

# A Modern Plague

## *Rabies in South Africa, Past and Present*

The fact is placed beyond dispute, by the experience of the medical world at large, that the great majority of hydrophobic patients die one of the most painful deaths, it is possible to imagine, life terminating in strong convulsions and in suffocation caused by spasms of the respiratory muscles.<sup>1</sup>

Frank Kerslake, *Rabies and Hydrophobia*, London, 1919

RABIES IS a terrible way to die.

In February 1970, staff at the H. F. Verwoerd Hospital in Pretoria were alarmed and shocked by what for many was probably their first encounter with a rabies victim. The patient, a thirty-one-year-old farmer, known only by his surname, Duvenhage, had been referred to the hospital by a doctor from Warmbaths, located about one hundred miles north of the capital. On 20 February this doctor had visited the patient at his farm, Tooyskraal, where he found him “in a highly agitated state, sweating profusely and continuously and exhibiting signs of involuntary muscle spasm of neck and head.” It had proved impossible to physically examine him because “the slightest touch provoked generalized convulsive spasms particularly of face, arms and torso. During these attacks the patient became wild and aggressive in manner.” Duvenhage explained that he had felt ill for three days, suffering from headaches and muscular pains and that he was tormented by nightmares. Significantly, “He was concerned over a progressive interference in swallowing and felt that this illness was somehow connected

with the fact that a bat had bitten him on the lip while he was sleeping about a month earlier.” Difficulty in swallowing suggested rabies, but up to that point there had been no reported fatalities in southern Africa following a bat bite.

After Duvenhage arrived at the hospital, his death was slow and torturous, for once the symptoms appeared there was no cure. Duvenhage demonstrated the usual characteristics of hydrophobia, or fear of water: “When coaxed to drink water he cried out in pain and underwent intense spasms of the pharyngeal muscles as well as the upper part of the body and arms.” He became aggressive and uncontrollable; sedatives and painkillers had little impact. The hospital reported, “During the night the patient became increasingly violent and difficult to control. A variety of drugs (Valium . . . ) were administered with little, and then only temporary, effect.” By morning he was “completely beserk [*sic*]” and “frothing at the mouth.” He pulled down the drip bottle and dashed it against the wall. He also kicked his attendants. The medical staff had to use “forcible restraint” to achieve sedation. Duvenhage died of respiratory arrest twenty-four hours after admission.<sup>2</sup>

The account of Duvenhage’s death provides some important insights into the nature of rabies and the effect it has on those who succumb to the virus. In between the spasm attacks, the patient experiences long periods of lucidity and is well aware that death is imminent. Death is painful and traumatic for both the victim and the onlookers. Drugs are not always effective at dulling the pain or keeping frenzied patients under control. Once the symptoms appear, several weeks or months after being bitten, death soon follows. Since the development of Louis Pasteur’s antirabic vaccine in Paris in 1885, people who have been mauled by rabid animals have been able to receive a series of postexposure prophylactic injections, which should save the patient so long as they are administered soon after being bitten.<sup>3</sup> Vaccines are effective because the disease has a long incubation period. During the series of injections, the patient builds up his or her own antibodies to attack the virus before it reaches the brain, after which symptoms would appear. Not everyone who is attacked by a rabid beast contracts rabies, but the number of victims is sufficient to justify the need for swift medical treatment of all those injured by a rabid animal.

In many parts of the world, dogs or other canids, such as foxes, wolves, and jackals, are the main vectors, or carriers, of rabies. But this is not always the case. The yellow mongoose (a type of meerkat) in South Africa, the raccoon and skunk in North America, the blood-sucking vampire bat of Latin America, as well as fruit- and insect-eating bats found throughout the world,



South Africa, ca. 1900

are all important reservoirs of this disease.<sup>4</sup> The virus is also unpredictable in its choice of hosts, and the range of carriers can vary and expand, as the Duvenhage case showed. In 1970 South African scientists were unaware that South African bats could transmit rabies, which perhaps explains why the patient did not seek medical attention until it was too late. The sinister nature of rabies means that the virus can remain undetected in fauna yet strike at any time.

Human-animal contacts form the subject of this book, which explores the history of one of the world's most feared diseases in the geographical setting of South Africa. The earliest accounts of rabies in South Africa date back to the early nineteenth century. The country is home to a comparatively large number of rabies viruses, and it has a complex epidemiology that has altered dramatically over the course of the last two centuries. In South Africa rabies is not just a story about dogs, as the disease has been able to adapt to a variety of faunal vectors. Significantly, rabies is a disease that has been on the increase in recent years rather than in decline. In southern Africa rabies has also proved to be a disease that can traverse national frontiers, hosted by animal rather than human carriers, which has

had implications for its control. This means that the history of rabies in South Africa has to be looked at in relation to the rabies situation in neighboring states. In the twentieth century South Africa has emerged as an important center for microbiological and ecological research into rabies, its etiology, its vectors, and its modes of transmission. Moreover, efforts to control rabies in humans and domestic animals have brought to light a range of social and medical issues and provided insights into the nature of power relations and the exercise of scientific authority in colonial and apartheid South Africa.

### Rabies in Historical Context

One of the most notable symptoms that Duvenhage and many other victims of rabies experience is hydrophobia. Hydrophobia has become synonymous with rabies in humans, since other mammals do not experience a pathological dread of water. However, historically, European writers used the terms “hydrophobia” and “rabies” interchangeably for both human and animal cases. Hydrophobia in humans can be understood as both a physical and a psychological manifestation of the disease. Physically, the virus inhibits the operation of the throat muscles, which causes the patient to choke on fluids. The inability to swallow leads to hypersalivation and drooling. Psychologically, the sight or sound of water can generate terror in the mind of the patient, fearful of being choked to death.

In modern times, microbiologists have demonstrated that rabies is almost invariably fatal once the symptoms appear, which makes it a unique, and therefore a very frightening, disease. Normally some people would survive even the severest of classic epidemics. For example, not everyone who contracted bubonic plague in medieval Europe or flu during the 1918–19 influenza pandemic lost their lives as a consequence. To date, however, only three people who had not received any prophylactic injections against rabies are known to have survived the onset of symptoms, as a result of medical interventions that were not available to past generations. The first case, which attained publicity through the documentary *The Girl Who Survived Rabies*, was Jeanna Giese, bitten by a bat in a church in Wisconsin (U.S.) in 2004. Doctors placed her in a chemically induced coma and administered a cocktail of antiviral drugs, which became known as the Milwaukee Protocol, to enable her to build up her own antibodies to destroy the virus. Since 2004, there have been two other survivors, but there have also been a larger number of failures.<sup>5</sup> Stories of survival may offer hope for a future cure, but at present, medical treatment is still generally ineffective because of the way the virus attacks the

nervous system. Consequently, the sense of impending doom attached to rabies ensures that it is a disease that continues to be feared globally today, just as it was in the past.

Nevertheless, people have not always associated hydrophobia with impending mortality. In eighteenth- and nineteenth-century Europe medical practitioners differentiated between two types of rabies: a fatal and a non-fatal type, the latter often being referred to as “spurious” or “hysterical” rabies. With “hysterical rabies,” individuals who had been bitten by an ostensibly “mad dog” became terrified lest they had contracted the disease, and they displayed the symptoms of hydrophobia, from which they eventually recovered. Such behavior was illustrative of the profound psychological effect the disease, both real and imagined, had on some people who had been assailed by vicious or rabid dogs. According to John Blaisdell, who looked at the history of rabies in eighteenth-century Britain and New England, “hysterical rabies” was a neurological condition that created an exaggerated sense of the disease’s prevalence and contributed to the mass panics that accompanied rabies scares throughout Europe before the arrival of the Pasteur vaccine. Consequently, when Pasteur publicized his discovery of an antirabic prophylactic, people flocked to Paris from many parts of the world, including South Africa, to receive this treatment, which was indicative of the psychological trauma rabies caused.<sup>6</sup>

In their 2007 book on rabies in nineteenth-century Britain, Neil Pemberton and Michael Worboys also questioned why hydrophobia evoked such horror and why rabies attracted more popular attention than mortality rates appeared to justify. Between 1837 and 1902 (when the disease was eradicated from Britain) reports showed that 1,225 people had died of rabies, making an average of under twenty cases per year. There were far fewer fatalities from rabies than from other diseases, such as tuberculosis, measles, and influenza. Only the fear of falling prey to cholera, which also led to a gruesome death, desiccating the body through extreme dehydration, could parallel the terror of dying of rabies. Both diseases resulted in the loss of control over bodily functions in a way that was psychologically degrading. Rabies “dehumanized” patients, turning them into uncontrollable “animalistic” beings. Rabid patients lost their sense of reason; they could become wild and aggressive, frothing at the mouth like savage beasts. Their behavior revealed the fragility of human civilization, a mask that only thinly disguised baser, bestial instincts within. In class-conscious Victorian Britain, where social status was partly contingent on public appearance, commentators claimed that poorer people became particularly wild when enduring the throes of rabies.<sup>7</sup>

In Britain the rich often blamed the poor for rabies outbreaks. It was inconceivable to the wealthy owners of pedigreed hunting hounds and parlor poodles that their well-bred and well-fed dogs could possibly be susceptible to a disease as ghastly as rabies. For them rabies was a disease of the streets, of half-starved mongrels and curs that roamed the thoroughfares, of animals mistreated by their masters and forced to engage in working-class pursuits such as dogfights. In the writings of the literate bourgeoisie, the behavior of the street dogs mirrored that of their owners.<sup>8</sup>

This was also true of South Africa, as shown in the only existing historical account of rabies in that country. The article, written by Lance van Sittert, looked at the first recorded epidemic of canine rabies in South Africa, in Port Elizabeth in the Cape Colony. The disease was practically unknown to white settlers in South Africa during the nineteenth century. But in 1893 a pedigreed dog imported from Britain brought the virus southward. Expensive, foreign dogs had become symbols of wealth and status in the eyes of the white middle-class elite, who acquired them not just as pets, but in order to emulate the leisured hunting practices of the British gentry. The Cape government responded with quarantines, the culling of strays and compulsory muzzling orders, mirroring British antirabies policies of the time. These strategies were successful; the disease did not spread to the hinterland, and the port was cleared of rabies by 1895. As in Britain, the outbreak reflected various class tensions between the rich and the poor, the former denying responsibility for starting the epidemic and assuming its origins lay in the verminous streets. South Africa's racial history added a colonial aspect to the social construction of rabies. Not only did the bourgeoisie associate rabies with the hounds of the working classes; they also believed blacks were responsible for disseminating the disease, as they were purportedly incapable of looking after their dogs in a "civilized" manner.<sup>9</sup>

### The Biology of the Rabies Virus

The origins of rabies are unknown. But it is clearly an ancient disease. Records going back more than four thousand years showed that the ancient Mesopotamians, Greeks, and Romans knew that "mad dogs" spread rabies, and many writers believed that the source of the disease lay in the sick animal's saliva.<sup>10</sup> Since then it has been identified in a range of wild-life species. Scientists refer to rabies in wildlife as sylvatic rabies. Recently, microbiologists have postulated that the disease might have originated in Africa many millennia ago, due to the comparative variety in types of rabies viruses on that continent. African bats were possibly the initial hosts, as some have evolved a resistance to the virus, suggesting a long period of

exposure and ongoing adaptation.<sup>11</sup> All warm-blooded animals are susceptible to rabies, but some mammals are more vulnerable than others. Because the virus is particularly virulent in canids and because dogs live in close proximity to humans, canines constitute the primary vector of the disease worldwide.

Rabid dogs, just like humans, experience psychological as well as physical symptoms. Some develop “dumb” rabies in which they rapidly become paralyzed and die. Others display the more popularly recognizable symptoms of “furious” rabies. Both are caused by the same virus. With furious rabies, dogs become aggressive and wander long distances, picking fights with other canids, animals, and sometimes humans. The drooling jaws, the frothing at the mouth, and the strange howl that a rabid dog utters enhance the savage and menacing aspect of the sick animal.

In dogs, as in other mammals that succumb to rabies, the virus has found a unique way of reproducing itself—by altering the animal’s behavior. The virus can transform the most placid and timid lapdogs into ferocious and fearless biting machines. But it also happens that otherwise aggressive dogs can turn into seemingly docile hounds, which are nonetheless programmed to snap at unwary passersby. The docile rabid dog along with those that die of “dumb” rabies are particularly dangerous because their lack of obvious symptoms means there are no clear warning signs that they are sick. That many people who die of rabies contract it from domestic dogs also illustrates how insidious the disease can be. Domestic dogs, construed as “man’s best friend,” occupy a special position in the human household. But their interactions between the enclosed private home and the open public streets can portend danger. Rabies is a disease of the wild, but it is also a disease of the hearth, and the dog has been the most important interface between these two spheres.<sup>12</sup>

The danger posed by rabid dogs was the incentive for medical investigations of rabies. Since the development of Louis Pasteur’s vaccine there has been an exponential increase in scientific understanding about the etiology, pathology, and epidemiology of the disease. Rabies is caused by a tiny virus of the *Lyssavirus* genus that is visible only under an electron microscope.<sup>13</sup> In the 1960s scientists discovered the virus’s bulletlike shape, and since then they have begun to explore its genetic makeup and trace its evolution. The germ has a predilection for nervous tissues, where it multiplies at the location of the bite, undetected by the victim’s immune system. It is only when the virus has traveled up the peripheral nerves to the brain that the body responds and the characteristic symptoms appear, by which time it is normally too late to treat the patient.

Rabies is not caused by a single virus but by one of seven genotypes. Genotype 1 is known as classical or cosmopolitan rabies. Historically, this is the virus that has infected dogs throughout much of the world, has terrorized the public, has generated the initial scientific searches for a vaccine, and has encouraged national governments to legislate to control the dog population. The term “classical” rabies emphasizes its ancient origins, whereas “cosmopolitan” refers to its almost global epidemiology. It is present in all continents except Australasia and is the most common type of rabies virus worldwide. Australia and New Zealand have evaded the disease due to geographical isolation and the imposition of strict quarantine regulations, dating back to the late eighteenth century, on imported dogs. This virus is found in wild canids such as foxes and coyotes as well as in other species such as bats, raccoons, and skunks. In South Africa the yellow mongoose is an important vector, and the biotype (or variant) it carries is related to the classical rabies virus, suggesting that perhaps it too has primordial origins.

The other six genotypes are known as rabies-related viruses because they are genetically slightly different from cosmopolitan rabies. However, they all produce similar symptoms and are treated with the same injections. Most are carried by bats. Material isolated from the brain of the unfortunate Duvenhage revealed that he had died of an unusual strain of the virus, which was named Duvenhage after him. Microbiologists have so far discovered that South Africa and neighboring Zimbabwe are home to four of these genotypes, possibly more than have been identified in any other part of the world. In South Africa, both the canine and mongoose biotypes of the classical virus, as well as three rabies-related genotypes, Duvenhage, Lagos bat, and Mokola, all circulate among the nation’s fauna.<sup>14</sup>

Biomedical interpretations of the etiology of rabies epitomize a Western approach to disease causation. Unfortunately, very little is known about how African communities have understood rabies and tried to deal with it. Accounts from Barotseland, north of the Zambezi River in present-day Zambia, date back to the late nineteenth century, and it is evident from the missionary records that the Barotse linked canine rabies with hydrophobia and dealt with outbreaks by destroying dogs. But these missionary memoirs did not tell us how the Barotse conceptualized the disease and whether they associated it with natural or supernatural causes.<sup>15</sup> The situation is similar for South Africa. As this book will show, African rural communities contributed to the collection of epidemiological data about rabies. However, in their reports rabies investigators did not record African ideas about the provenance of the disease. Perhaps they never asked those

types of questions. Nor do we know whether Africans differentiated between physical and psychological symptoms or how they treated rabies victims. These are interesting issues that lie outside the scope of this history, but future historical and ethnographic research might provide some interesting insights into these questions.

### The Emergence and Resurgence of Rabies in South Africa

The earliest accounts of rabies in South Africa date back to the early nineteenth century, when the British took over the Cape of Good Hope from the Dutch East India Company during the Napoleonic Wars. In the nineteenth century Europeans appropriated more and more land in southern Africa, defeating African states and parceling out territory among white settlers. Some Africans continued to occupy or work on settler farms, although others were forced to live in the designated reserves. Power in nineteenth-century South Africa became consolidated in four states: the Cape and Natal controlled by Britain and the two independent Afrikaner republics, the Orange Free State and the Transvaal (South African Republic) in the hinterland. Britain annexed these republics during the South African War (1899–1902), and in 1910 the four provinces formed the Union of South Africa. Political and economic power remained concentrated in white hands until the end of apartheid in 1994. The development of mining capitalism, especially following the discovery of gold in 1886 on the rand near present-day Johannesburg, along with the industrial boom of the twentieth century, fueled urbanization and encouraged labor migrancy from the rural areas to the mines and cities. Colonialism brought about major political and social changes and had an important impact on the distribution and dissemination of rabies.

Since the 1930s the number of recorded deaths from rabies has risen in South Africa. Two hundred years ago many European writers assumed rabies did not exist south of the Zambezi River. This belief was reinforced by a lack of accounts of rabies from the region itself. The Cape archives are bereft of documents referring to rabies during the period of Dutch East India Company rule dating back to 1652. This suggests that the disease either did not exist, or if it did, fatalities were insufficient to attract official attention. However, that scenario changed over the course of the nineteenth century, and especially the twentieth century, when doctors reported that many people in South Africa were dying of hydrophobia, contracted from a range of domestic and wild animals. The yellow mongoose, the genet (a type of wildcat), and, from the 1950s, the domestic dog were the main culprits. Most of these recorded cases occurred after Pasteur's discovery of a vaccine and

the emergence of diagnostic techniques, which theoretically implied that rabies should never have been able to pose a significant long-term threat to human life in South Africa. The twentieth century also witnessed the development of pre-exposure injections to protect humans, dogs, cats, and some other mammals from rabies. Post-exposure inoculations have improved too and are generally administered in the arm, rather than in the stomach. Today human deaths are rare in Europe and North America due to medical treatment and the successful control of rabies in the domestic dog and cat population through routine vaccination. Unfortunately, that is not yet the story for South Africa or for many other parts of the developing world.

In South Africa up to thirty people on average die in hospital of hydrophobia annually.<sup>16</sup> In some years, local epidemics, such as that which struck the northern Limpopo Province in 2005–6, augmented the mortality figures. But these statistics are thought to represent only the tip of the iceberg because, for a range of cultural and economic reasons, many people who contract rabies do not seek medical treatment and die at home, the cause of death uncertified. Poor blacks, living in remote rural areas with inadequate access to health care or veterinary medicines, as well as those who have flocked to the overcrowded, squalid informal settlements that surround the major cities, are the main victims of this disease. Children are particularly vulnerable because their small stature makes them easy targets for rabid beasts.<sup>17</sup>

Mortality figures for rabies might be minuscule in comparison with the death toll wreaked by HIV/AIDS, tuberculosis, or malaria, but these figures are nonetheless important because they signify needless deaths. Had the victims received medical treatment after being bitten they probably would have lived. History shows that human rabies in South Africa is a consequence of poverty, ignorance, political incompetence, and neglect. But it is also a disease that, over the nineteenth and twentieth centuries, has followed a shifting trajectory in South Africa as a result of human activities and environmental changes. This book examines these issues and considers why, despite the availability of vaccines and initiatives to protect human lives by controlling the disease in the dog and wildlife population, rabies is on the rise in South Africa: it is both emergent and resurgent.

The reasons for the emergence and resurgence of rabies lie in the environmental factors that have enabled the virus to find a niche among a range of mammalian hosts, as well as the political and socioeconomic consequences of colonialism and apartheid. Folk knowledge, more recently backed up by virological testing, showed that South Africa had its own indigenous form of rabies in mongooses as well as an imported form in

dogs.<sup>18</sup> The type of rabies carried by mongooses in South Africa is unique to that country and is therefore of historical and epidemiological significance. Medical interviews with rural communities in the 1920s revealed that a number of people who had been bitten by yellow mongooses died from hydrophobia each year. People often came into contact with these creatures because they invaded the homestead. Rabid meerkats<sup>19</sup> lose their sense of fear; the virus impels them to wander into houses, cattle kraals, and poultry pens in search of new hosts.

Since the 1950s there have been major changes in the epidemiology of the disease. More people now die of canine rabies than mongoose rabies. Until 1950 canine rabies was rare in South Africa. There was only one recorded epizootic before 1950, the Port Elizabeth outbreak of 1893. From around 1940, however, rabies moved southward from central Africa, reaching South Africa in 1950. Since then it has proved ineradicable. Canine rabies took hold in South Africa during the apartheid era (1948–94), when the ruling National Party consolidated and extended the racist and segregationist policies that had characterized the country's earlier history. A key aspect of apartheid ideology was to divide Africans into different ethnic groups, each of which would have its own "independent" homeland, or bantustan. However, these homelands were never internationally recognized and led to the fragmentation of South Africa's political life, making disease control campaigns difficult to organize and coordinate. Insufficient investment in the medical and veterinary infrastructures of the homelands and the informal settlements that burgeoned around the major cities, compounded by grueling poverty and ignorance about the availability of human and canine vaccinations, coalesced to undermine efforts at rabies control.<sup>20</sup>

Human deaths from HIV/AIDS have exacerbated the rabies problem. AIDS has had a devastating impact on the population of South Africa, and in parts of the country dogs of deceased owners have become strays that form packs that scavenge for food in order to survive. Communal foraging has facilitated the spread of rabies through the exchange of infected saliva, and feral dogs can terrorize poorer communities. Importantly, not only has the province of KwaZulu-Natal been particularly badly struck by the HIV virus, it has also been the site of the highest number of recorded deaths from hydrophobia in South Africa since the 1970s. Rabies is thus historically and currently linked to the political economy of HIV/AIDS, and its ongoing prevalence is one of the surprising and alarming consequences of the AIDS epidemic.<sup>21</sup>

Since the 1950s rabies has infected not only domestic dogs but also wild canids, such as jackals, bat-eared foxes, and the African wild dog.

In addition, microbiologists have identified rabies in several species of mongooses, antelopes, and wildcats, as well as in squirrels, hyenas, honey badgers, striped polecats, zebras, baboons, and bats. In South West Africa (now Namibia), run by South Africa from 1915 to 1990, there was a major epizootic among kudus in the 1970s and 1980s, killing thousands of these antelopes and damaging many livelihoods. The outbreak showed that the virus did not always rely on the jaws of carnivores for its survival and propagation, as communal browsing on the same herbage possibly enabled rabies-laden saliva to cross from one kudu to another.<sup>22</sup> This kudu epizootic, as well as those that have followed since the 1980s, demonstrated the virus's varied modes of transmission in southern Africa, raising additional scientific and political challenges for rabies control.

South Africa's rich wildlife reservoir has increased the potential for human exposure to rabies and threatened the well-being of domestic animals that are important for the regional economy. Possibly no country in the world, with the exception of the United States, possesses such an assortment of rabies vectors. In Europe, by contrast, rabies has been primarily a canine affair, and historians have largely focused on the impact of this disease in metropolitan settings.<sup>23</sup> In South Africa, however, rabies inhabits both rural and urban spaces. The virus flirts between the wild and the domestic, as rabid mongooses, genets, and jackals bring rabies into the farmsteads and townships. Infected dogs can pass the virus on to jackals and other canids, perpetuating an ongoing web of transmission between domestic and wild fauna. Rabies also has the ability to decimate endangered wildlife species, such as the African wild dog, adding a conservationist dimension to the rabies story and reminding us that animals as well as humans are victims of this disease.<sup>24</sup> The survival, albeit a sometimes precarious one, of wildlife in South Africa despite human population growth and the expansion in commercial agriculture since the nineteenth century has revealed not only the difficulties farmers and the state face in trying to manage game and the diseases they carry but also the importance of wildlife as part of the country's national heritage.

Animals have held an ambivalent position in the South African psyche. For pastoralists, game competed with livestock for edible grasses. For farmers of arable lands, wild animals that could not be herded damaged or devoured crops. Some animals such as jackals also preyed on livestock, and from the late nineteenth century the Cape government offered bounties for the destruction of these canids, as they undermined the colony's important wool industry.<sup>25</sup> Most rural people were also unnerved by marauding elephants and carnivorous felines. For that reason farmers have

consistently striven to clear land of wildlife by trapping, shooting, poisoning, or fencing. For other groups, mainly townspeople, hunters from overseas, and tourists, game has held a different cultural value that has altered over time. During the Victorian era game hunting was associated in the Western imagination with masculinity, physical prowess, and the attainment of bourgeois respectability.<sup>26</sup> This resulted in the decimation of animals from much of southern Africa during the nineteenth century, which in turn led to the emergence of politically influential conservationist lobbies in both Britain and South Africa. South African states responded to this growing protectionist ethos by restricting hunting and founding game parks. For example, in 1898 the Transvaal government created the Sabi Reserve, which became the nucleus of the Kruger National Park, inaugurated in 1926. Around the same time, the British in Natal established the Umfolozi and Hluhluwe Reserves in Zululand. Politically and culturally the game reserves were problematic because during the years of white political supremacy, Africans were forced out of the parks or denied access to them. National parks were about a “white heritage” and conceptualization of an African landscape teeming with game.<sup>27</sup>

However, for farmers and veterinarians the survival of wildlife has posed considerable problems for disease control. Many scientists viewed game reserves as sanctuaries not only for wildlife but for serious infectious diseases such as nagana (bovine trypanosomosis, akin to human sleeping sickness) and tuberculosis.<sup>28</sup> In the twentieth century there were concerns that rabies might spread to the game reserves and thus create an endless source of transmission. Fears mounted in the 1980s when scientists isolated the rabies virus from hyenas in the Kgalagadi Transfrontier Park that spans the South African–Botswanan border.<sup>29</sup> Rabies has continued to highlight the problematic nature of wildlife protection, which at times has been at odds with concurrent state agendas of improved public health and agricultural growth.

It will become clear from the narrative that geographical and political borders were important in explaining the distribution of rabies. The rabies situation in South Africa was contingent on the existence and the effective control of rabies in nearby states. In 1902, for example, rabies reached South Africa’s northern neighbor, Southern Rhodesia (now Zimbabwe). The Rhodesian authorities eradicated the disease in a decade or so, and the virus did not cross the Limpopo River into South Africa. In contrast, the arrival of canine rabies in South Africa and Southern Rhodesia in 1950 was a result of the southward progression of the disease from north of the Zambezi River through the Bechuanaland Protectorate (now Botswana), from where the virus dispersed into surrounding countries. The spread of

rabies demonstrated the potential porosity of geographical and political frontiers, and illuminated some of the factors that have enabled the cross-border transfer of serious diseases. The fact that South Africa did not succumb to rabies in the first decade of the twentieth century showed that the transfrontier dissemination of infections was not always inevitable. Particular political, ecological, demographic, and socioeconomic circumstances helped explain why the earliest rabies outbreaks in the region proved controllable and why, from around 1950, canine rabies was able to spread throughout much of southern Africa, where it remains a medical and veterinary scourge to this day.

### Themes of the Book

A history of rabies in South Africa is important not only because the disease is on the increase and has an interesting and unusual epidemiology but also because its story provides a lens through which to analyze various aspects of the country's environmental, medical, and social history. To contextualize the history of rabies in South Africa, this book elaborates six main themes that collectively explore human-animal relationships and the impact rabies has had on developments in science and on public health policies.

The first theme is that of human-animal interactions and the way zoonotic diseases, or infections that pass between animals and people, reflect the precarious relationship humans enjoy with other creatures. Zoonoses such as rabies show how humans are very much part of nature and, despite cultural and technical advances, will always be susceptible to its vicissitudes. Zoonoses demonstrate that animals, as opposed to just germs, can threaten human health and are consequently something to be feared. The history of rabies pertinently relates to current concerns about the rise and spread of a number of serious and deadly infections that originated in other species. In 2005–6, the media attention given to the appearance of the H5N1 avian flu virus, which infects both wild and domestic birds and could potentially mutate to become easily transmittable between humans, was symptomatic of public fears about the ability of viruses to cross species boundaries. Similarly, the emergent H1NI or swine flu virus created a palpable panic in 2009 and pointed to pigs, rather than birds, as a source of a possible global flu pandemic.

Africa is home to a number of zoonotic diseases restricted to that continent, such as sleeping sickness, a parasitic disease transmitted by tsetse flies from immune game to susceptible humans.<sup>30</sup> Others diseases, identified since the 1960s, include the viral hemorrhagic fevers lassa and ebola, hosted by rodents and fruit bats respectively. Currently, these hemorrhagic fevers

exist only in the African rainforests, but descriptions of the terrifying symptoms, which include the liquefying of the internal organs and the oozing of blood from every orifice, create vivid mental images of a dreadful death. Even though mortality figures are comparatively low, these diseases capture the imagination in a way that is out of proportion with the likelihood of contracting them.<sup>31</sup> Such ideas are reinforced by popular science books such as Laurie Garrett's *The Coming Plague*, which combines storytelling with factual information about the evolution of a number of gruesome and highly fatal infections, many of them involving animals.<sup>32</sup> Like the hemorrhagic fevers, rabies remains a disease to be feared, even if the chances of catching it are relatively remote. Even in countries such as Britain, which has been free of rabies since the early twentieth century, there is an ongoing concern and a foreboding presumption that rabies will one day return.<sup>33</sup> The history of the emergence and resurgence of rabies in South Africa fits into this wider picture of changing disease patterns that can be linked to the evolution of microbes and their adaptability to new hosts. As canine rabies is relatively new to South Africa, and has only become endemic since the 1950s, it is possible to explore the rise of an emergent disease in action.

The second theme is the cultural impact rabies has had on how South Africans have viewed wildlife. As already mentioned, South Africans have had a love-hate relationship with game. Once scientists had detected rabies in particular animals, their cultural status altered. Rabies transformed jackals and mongooses from irritating thieves of small livestock and poultry into carriers of a fatal disease that could endanger lives and damage rural livelihoods. Rabies shifted definitions of vermin from animals that were predators to animals that were also reservoirs of disease. From the 1930s rabies encouraged animal culling on an unprecedented scale as farmers and veterinarians tried to destroy rabies carriers through poisoning, trapping, and gassing. Extensive animal slaughter was symptomatic of the intense psychological fear that rabies could generate. During the mid-twentieth century in particular there was the sense that rabies could get out of control and sweep through the country, assuming epidemic proportions, unless the vector populations were dramatically reduced. However, by the 1980s, killing became increasingly controversial, and some scientists, conservationists, and dog lovers voiced criticism of this policy. These tensions revealed the ongoing equivocal status of wildlife in the South African consciousness, as well as disputed approaches to tackling rabies.

The third theme is the socioeconomic impact of colonialism on the distribution of rabies. In this way the story of rabies relates to other historical accounts that have looked at how colonialism has aided the spread of

diseases such as smallpox and sleeping sickness through warfare, population movements, and various settlement and agricultural programs aimed at furthering rural development.<sup>34</sup> In South Africa the emergence of rabies and a number of other diseases was closely linked with colonialism and the expansion in capitalist production. The importation of foreign livestock into South Africa during the nineteenth century to commercialize the agricultural sector resulted in the arrival of new animal diseases, especially in cattle, such as lungsickness (contagious bovine pleuropneumonia) in the 1850s, rinderpest in the 1890s, and tick-borne east coast fever in the early twentieth century.<sup>35</sup> The 1893 rabies outbreak in Port Elizabeth revealed that pets as well as livestock could be carriers of infection. During the nineteenth century, the trade in pedigreed dogs also led to the transfer of rabies from Europe to a number of colonies in Latin America and Asia. The history of rabies therefore fits in with Alfred Crosby's concept of a "Columbian Exchange" and the global movement of biota, including pathogens, which followed European expansion from the days of Christopher Columbus. Crosby focused his arguments on the high death rates that struck the local population of Latin America when the Spanish conquistadores unwittingly brought smallpox and measles in their wake in the early sixteenth century.<sup>36</sup> The immediate death toll inflicted by the introduction of canine rabies to the Cape and elsewhere was minuscule in comparison with that due to smallpox in Latin America, but environmentally the comparisons were of degree rather than effect. European colonialism, and the human and animal population movements this facilitated, contributed to the international spread of the rabies virus.

In the early 1950s some scientists associated the reappearance of canine rabies in South Africa with labor migrancy to Johannesburg's gold mines from British colonies north of the Zambezi River, where rabies was endemic. In the ensuing decades, colonialism eventually gave rise to African resistance, and the collapse of European imperialism in southern Africa was often protracted and bloody. Social unrest and warfare blighted the road to democracy and resulted in the collapse of veterinary and medical services, as well as the flight of beleaguered people and their dogs to places of comparative safety. In such a political environment diseases that infected both humans and animals could flourish and escalate out of control. The resurgence of rabies was part of that epidemiological picture and showed how violence, just like trade and migrancy, aided the spread of rabies throughout the region during the colonial and apartheid periods.

The colonial period was also a time of medical change, which relates to the fourth theme of the book: the evolution of Western knowledge

about rabies. During the early nineteenth century, European doctors and travelers discussed rabies in the medical language of the day, which revolved around concepts of miasma, climate, and spontaneous generation. By the late nineteenth century environmental and miraculous assumptions about the origins of diseases gradually gave way to germ theories, paving the way for the development of vaccines.<sup>37</sup> The study of rabies contributed to the growing importance of the microbiological and ecological sciences in South Africa. This relates to historiographical debates about “colonial medicine” and whether “colonial science” was different from or inferior to that produced in the European metropole.<sup>38</sup> Some historians, such as Saul Dubow for the South African context, have shown that the development of science in the colonies was an important cultural indicator of growing political and social maturity, and demonstrated the country’s ability to manage its own environment and hence its own destiny.<sup>39</sup>

South Africa asserted its scientific independence from Britain in founding the Onderstepoort Veterinary Laboratory near Pretoria in 1908. This institution reflected the importance the state attached to veterinary research, and it became one of the foremost laboratories in colonial Africa, as well as a major locale for rabies investigations.<sup>40</sup> In dealing with rabies, South African scientists built on knowledge from Europe and elsewhere. Britain provided the regulatory models of quarantines, culling, and muzzling, but that country was not at the forefront of vaccine research. The biggest breakthroughs in European strategies for managing rabies came from France, with the discovery of the Pasteur vaccine. During the twentieth century most of the sweeping advances in prophylactic technologies, as applied in South Africa, have come from the United States. South Africa’s major contribution to the history of rabies has been the identification of multiple strains of the virus and their existence in a wide range of fauna. Such discoveries, dating back to the 1920s, highlighted South Africa’s scientific advancement in a colonial setting and its ability to produce its own science, independent of Britain.

An expanding knowledge about the etiology and epidemiology of rabies has had an important impact on policymaking, which brings us to the fifth theme: the role of the state in rabies control. Since the Port Elizabeth outbreak of 1893, successive governments have invoked a number of measures to try to eradicate, or at least control, rabies. These changed in response to developments in biomedical technologies and the shifting sources of infection. The measures used to tackle canine rabies in Port Elizabeth, for example, were inappropriate for dealing with mongoose rabies in the rural areas. As meerkat rabies entered the veterinary cosmos

in the late 1920s, gassing the underground warrens in which they lived became the official method of disease control. Canine vaccines were available in South Africa from the early 1950s and presented alternative possibilities for disease management, theoretically reducing the need to muzzle and cull dogs. Ironically, however, improvements in technology did not necessarily result in more effective public health policies. Vaccines alone could never solve the disease problem however biologically efficacious they might be. The fractured nature of the South African health and veterinary services that resulted from the bantustan policy, and the civil unrest that characterized the struggle against apartheid, clearly revealed the limitations of scientific interventions when applied against a background of political disunity and instability.

Political instability was also a reflection of deeper tensions within society. The sixth theme is concerned with how rabies brought some of these social anxieties to light. Some historians have regarded epidemics as useful tools for analyzing broader social problems and cultural trends that surface in times of crisis.<sup>41</sup> This was true of rabies outbreaks in South Africa, especially when it reached the urban areas, such as Port Elizabeth in 1893, and later in 1961, when canine rabies first arrived in the cities of Pietermaritzburg and Durban in Natal. Whites were quick to castigate blacks and their dogs as perpetrators of rabies and rarely considered the consequences of their own actions. To the white readers who submitted their letters to local newspapers in 1893 and 1961, African-owned dogs were essentially pathogenic and posed a dangerous and potentially uncontrollable threat to public health. Africans responded with their own indictments of the racially discriminatory way in which the authorities enforced the anti-rabies regulations. After 1950 some blacks openly rejected state efforts to inoculate their dogs, illustrating a distrust of Western medicine as well as opposition to the undemocratic regime that imparted these measures.

Once canine rabies became an enzootic disease in dogs in parts of the country after 1950, the long-term economic divides that have scarred South African society have become increasingly apparent. For instance, blacks who have sought hospital treatment have at times found their access to such services blocked because of costs or the lack of local medical facilities. Under apartheid, there was much greater investment in white hospitals than in black hospitals, so whites had far fewer difficulties in acquiring vaccines. This was symptomatic of racial disparities in state-funded medical care. Hydrophobia has become a disease that primarily affects poor Africans living in impoverished areas. Immiseration and political marginalization remain enduring legacies of colonialism and apartheid. The

history of rabies thus informs some of the social, economic, and cultural injustices blacks have experienced in nineteenth- and twentieth-century South Africa.

In tackling these themes, I take a broadly chronological approach in this book, commencing with the early nineteenth century, when white male doctors, settlers, and travelers debated whether rabies existed in South Africa at all. The Port Elizabeth epidemic of 1893 challenged these uncertainties. This outbreak constituted a pivotal point in the history of rabies because it brought the disease before the public consciousness in a way that it had never registered before. The authorities succeeded in ostensibly eradicating the disease from Port Elizabeth, as did their Southern Rhodesian counterparts when rabies arrived in that colony in 1902. By the 1920s it was the turn of the yellow mongoose to catch the limelight as scientists identified meerkats as perilous vectors. With the return of canine rabies to South Africa in 1950, the disease became increasingly prevalent, adapting to wildlife and dispersing throughout the region. Once canine rabies invaded Natal in 1961, it shifted from being just a predominantly rural problem to becoming an increasingly urban nightmare, with denser settlement enhancing the danger of human exposure to the virus. KwaZulu-Natal, in particular, remains a hotbed of rabies, and agonizing deaths, like that endured by Duvenhage forty years ago, are still a reality in contemporary South Africa. This book tells the story of how that came about.