which have been incorrectly interpreted. This leads to substantially fewer errors associated with the database than if it was manually entered. (Generally, there is not sufficient time to verify 100% of the data when it has been manually entered.) This is a much more efficient method than manually entering the data.

As a result of this less time-consuming method, a person can scan and correct four times as much data in an average day as what they can manually enter without any corrections.

The RRDU's goal is to scan the data throughout the field season so that all data is ready for analysis within a few days of completion of the project. Due to this much quicker method, interim analyses can now also be calculated within the database. Traditionally, these analyses have been calculated by hand during the field season because the results were required before the data could be manually entered. The ability to use pre-defined queries within a database will also save considerable time. These combined advantages should allow field staff to spend more time working doing field work and less time doing paperwork.

We look forward to seeing the actual results and time savings at the end of the first complete field season.

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Peterborough, ON

Dave Antonio's Spirit is Still Part of TVR

It is well into the field season and so far it has been a fairly typical year. Here in the Niagara TVR program, it has been a busy time training our influx of new staff. We have had the usual problems with the truck orders, the usual hectic training week, and the usual controlled chaos that comes with the startup of each trapping season and a mix of new faces, paperwork, and equipment. The returning staff tell the usual stories and jokes, and the new staff enjoy them, but they don't realize that for us "old guys" the jokes and stories are quite unusual this year. Our stories are all right, but nobody could tell a tale like Dave Antonio. Our jokes are still funny, but by the time Dave was done telling them, you were on the floor laughing. Dave was always the bright light at any get-together — be it a party or a meeting. And that's what is missing this year.

Tragically, Dave passed away last winter after a long and ferocious fight. For anyone who had the pleasure of working with him, you will no doubt have great memories of a kind and generous man, who was always at his best playing the host. Whether at his trailer, his house, his hotel room, or the tailgate of his truck, Dave was always ready with a spread to satisfy anybody. And who could resist the company? His good nature and camaraderie were contagious, and anyone joining the party in Dave's hospitality suite instantly became part of a very large group - Dave's group of friends.

Those of us who were fortunate enough to spend a substantial amount of time with Dave will always remember the depth of his kindness. Only if asked would Dave give his opinion and sound advice, but he would give you the shirt off his back long before you even knew you were cold. It is the loss of such a selfless and positive personality that leaves a noticeable hole in the lives of everyone he touched.

Dave's name inevitably comes up at almost every group meeting and to explain his loss, or what Dave Antonio was like to the new staff or anyone who didn't know him is an exercise in futility. It is impossible to convey who he was with a few stories and it is easy to despair that these people will never benefit from Dave's wisdom. What is not so easy, is to realize that by simply mourning the loss we are doing Dave and ourselves a great disservice.

During his first week of trapping this year, I was showing a new staff member a staking method to prevent raccoons from turning over our live traps. When he was done he asked me where I had learned the method. I had to think about it but I eventually realized that Dave taught it to me several years ago. It suddenly dawned on me how much of what I teach new trappers comes from Dave, and how often, when dealing with difficult people, I think "Now what would Dave do?". I also know that I can't be alone in this respect. Anyone touched by his remarkable generosity can't help but offer the same kindness more readily than before.

It is in this way that we can remember and honour Dave the best – passing on what he has shared with us. Whether retelling one of his stories, sharing one of his trapping tricks, or even speaking kindly and respectfully to a stranger, each small act keeps Dave's memory alive inside all of us and enables those who didn't get a chance to experience at least a small part of him. He is dearly missed, and no one could ever replace Dave Antonio, but we could all strive to be a little more like him.

Rob Warren
RRDU
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Editorial Note: Dave was nominated for a MNR PRIDE award in recognition of his contributions and importance to the RRDU.

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Animal Rabies Report: April to June 2004

Animal Type	Fox			Raccoon			Skunk			Other Wildlife			Bat			Dog			Cat			Livestock			Totals		
County or Region	#	Cumulative 04	Cumulative 03	#	Cumulative 04	Cumulative 03	#	Cumulative 04	Cumulative 03	#	Cumulative 04	Cumulative 03	#	Cumulative 04	Cumulative 03	#	Cumulative 04	Cumulative 03	#	Cumulative 04	Cumulative 03	#	Cumulative 04	Cumulative 03	#	Cumulative 04	Cumulative 03
Eastern																											
Stormont, Dundas & Glengarry																									0	0	0
Prescott																									0	0	0
Russell																									0	0	0
Ottawa-Carleton													2	3	3										2	3	3
Renfrew																									0	0	0
Lanark																									0	0	0
Leeds and Grenville						16									2										0	0	18
Frontenac													1	1	1										1	1	1
Lennox & Addington															1										0	0	1
Central																											
Hastings															1										0	0	1
Prince Edward																									0	0	0
Northumberland																									0	0	0
Victoria																									0	0	0
Haliburton																									0	0	0
Peterborough															1										0	0	1
Durham													1	1											1	1	0
York Region													1	1	1										1	1	1
Toronto																									0	0	0
Simcoe							2	3														2	*11*		4	14	0

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County or Region	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		04	03		04	03		04	03		04	03		04	03		04	03		04	03		04	03		04	03
Western																											
Peel																									0	0	0
Halton													2	2											2	2	0
Dufferin								1																1	0	1	1
Wellington															4								1	1	0	1	5
Waterloo															1										0	0	1
Perth		1																							0	1	0
Grey					1		1	2	3														6	1	1	9	4
Bruce							2	3	4													1	2	2	3	5	6
Huron									2																0	0	2
Southern																											
Wentworth															1										0	0	1
Haldimand-Norfolk																									0	0	0
Brant																									0	0	0
Niagara																									0	0	0
Elgin																									0	0	0
Oxford																									0	0	0
Middlesex													1	2											1	2	0
Lambton															2										0	0	2
Kent															2										0	0	2
Essex																									0	0	0

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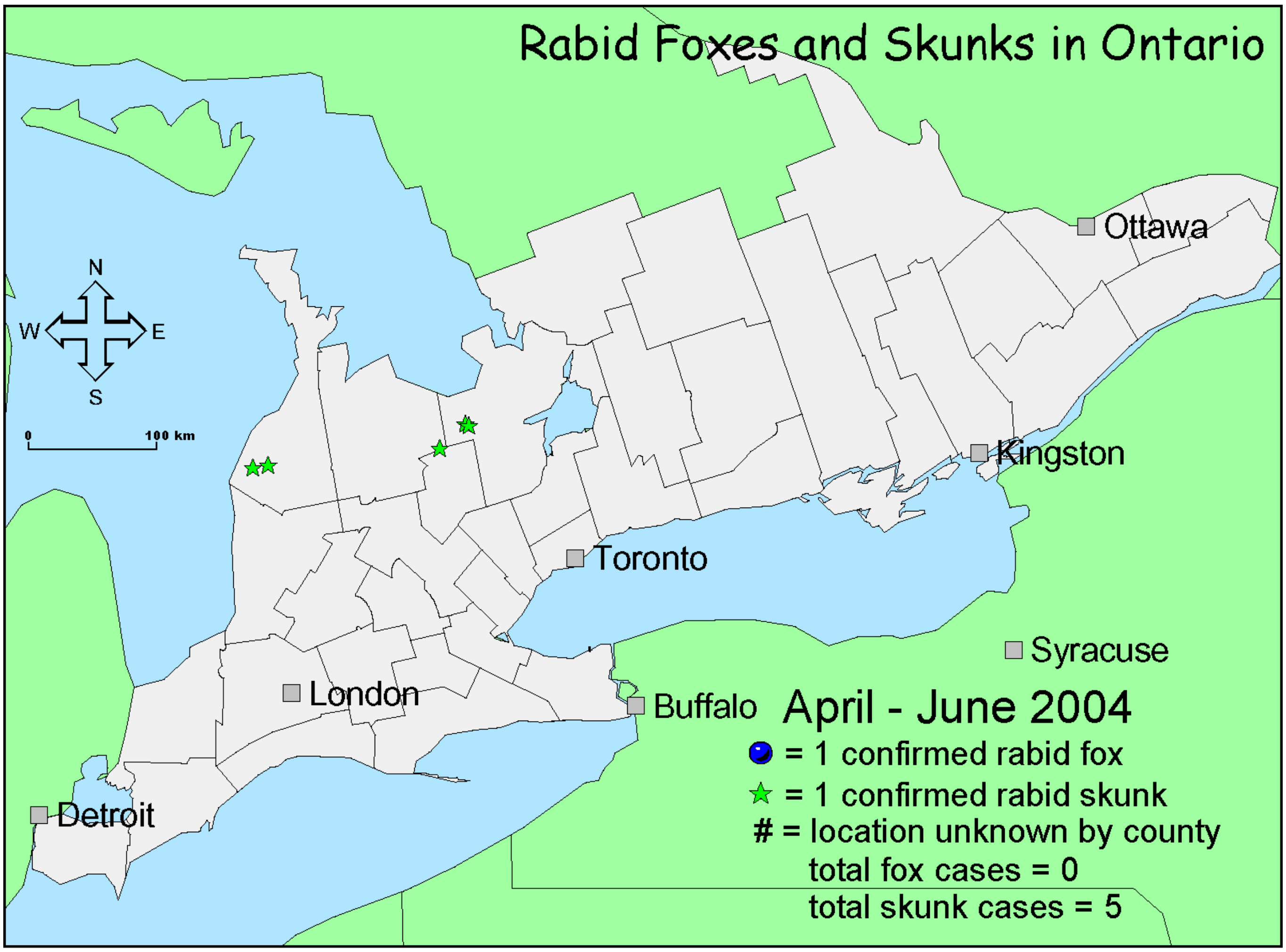
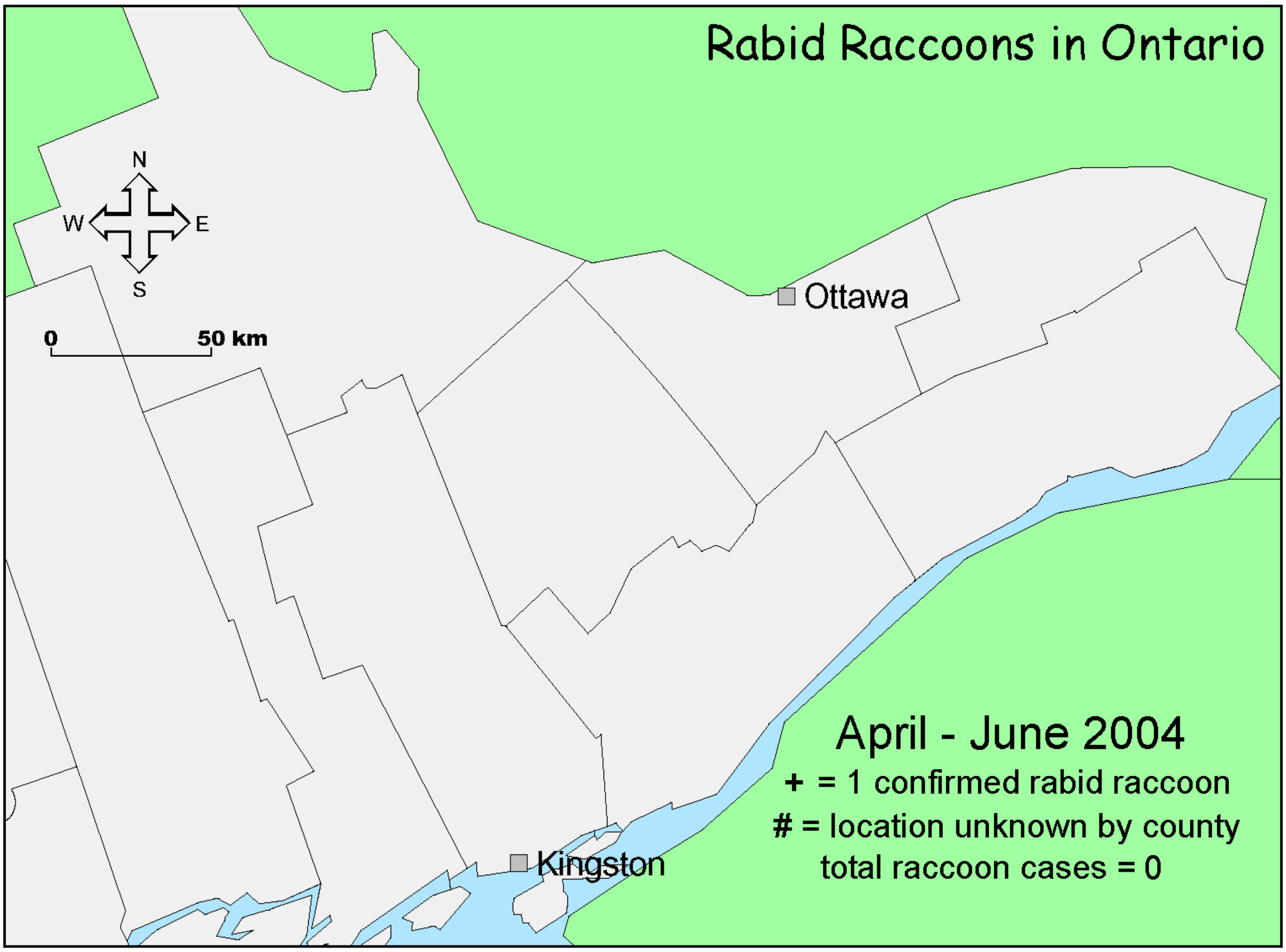
County or Region	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		04	**03**		**04**	**03**		**04**	**03**		**04**	**03**		**04**	**03**		**04**	**03**		**04**	**03**		**04**	**03**		**04**	**03**
Northern																											
Muskoka																									0	0	0
Parry Sound																									0	0	0
Nipissing																									0	0	0
Sudbury												1													0	0	1
Cochrane																									0	0	0
Timiskaming																									0	0	0
Algoma																									0	0	0
Thunder Bay			1																						0	0	1
Rainy River																									0	0	0
Kenora																									0	0	0
Regional Totals																											
Eastern						16							3	4	7										**3**	**4**	**23**
Central							2	3					2	2	3							2	*11*		**6**	**16**	**3**
Western		1			1		3	6	9				2	2	5							1	*9*	5	**6**	**19**	**19**
Southern													1	2	5										**1**	**2**	**5**
Northern			1									1													**0**	**0**	**2**
TOTALS	**0**	**1**	**1**	**0**	**1**	**16**	**5**	**9**	**9**	**0**	**0**	**1**	**8**	**10**	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**20**	**5**	**16**	**41**	**52**

Notes for this quarter:
All bats were big brown bats.
The livestock was a horse in Bruce county and a cow and a goat in Simcoe county.
There are also seven clinical cows included in this table which were not included during the first quarter - 5 from Simcoe county and 2 from Grey county.



GIS Lab, Queen's University
Data Source: Ontario Laboratory-Fallowfield (CFIA)



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