Veterinary Students Study Tuberculosis at Kruger National Park, South Africa

Jeb Mortimer  
*Iowa State University*

Deb Quackenbush  
*Iowa State University*

Andy Piller  
*Iowa State University*

Charles Thoen  
*Iowa State University*

Follow this and additional works at: [https://lib.dr.iastate.edu/iowastate_veterinarian](https://lib.dr.iastate.edu/iowastate_veterinarian)

Part of the [Animal Diseases Commons](https://lib.dr.iastate.edu/iowastate_veterinarian), [Bacterial Infections and Mycoses Commons](https://lib.dr.iastate.edu/iowastate_veterinarian), [Large or Food Animal and Equine Medicine Commons](https://lib.dr.iastate.edu/iowastate_veterinarian), [Respiratory Tract Diseases Commons](https://lib.dr.iastate.edu/iowastate_veterinarian), and the [Veterinary Pathology and Pathobiology Commons](https://lib.dr.iastate.edu/iowastate_veterinarian)

**Recommended Citation**

Mortimer, Jeb; Quackenbush, Deb; Piller, Andy; and Thoen, Charles (1998) "Veterinary Students Study Tuberculosis at Kruger National Park, South Africa," *Iowa State University Veterinarian*: Vol. 60 : Iss. 1 , Article 6. Available at: [https://lib.dr.iastate.edu/iowastate_veterinarian/vol60/iss1/6](https://lib.dr.iastate.edu/iowastate_veterinarian/vol60/iss1/6)

This Article is brought to you for free and open access by the Journals at Iowa State University Digital Repository. It has been accepted for inclusion in Iowa State University Veterinarian by an authorized editor of Iowa State University Digital Repository. For more information, please contact [digirep@iastate.edu](mailto:digirep@iastate.edu).
Veterinary Students Study Tuberculosis at Kruger National Park, South Africa

Jeb Mortimer*, Deb Quackenbush, Andy Piller**, and Charles Thoen***

During the summer of 1996, we had the opportunity to travel to South Africa to study the problem of *Mycobacterium bovis* infection in one of Africa's premiere national wildlife reserves—Kruger National Park. Thanks to financial support from Merck Pharmaceuticals (Merck Summer Research Scholarship Program) and the ISU CVM International Scholarship fund, we spent a total of 6 weeks with veterinary professionals dealing with all aspects of this infectious disease problem. The first four weeks were spent in the reserve assisting the Park Veterinary Staff (Dr. Roy Bengis and Dr. Dewald Keet) with daily activities, as well as working on specific projects related to the *M. bovis* problem. This was then followed by a two-week stay at Onderstepoort Research Institute where we learned the technology related to diagnostic evaluation of *M. bovis* infection.

**Background Information**

The spread of *Mycobacterium bovis* infection in Kruger National Park, South Africa, became a concern in the early 1960s when significant outbreaks occurred in cattle herds located south of the park near the Crocodile River. This outbreak was thought to be controlled, but subsequent outbreaks of Corridor disease (buffalo-associated theileriosis) were also detected in these cattle herds, thus suggesting contact with the Cape buffalo populations of Kruger.

In 1966, an extensive infectious disease survey was performed on the Cape buffalo populations in the southern regions of the park. This study involved over 100 necropsies from most of the southern herds but failed to detect the clinical presence of mycobacte-

---

*Jeb Mortimer is a third-year veterinary student at the Iowa State University College of Veterinary Medicine.
**Deb Quackenbush and Andy Piller are fourth-year veterinary students at the Iowa State University College of Veterinary Medicine.
***Dr. Charles Thoen is a professor and Interim Co-Chair of Microbiology, Immunology, and Preventive Medicine at the Iowa State University College of Veterinary Medicine.
rium infection. However, granulomatous lymphadenitis of an unknown etiology was seen in two animals. A positive diagnosis of bovine tuberculosis was not made until July of 1990, when a two year-old bull was found emaciated and recumbent near the southwestern boundary of the park. At necropsy, disseminated pulmonary and mediastinal lymph node lesions characteristic of *Mycobacterium bovis* infection were discovered. Following this significant finding, during the 1990 buffalo survey/cull, 9 out of 57 animals tested (15.8%) had lesions indicative of tuberculosis. These gross findings were reinforced by the presence of acid fast organisms on histopathology and a subsequent confirmatory culture. This was suggestive of a disease process that had been present for "several years or decades."1

Unfortunately, this problem is not an easy one to solve. During the 1991, 1992, and 1993 culling operations, further diagnostic screening was performed. One thousand six hundred and ninety-five animals (1,695) were randomly culled from herds spanning the entire park. Twenty-six herds out of the 44 herds tested had clinical infection. The spread of this organism throughout the park is currently progressing northward at an appreciable rate. Another unfortunate fact is that the organism is not solely limited to the Cape buffalo populations. There have been documented cases of *M. bovis* in the lion, cheetah, kudu, and baboon populations. It is interesting to note that through the technology of Restriction Fragment Length Polymorphism (RFLP or DNA fingerprinting), researchers have been able to track the identical isotype of *M. bovis* from the original cattle farm in the 1960s to all of the above mentioned wildlife of Kruger.2

Prior to our arrival at Kruger, it was discovered that a troop of baboons near the Skukuza Research Camp had contracted tuberculosis. These animals were showing chronic signs of infection such as coughing, dyspnea, and cachexia. One six-month-old female presented with partial paralysis due to a spinal granuloma. The primary source of transmission to these baboons appeared to be through consumption of infected buffalo tissue that was being stored in biocontainment tubs for incineration. Members of this troop consumed some infected buffalo tissue and then returned to the troop. An interesting epidemiological twist to this situation is that this particular troop spent its nights on a discontinued railroad bridge over the Sabie River. This provided them with effective protection from predators but resulted in an accelerated rate of disease transmission within the troop. On the bridge, there was a small room (10' x 10') where all the dominant troop members spent the night. We had the chance to examine this room, and it was loaded with feces and urine with very limited ventilation. This is thought to be one reason that such extensive lesions are being discovered in these animals.

Members of a baboon troop presumably contracted tuberculosis by consuming tuberculosis-infected buffalo tissues in biocontainment tubs destined for incineration. These baboons then transmitted the disease to the rest of the troop.

Dominant members of a baboon troop spent their nights in a 10' x 10' room on this discontinued railroad bridge spanning the Sabie River. This allowed the troop to escape predation, but accelerated the rate of tuberculosis transmission.
This cross-section of a baboon spleen shows a large granulomatous lesion characteristic of tuberculosis.

The majority of our time at Kruger was spent live-capturing members of this troop, performing tuberculin skin tests, and then conducting post-mortem examinations. The lesions in these baboons were quite varied, depending on the route of exposure to *M. bovis*. Pulmonary lesions were quite marked when present, but several of these animals presented with disseminated pathology including the spleen, liver, kidney, mesenteric lymph nodes, and tonsils. These baboons often did not have associated pulmonary lesions, thus implicating ingestion as a major route of infection.

Currently, the veterinarians and conservation biologists of Kruger are looking at this disease outbreak as an endemic problem that has become a permanent part of the park ecology. Attempts to completely stop the progression of the disease are not very feasible when dealing with a complicated and large-scale ecosystem such as KNP. Researchers at Onderstepoort Veterinary Institute and the Kruger veterinary staff are joining forces in an attempt to develop a less costly, yet more expedient, specific, and sensitive diagnostic test for the detection of *M. bovis* infection.

**Elephant Relocation**

Along with the *M. bovis* work, we were also fortunate to have had the opportunity to help with the first elephant relocation project to occur at Kruger National Park. This project was funded by a number of conservation organizations, and it entailed relocating elephants that would otherwise be culled due to overpopulation. These animals were transported to other nature reserves within South Africa.

The entire procedure was meticulously organized and truck-loads of people were all working together to ensure a safe and successful translocation. As veterinary students, our job was to assist the ground team. Once a family group of elephants was located and determined to be a candidate for transportation, the animals were darted from a helicopter. When the entire herd was immobilized and the helicopter pilot had ensured that there were not any other elephants hiding in the periphery, the ground team raced through the bush in land rovers and tractors to stabilize the anesthetized herd. All elephants were placed in lateral recumbency, identified with a number, and monitored for anesthetic depth until they could be transported. During this time, we performed blood gas studies and maintained their body temperature by pouring cold water over the large vasculature of the ears. In order to transport the elephants, they were first rolled onto a giant rubber sling and winched up onto a hydraulic tractor-trailer. They were then transported to the nearest road and loaded into transportation crates on the back of a semi-truck. Once inside the crate, they were revived in a recovery portion of the crate and allowed to join the rest of the revived elephants. Careful attention was made to allow these family groups...
African elephants that would otherwise be called due to overpopulation are relocated to other nature reserves in South Africa.

to travel together. During our stay at Kruger we had the chance to help the relocation team on two separate projects. Over 100 elephants were scheduled for relocation during the summer of 1996.

**Lion Capture**

Another experience we will not soon forget was lion capture. The Kruger Veterinary Team periodically spends time out in the park performing population studies and infectious disease surveys. This particular time our main interest was looking for lions infected with *M. bovis*. We drove to the northeastern boundary of the park near the Mozambique border and set up camp in an area known for its increased lion density. Our equipment included a small trailer, two pickup trucks, and a rather interesting looking sound system.

When we arrived at our camp, lions feeding on a kill could be heard in the distance. In order to get these large predators to come to our site, we first needed to do a little advertising. This was accomplished by sacrificing a zebra, opening up its abdomen, and tying it to the back of the pickup truck. We then proceeded to drive in a circle (three-mile radius) around the camp. This provided the appropriate amount of scent to ensure that any animals passing through would take notice. We then returned to camp and chained the zebra to a tree located approximately thirty yards in front of our camp. Extensive amounts of thorn bushes were placed behind the tree in order to force the lions to approach the carcass from our side of the tree. Once the carcass was prepared, sounds of a buffalo in distress and hyenas and vultures on a kill were played through the sound system. Within 45 minutes, we were in the company of over twenty spotted hyenas. These animals kept their distance, but definitely made their presence known. Around 3 AM, a solitary lioness approached the kill and she was darted. After examining the animal, Dr. Bengis and Dr. Keet did not feel that she showed any signs suggestive of disease, so anesthesia was reversed. After she recovered, she continued to feed on the carcass until daylight, when she was chased away by a gang of 12 hyenas.

The vervet monkey is a common inhabitant of Kruger National Park. The males can be easily identified by their brilliant blue scrotum.
Conclusion

Throughout our time in Kruger National Park, we were constantly amazed by the beauty and biodiversity that South Africa has to offer. The veterinarians of Kruger National Park, Onderstepoort Veterinary Institute, and the University of Pretoria Veterinary School opened their homes and their facilities to us, and it culminated in a learning experience that changed our lives. Through this experience, we not only gained knowledge relative to the infectious diseases present in other countries, but we also realized that the “greatest profession” transcends all international borders.

References