KURU, PRIONS, AND HUMAN AFFAIRS:  
Thinking About Epidemics

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Abstract  The study of epidemics provides a unique point of entry for examining the relationships among cultural assumptions, institutional forms, and states of mind. The Black Death is said to have contributed to the emergence of nation states, the rise of mercantile economies, and the religious movements that led to the Reformation. It may also have brought about new ways of understanding God, the meaning of death, and the role of authority in religious and social life. Cholera induced a public health approach that stressed quarantine, and venereal diseases led to contact tracing. Western medicine, however, failed to cure the epidemics that resulted from imperial expansion into the Americas, Asia, Africa, and Europe. The focus of this essay is on the impact of two contemporary epidemics considered to be caused by prions: a newly recognized infectious agent: kuru in Papua New Guinea and bovine spongiform encephalopathy (associated with variant Creutzfeldt-Jakob disease) in Europe. A close look at epidemics constitutes a sampling device for illuminating relationships among illness, social forms, and social thought. Theories of disease causation provide ways of thinking about the world and sets of directions for acting in it.

INTRODUCTION

The unexpected emergence of AIDS in the early 1980s, which signaled the return of the industrialized nations to what we had assumed was a vanished world of infectious disease, drew anthropologists along with many others to consider the nature of epidemics (Farmer 1992, 1999; Herdt & Lindenbaum 1992; Kane 1998; Singer 1998; Treichler 1999; Bastos 1999 to cite but a few anthropological studies). The AIDS epidemic initially led many scholars to compare it with past epidemics, especially the bubonic plague (the Black Death) in Europe between 1348 and 1350, following the death of millions of Asians in the preceding decade (McNeill 1976). Historians attribute the spread of the Black Death, in part, to the emergence of nation states, the rise of mercantile economies, and the religious movements that led to the Reformation (Campbell 1931, McNeil 1976, Tuchman 1978). The Black
Death may also have brought about new ways of understanding God, the meaning of death, and the role of authority in religious and social life (Jonsen & Stryker 1993, p. 5).

The comparison of AIDS with past epidemics also suggested ways in which epidemics left a beneficial imprint on social institutions. Cholera, for example, initiated a public health approach that stressed quarantine, and venereal diseases led to contact tracing (Jonsen & Stryker 1993, p. 6). On the other hand, Western medicine is pictured as failing to cure the epidemics that resulted from imperial expansion into the Americas, Asia, Africa, and Europe (Watts 1997).

In their public character, dramatic intensity, and unity of time and place, epidemics are well suited to the concerns of moralists, as well as to scholars seeking to understand the relationships among ideology, social structure, and the construction of particular selves (Rosenberg 1992, p. 279). Severe misfortune and illness precipitate a crisis, mobilizing communities to produce a pageant of ritual responses in which common values are stressed and the actors reaffirm fundamental social conventions and conformist dictates (Turner 1957). Epidemics are thus lightning rods for eliciting the particular terrors that monitor the social forms and cultural values of different communities (Lindenbaum 1998).

Recent research on the nature of epidemics suggests that the shock of pestilence elicits quite similar responses in very different historical and geographical contexts (Slack 1992, p. 3). Many historical forms of pestilence were seen by their contemporaries as being transmitted from person to person. Even when theories about their origin combined notions of miasma and contagion, they were said to arise in the stench of filthy local conditions. Once recognized, the social response usually involved flight. Disease carriers were identified as scapegoats and stigmatized—foreigners in Renaissance Italy and modern Hawaii, immigrants to the United States (Kraut 1994), and “polluters” of different kinds—untouchables in India, ex-slaves in Africa, or Jews at the time of the Black Death. Epidemics have elicited religious and ritual responses that promised effective action—processions in Merovingian Paris and Renaissance Europe, and ecstatic or prophetic cults in Athens and Africa. In addition, outbreaks of epidemic illness are often associated with social upheavals, war, famine, migration, and sometimes pilgrimage (Slack 1992, pp. 2–8).

In 1998 it was still possible to say that AIDS may be the most widely discussed disease in the history of medicine (Lindenbaum 1998, p. 34), and until recently the AIDS epidemic continued to occupy center stage. That was before the arrival of bovine spongiform encephalopathy (BSE) and the variant form of Creutzfeldt-Jakob disease (vCJD) in humans, both considered to be caused by an infectious agent the nature of which has been the subject of heated debate.

The focus of this essay is on two contemporary epidemics: kuru in Papua New Guinea and bovine spongiform encephalopathy (associated with variant Creutzfeldt-Jakob disease) currently moving like a tsunami across Europe. In the text that follows, I discuss BSE and vCJD as a single, related epidemic. A close look at the epidemics of kuru and BSE/vCJD constitutes a sampling device for
illuminating the relationships among illness, social forms, and social thought. Theories of disease causation are not only ways of thinking about specific diseases, but ways of thinking about the world and sets of directions for acting in it (Rosenberg 1992, p. 304).

Kuru, BSE (and vCJD)

When the first cases of BSE, the new neurological disease in cattle, were identified in Britain in 1986, veterinarians noted that the brain pathology was similar to that seen in scrapie, a fatal neurological disease in sheep, endemic in British flocks and known in Europe since the middle of the eighteenth century. Scrapie had provided the stimulus for earlier research on kuru, a fatal neurological disorder in humans affecting people in Papua New Guinea. W. J. Hadlow, a veterinarian working on scrapie, had pointed to the remarkable similarities in the clinical and pathological features of kuru and scrapie. Moreover, the disease of sheep was transmissible by inoculation, leading Hadlow to suggest that kuru, like scrapie, might be experimentally transmissible (Hadlow 1959). By 1957, the epidemiology of kuru had been mapped, revealing its high incidence in certain families and hamlets, its localization to the Fore (pronounced "Foray") and adjacent peoples with whom they intermarried, and its predilection for children and adult women (Gajdusek & Zigas 1957). A genetic basis for the disease was soon proposed. Kuru was said to be a hereditary disorder determined by a single autosomal gene, dominant in females but recessive in males (Bennett et al 1958, 1959). It became apparent, however, that a fatal genetic disorder could not reach the incidence kuru then had among the South Fore without killing off the host population, unless the gene for kuru conferred a selective survival advantage. There was no evidence to support this notion (Mathews 1971).

Anthropological evidence gathered in 1962 by Glasse and Lindenbaum indicated that kuru was of recent origin and that many people could provide vivid accounts of their first encounter with the disease. According to the Fore, kuru first entered the Fore region from the north some time in the early 1920s, arriving in the South Fore in the late 1920s and early 1930s, and in some border areas as late as the 1940s (Glasse 1962). Ethnographic research also suggested that the arrival of kuru was related to the earlier adoption of the consumption of deceased relatives, which began in the north at the turn of the century, and at later moments in the south (Glasse 1963, 1967, Lindenbaum 1979). Accounts of the consumption of the first kuru victims in a certain location also described cases some years later among those who had eaten the victim (Mathews et al 1968, Klitzman et al 1984).

Following Hadlow's observation of the remarkable similarities in the clinical and pathological features of kuru and scrapie, Gajdusek and coworkers began work with primates, and in 1966 they announced that after incubation periods of up to 50 months, chimpanzees injected with brain material from deceased kuru patients had developed a clinical syndrome akin to kuru (Gajdusek et al 1966). Kuru, like scrapie, appeared to be a viral disease of extraordinarily long incubation, transmitted by cannibalism.
The three diseases (kuru, BSE, and vCJD) gained conceptual unity with Prusiner’s suggestion that the infectious agent causing certain degenerative disorders in humans and animals might consist of a protein (Prusiner 1982), a notion that initially elicited widespread skepticism. The idea of a proteinaceous agent for the prion diseases, or transmissible spongiform encephalopathies (TSEs), had been suggested earlier by Alper and coworkers, who found that ultraviolet radiation that destroys all nucleic acids does not destroy scrapie infectivity in sheep (Alper et al 1967). Griffith (1967) soon proposed that infectivity of scrapie could be due to the altered conformation of a normal cellular protein. In 1982 Prusiner achieved biochemical purification of the scrapie agent (Science 216, pp. 136–44), and coined the term “prion” to distinguish the infectious pathogen from viruses or viroids (the term said to be used for small virus-like particles often used in TSE research when the infective agent is not known). Prions were defined as small proteinaceous infectious particles that resist inactivation by procedures that modify nucleic acids (Collinge & Prusiner 1992, p. 7).

The prion diseases now include scrapie (in sheep and goats), bovine spongiform encephalopathy (BSE) in cattle, transmissible mink encephalopathy (in mink), chronic wasting disease (CWD) in mule deer and elk, as well as Gerstmann-Straussler-Scheinker syndrome (GSS), fatal familial insomnia, Creutzfeldt-Jakob disease (CJD), and kuru in humans (Collinge & Prusiner 1992, pp. 6–7). BSE has caused the death of domestic cats in Europe, as well as the death of exotic ruminants in English zoos. Bison, nyala, gemsbok, oryx, greater kudu, and eland have all been shown to die from BSE, as did Major, a popular lion, despite his treatment with conventional medicines, a magnetic collar, and faith healing (De Bruxelles 2000).

Prion diseases are unique in that they are inherited disorders and yet often transmissible experimentally to laboratory animals (Anderton et al 1992, p. 3). They can also cause sporadic disease in which neither inheritance nor transmission between individuals is evident (Prusiner 1995, p. 48). The diseases slowly attack brain tissue, often leaving microscopic spongiform holes characterized by accumulations of abnormal forms of the prion protein (PrP) that occur naturally in brain tissue. Recent studies in mice show that the infectious prion accumulates in the absence of any clinical signs (Hill et al 2000), a finding with important implications for public health, both with respect to iatrogenic transmission from apparently healthy humans, and dietary exposure to cattle and other species exposed to BSE prions.

Recent theories concerning the origin of the BSE epidemic now propose that the disease was derived not from sheep infected with conventional scrapie, but from the recycling in cattle feed of cattle remains infected with BSE itself. The first case may have originated in a cow that developed the disease as a consequence of a gene mutation. The looser regulation in the rendering process of meat products, once thought to be a cause, is also discounted, since rendering practices were never capable of completely inactivating the infectious agent. The social circumstances contributing to the spread of BSE are thus said to result from the unforeseen dangers associated with industrialized farming, as well as the ineptitude of a government
bureaucracy and the collusion of government agencies charged with monitoring the beef industry. The findings of a British government inquiry, the Phillips Report, were published on 27 October, 2000 (Guardian 2000). More recently, additional farming practices have been identified as a potential danger. BSE is said to have arisen in British herds in the 1980s when the Ministry of Agriculture ordered cattle farmers to treat their animals for warbler fly infection with high doses of Phosmet, an organophosphate that captures copper. At the same time cattle feed was supplemented with chicken manure from birds dosed with manganese to increase their egg yield. The prion proteins in cows’ brains were both deprived of copper and dosed with manganese, causing the prions to become distorted (Monbiot 2000, Purdey 1996a,b, 1998).

Kuru, BSE, and vCJD have contributed to a new field of scientific research that lies at the intersection of genetics, cell biology, and virology. They also provide a compelling case for the inclusion of the human sciences in the study of epidemics, reclaiming the legacy of Rudolph Virchow, the German pathologist whose studies of typhus in Upper Silesia in 1848, cholera in Berlin, and an outbreak of tuberculosis in Berlin during 1848 and 1849 led him to develop a theory of epidemics that emphasized the social circumstances contributing to the spread of illness (Waitzkin 2000, p. 62). The study of epidemics contributes to our understanding of the human, organizational, and cultural contexts in which disease thrives or fails to gain a foothold (Rosenberg 1992, p. 303).

Kuru and Human Affairs

As social phenomena, epidemics are said to have a familiar dramaturgic form. They “start at a moment in time, proceed on a stage limited in space and duration, following a plot line of increasing and revelatory tension, move to a crisis of individual and collective character, then drift toward closure” (Rosenberg 1992, p. 279). The kuru epidemic appears to follow this plot line of progressive revelation (Act 1), agreement among different actors on an explanatory framework (Act 2), a sense of crisis that elicits individual and collective political and ritual action (Act 3), and a gradual drift toward closure (Act 4).

Act 1 began for the Fore in the late 1920s and early 1930s with the emergence of the first puzzling cases. Thought at first to be a benign shaking disorder called cassowary disease resulting from assault by ghosts of the dead, they fed the sufferers a homeopathic mixture of pork and casuarina bark. (The victim’s tremor resembled the swaying fronds of casuarina trees, and by further analogue, cassowary quills). For a short time they also called the condition negi nagi, indicating silly or foolish behavior, thinking that they were observing a form of temporary derangement and bodily tremor caused by anthropomorphic spirits. When they saw that the victims were uniformly dying, they concluded that living sorcerers were to blame (Act 2), a diagnosis that assigns etiology to the malevolence of male competitors beyond a limited range of kinship and residence. This statement about the nature of perceived dangers and unacceptable behaviors is a sociomedical diagnosis that continues to
this day. Calling the illness "kuru," a word denoting shaking or fear, again incorporating both biology and culture, is an apt description of the victim’s tremors and a term that has a certain political and social resonance.

Act 3 began in the late 1950s and 1960s when the epidemic reached its height and the Fore began to speak of a social and moral crisis. The sexual bias in kuru mortality, which had resulted in male-female ratios of 3:1 in some hamlets, left many men without wives and many infants without mothers. Daily activities now included the investigation of suspected sorcerers, the policing of hamlets and political boundaries, and propitiatory rituals directed at exposing the killers. Large-scale ceremonies provided a forum for purging by confession, and for an appeal to halt the aggression that they believed had raised the spectre of demographic extinction and internal disruption so great that society itself was in danger (Lindenbaum 1979).

By the 1990s, cases of the disease were extremely rare, and the sense of crisis had passed. There are currently about 4 cases a year (J. Whitfield, personal communication). Fore now say that the arrival of Christianity and "development" directs their attention to more pressing matters, and that the older generation no longer conveys knowledge of sorcery to young men (S. Lindenbaum, unpublished data). Act 4 thus ends not with a bang but a whimper, providing the Fore with an opportunity for retrospection and moral judgment, in the classical rendering of the finale (Rosenberg 1992, pp. 286–87).

For non-Fore observers, Act 1 opened in August 1953 when a government patrol officer noted the violent shivering and spasmodic jerking of a young girl seated by a fire. The Fore said that she was a victim of sorcery and would be claimed by death within a few weeks (Lindenbaum 1979, p. 9). The first medical evaluation of kuru in 1955 suggested "acute hysteria in an otherwise healthy woman" thought to be precipitated by the threat or fear of sorcery, a diagnosis discounted by Gajdusek based on evidence of advanced neurological disease (quoted in Lindenbaum 1979, p. 14). Act 1 continued with the clinical description of the disease and spatial mapping of the epidemic (Gajdusek & Zigas 1957).

Act 2, with its plot line of revelatory tension, unfolds with Hadlow's contribution concerning scrapie. The drama took a sensational turn with the transmission of the infectious agent to laboratory primates (Gajdusek et al 1966) and introduced additional actors and themes. Anthropological data concerning the recent arrival of kuru, the adoption and then abandonment of cannibalism, and the demonstration that Fore genealogies were social, not entirely biological constructs, opened the door for a nongenetic interpretation of the disease (Lindenbaum 1979, Chapters 2, 4). The 1966 transmission of kuru to laboratory primates, as well as epidemiological evidence gathered between 1970 and 1977, showed that no cases of kuru had occurred among people born after the cessation of cannibalism, and this fact strengthened the hypothesis that kuru was a disease transmitted by cannibalism and caused by an infectious agent of extremely long incubation.

The early years of kuru research, however, continued to provide an abundance of hypotheses—infected etiology, possible plant toxins, metallic poisoning (Reid & Gajdusek 1969, Sorenson & Gajdusek 1969), and a return to the supposition that
the genetic constitution of the kuru-affected populations could not be dismissed (Simmons et al. 1972, Plato & Gajdusek 1972). Cannibalism was given low priority or discounted, perhaps because Gajdusek's 1957 data on Fore cannibalism were inaccurate (Lindenbaum 1982), or because he thought the idea was too exotic (Rhodes 1997, p. 103). Act 2 thus introduced a greatly enlarged cast of characters and theories of disease causation more varied than those considered by the Fore. To this point, Fore and non-Fore plot lines differed mainly in scale and complexity.

Act 3 brings the Fore and non-Fore observers onto the same stage. Together they attended curing ceremonies and funerals, the observers experiencing but part of the anguish, since the crisis was not theirs. Conference papers and publications written for a non-Fore audience attempted to provide empathetic descriptions of the social and psychological impact of kuru on individuals and families; they described changes in Fore social life resulting from the epidemic and the colonial encounter (Glasse (Lindenbaum) 1962, Gajdusek & Alpers 1972). This was perhaps another form of ritual witnessing, admittedly in the distancing languages of anthropology and medicine.

Kuru Act 4 is the longest-playing scene in the scientific drama. By 1974 "the sinister trio" of kuru, scrapie, and classical Creutzfeldt-Jakob disease were considered to belong to the category of subacute spongiform viral encephalopathies (Lancet 1974), later called the transmissible spongiform encephalopathies. The nature of the infectious agent remained elusive until the early 1980s when Prusiner published his work on the prion protein and kuru joined the list of prion diseases. (Prusiner received the 1997 Nobel Prize in Physiology and Medicine for his work on prions 21 years after Gajdusek was made Nobel Laureate for demonstrating that TSEs were transmissible.) As a prion disease transmitted orally, kuru now provides an ideal model for studies of vCJD. Anthropological studies (in conjunction with medical research) have been recently revived, particularly in relation to regional variations in mortuary practices, population genetics, and susceptibility and resistance to infection. In light of research indicating that prion diseases may result from abnormalities of copper metabolism (Wadsworth et al. 1999, Purdey 1998), studies in Papua New Guinea also include an examination of copper and magnesium levels in plants, soil, and water (J. Whitfield, personal communication).

As the incidence of the disease gradually declines, the epidemic provides an occasion for retrospective thought and moral judgment in the form of autobiography (Zigas 1990, Klitzman 1998), popular science (Rhodes 1997, Cooke 1998), reflections on the way in which sorcery beliefs affected patterns of human interaction (Sorenson 1976), anthropological texts that retell the kuru story from different theoretical perspectives (McElroy & Townsend 1979, Keessing 1991, Park 2000), and the provocative suggestion that the connection between kuru and cannibalism is questionable because it is said that there is no satisfactory first-hand account of cannibalism as a socially approved custom in any part of the world (Arens 1979). A historian examined the multiple and cross-disciplinary contributions to kuru research that led to its successful scientific outcome, as well as the international disputes, differential rewarding of credit, and the moral and ethical issues raised by medical research in an era not well policed by ethical guidelines (Nelson...
Papers from a conference on prion diseases in humans and animals were supplemented by historical reflections from Hadlow, Alpers, Gibbs, Glassé & Lindenbaum (Prusiner et al 1992). As scholars increasingly study the way in which scientific knowledge is produced, kuru research has been examined to show how anthropologists and medical scientists, each with their grammar of practice, gain explanatory power and cultural authority through their interaction (Anderson 1992), and how the transaction of kuru material (brains, blood, and bodies) with their different meanings for the Fore, for Gajdusek, and for laboratory workers in Australia and the United States, lend themselves to observations about the creation of value and the circulation of goods in global science (Anderson 2000).

This much-telescoped account of the engagement of Western scholarship with kuru is tailored to reveal a scientific drama that runs parallel to that of the Fore. (The vast medical literature on kuru can be located on the National Library of Medicine PubMed website http://www.ncbi.nlm.nih.gov). With the decline in the epidemic, and Fore attention turning to other matters, Act 4 properly ends here. The kuru story, however, finds new life on another stage.

During the early years of the epidemic, kuru was extensively documented with cinema records, some now assembled as a research tool (Gajdusek et al 1970). Kuru has also been the subject of recent documentaries produced for television, as an example of medical sleuthing (WGBH-TV 1985) and contemporary cannibalism (Pangolin 1998, Café 2000). Journalists wrote about the disease during the 1960s, the Australian press insensitively dubbing kuru "the laughing death" just as the British press would later refer inappropriately to dying animals as "mad cows."

Kuru continues to excite popular imagination in the form of a short story (Berkun 2000), a comedy, said to be based "very very loosely on what was a true story" (Glisson 1991), and a wave of popular literature stimulated by the parallel with BSE. While some authors correctly cite original documents (Rhodes 1997), others make little effort at literature review, or misread published accounts (Cowley 2001), and include many errors, such as the statement that the initial symptoms of CJD, GSS, and kuru "are self-neglect such as failure to groom, bathe or eat properly" (Crawford 1998, p. 11), a misconception that appears to be based on data concerning TSEs in animals not humans, and that most patients are "in their late 50s at onset," a misreading of the history of the epidemic. It is also proposed that kuru and transplant tissues are dangerous because they are uncooked (Brouwer 1998, p. 31), although Fore cooking procedures as well as laboratory simulation of Fore cooking temperatures are well documented; that the disease attacks victims at atypically younger and younger ages (the reverse is the case); and an imaginative portrait of burial preparations in which women are said to suction "the brain from the dead person's skull, licking the straw as they worked" and "sharing it with their children" (Brouwer 1998, p. 30). The many misstatements in popular publications, as well as in scientific journals, suggest that anthropological contributions to scientific research are often overlooked (Goodfield 1997), a symptom perhaps of the more general subordination of the human sciences to the natural sciences.
(Nelson 1998, Nelkin 1995). The persistent misreading of existing epidemiologic and ethnographic data also lends itself to meta-analysis (Farmer 1992, p. 2), as do alternate theories of disease causation and counter-narratives (discussed below). The elaboration of Act 4, better seen as an epilogue, reveals an enduring engagement with the story of the epidemic, but the Fore are no longer active participants.

BSE, vCJD, and Human Affairs

An attempt to cast the story of BSE and vCJD in dramaturgic form is perhaps a test of the assumption that epidemics, like the theories that explain them, are tied to particular social forms. Analysis of the kuru epidemic reveals Fore consensus concerning etiology, intervention, and therapeutic response. This shared understanding stems from a relatively egalitarian social order that retains a fair degree of harmony between world view and assumptions about appropriate behavior and the way the body functions. By way of contrast, the BSE/vCJD epidemic produces a more complex set of understandings and responses in the context of a more fragmented social order.

Act 1 introduces the epidemic as a disease of cattle. On 22 December, 1984, a British veterinarian was called to examine a cow with arched back and weight loss, later identified as the first known case of BSE. In November 1986, scientists working for the Ministry of Agriculture formally identified the new cattle disorder. In June 1988, BSE became a notifiable disease, and in July, the feeding of sheep and cattle remains to cattle or sheep was effectively banned. Farmers with BSE-affected cattle were given 50% compensation for their slaughtered animals. In November 1989, the ban on specified bovine offal in human food came into force. In March 1990, the European Commission exacted the first restrictions on cattle exports applying to cattle under six months, and in April it made BSE a notifiable disease.

In May 1990, the British chief medical officer reassured the public that beef was safe to eat, as did the Minister of Agriculture, who appeared on television encouraging his four-year old daughter to bite into a beefburger. Later in 1990, however, the British government established the national CJD surveillance unit in Edinburgh to monitor vCJD cases and to investigate the possible link with BSE. By March 1993, BSE rates had started to decline, and the new chief medical officer again reassured the public that British beef was safe to eat. Adhering to the classical format of progressive revelation, Act 1 continues as officials track the new cattle disease for the next two years. (The Mad Cow web page, www.mad-cow.org, from January 3, 1999, to the present provides a detailed chronology of the epidemic. Other websites include www.bse.org.uk and www.doh.gov.uk/cjd).

Act 2 witnessed a growing consensus concerning the transmission of the disease, with disclosures about industrial farming. Precautionary measures taken to prevent the introduction of cattle offal into human foods, as well as the Minister for Agriculture's theatrical consumption of beef before an anxious television audience, had already begun to reflect a mood of increasing tension.
Act 2 was scarcely under way when players from Acts 3 and 4 burst on stage. The government’s announcement on Wednesday March 20, 1996, that the recent death of a 20-year old man, as well as 9 other recently diagnosed cases among young people was due to exposure to BSE, triggered a well-publicized crisis. Reversing the position the government had held for a decade, the announcement caused public hysteria, particularly in light of the loss of trust in the ability of the government to keep the food supply free of contamination. In the decade leading up to the BSE/vCJD crisis, British consumers had faced a number of food scares—Salmonella in eggs, Listeria in cheese, Escherichia coli, antibiotics, and hormones in meat, and pesticide residues and benzene compounds in other foods (Jacob & Hellström 2000, p. 305). The day after the announcement, five European countries banned the importation of British beef, and 10,000 British schools dropped beef from their menus. By Friday, McDonald’s had stopped serving British beef, and by Monday, Burger King and Wendy’s had also eliminated British beef from their offerings. The World Health Organization endorsed the British government’s conclusion that vCJD was best explained by its connection to BSE, that is from eating beef in the late 1980s before the introduction of controls to prevent contaminated beef entering the food chain (Greger 1996). BSE was viewed as the most serious threat ever posed to British agriculture. Attempts at statistical modeling to predict the eventual scale of vCJD ranged from 100 to several million cases (Collinge 1999, p. 354, p. 318), reflecting the many uncertainties surrounding the epidemic. By October 2000, 80 people in Britain had died of the disease, and five victims were reported to be still alive (Pallister 2000, p. 6). By January 2001, governments in Britain (and Europe) began to search for storage sites and for ways to subsidize the construction of incinerators to burn the mountains of dead cattle (Stecklow 2001). During December 2000 the BSE crisis spread throughout Europe, and there were fears of its entry into the United States.

The epidemic in Britain had not yet reached closure before the public was provided with moral judgments and lessons to be learned (the mark of Act 4). Critics pointed to government errors in risk management that must be prevented to avoid similar mistakes occurring in future scares concerning agricultural technology. The process of research and decision-making was said to have been dominated by scientists, industrialists, and civil servants, a group accused in the past of giving too little attention to health risks and too much to the needs of farmers and commerce. The cloistered activities of the Ministry of Agriculture, Fisheries and Food received special criticism (Nature 1996). The need to inform the public of potential health hazards, as well as the need of the media for sensational headlines, was seen as threatening to compromise the scientific process (Ashby 1996, p. 109).

The crisis in Britain simultaneously ignited an explosion of apocalyptic prose (characteristic of Act 3) concerning BSE, vCJD, and kuru. Journalists wrote about the dangers of “a terrifying new plague” (Rhodes 1997), and “the shocking legacy of a 20th Century disease” (Cooke 1998). A former dairy inspector and physician warned of the danger of a BSE epidemic in the United States (Hulise 1996), and a cattle rancher, now the president of the International Vegetarian Union, expressed
his concerns in writing (Lyman 1998) and on the Oprah Winfrey Show. A jury subsequently found Lyman, Winfrey, and Harpo Productions not liable for damages in a lawsuit filed by a group of Texas cattlemen who had charged them with “food disparagement” (Croft 2000).

Mad cow disease was fast attaining the status of “a global populist issue” and an “icon of our time” (McCalman 1998, p. ii). In the United States, a documentary told the story of “The Brain Eaters” (Nova 1998), citing BSE and kuru as examples of the dangers that arise when animals and humans consume their own species. Television in France and England provided graphic images of the deterioration of 17-year old Arnaud Eboli and 14-year old Zoe Jeffries, both afflicted with vCJD. The death of Zoe Jeffries is said to have been watched by millions of viewers (BBC News 2000). The sense of crisis had been sustained since the government revelation of March 20, 1996. Given the uncertainties surrounding the mode of transmission and the length of incubation, Act 3 may last for some time. Incubation periods for kuru range from 4 years (the earliest recorded case) to 50 years, with a mean of 12 years (Whitfield 2000, p. 54). Moreover, in this case, the crisis is ours.

Several seasons later, the French drama opened, closely following the British plot line. Act 1 began in March 1996 with a European Union ban on British beef. The French view BSE as a British epidemic. Act 2 revealed the participants attempting to reach agreement on an explanatory framework. The French agricultural minister hinted at a “mysterious third way” of spreading the disease, other than through animal-based feed and from cow to calf (www.mad-cow.org. 23 April 2000). By June 2000, 18 cases of BSE had been identified in France, but the government continued to assure the public that mad cow disease was confined to the United Kingdom. Nevertheless, a program to screen cattle began in mid June. Act 2 came to a close with a general sense that the source of the epidemic lay in Britain, and that British agricultural practices were to blame.

Act 3 opened abruptly in mid October 2000 with the arrest of a farmer who was trying to sell a diseased cow for slaughter. The authorities intercepted the cow, but a thousand tons of suspect meat from the same herd had already entered the market. On October 24, the Carrefour supermarket chain said that the meat had been distributed to 39 stores, mostly in northern France (Daley 2000). Television stations broadcast documentaries about vCJD, beef sales dropped, and France was said to be experiencing a psychosis. In a ritual echo of the British Agricultural Minister’s performance four years earlier, the French Farm Minister declared that “I eat beef, my children eat beef, and all the scientists who are mad cow disease experts eat beef, and so do their children” (Reuters, 8 Nov. 2000).

As in England, public confidence in the ability of the government to protect the safety of foods had been undermined by the discovery of tons of rotten duck about to be shipped off for sale, and by subsequent alerts over Listeria bacteria in sausages and ice cream (Reuters, 22 Nov. 2000). Many people still retained memories of the 1985 scandal over tainted blood, in which more than 4000 people contracted AIDS from contaminated blood or blood products (Butler 1994). Just as the ban on consumption of British beef had dealt a blow to national identity, the French
psyche was damaged by the recommendation that certain national delicacies—pâté, sweetbreads, and sausages made from cow intestines—were to be avoided (Lichfield 2000).

By the end of the year the public was experiencing a confusing mix of moral judgment, collective action, and political ritual. The French Agricultural Minister said that Britain would be "judged morally" for introducing mad cow disease to France (Bishop 2001); the government launched a counter-offensive in support of the beef industry; and opposition benches in parliament, with an eye to challenging the presidency in 2002, proposed a policy of urgent caution. The family of a third French vCJD victim joined two other families in filing a novel lawsuit challenging French, British, and European Union authorities for mishandling outbreaks of BSE in the 1980s and 1990s (Reuters, 23 Nov. 2000. Meat workers, demanding compensation, barricaded the roads around Paris, Bordeaux, Toulouse, and Lyon (New York Times, 9 Jan. 2001), and cattle raisers sponsored a "sane cow barbecue" in the Luxembourg Gardens in an attempt to persuade the public that the danger lay in meat from dairy herds, not beef cattle (Reuters, 10 Dec. 2000).

As in Britain, the classical narrative structure appears to be violated: Acts 3 and 4 had opened before Act 2 had run its course. The cacophony of voices, as well as the media reenactment of the many acts of protest and political theater, convey a sense of self-conscious display and detachment. By way of contrast, the sequence of events in the kuru epidemic had been more orderly and predictable. In their small-scale, relatively homogeneous communities, the Fore assemblies held to discuss the epidemic reinforced a common set of understandings about the nature of their predicament. Produced with an eye on the Australian Administration, which they feared would punish them for excessive and continued use of sorcery, the assemblies manifested an element of self-consciousness. Nevertheless, they were not postmodern happenings (Lindenbaum 1998, p. 45).

Postmodern Epidemics, Postmodern Societies?

The question of whether an epidemic might be considered postmodern in an era of postmodernity had been raised earlier for AIDS (Rosenberg 1992, p. 292). In the rapidity of its spread and the parallel rapidity of its identification as a unified clinical entity, AIDS differed from syphilis, tuberculosis, and rheumatic fever, which only gradually emerged as clinical entities, observations that apply well to BSE/vCJD. As with AIDS, it could also be said that BSE and vCJD seem postmodern phenomena in the self-conscious, reflexive, and bureaucratically structured detachment with which we regard them (Rosenberg 1992, pp. 289–90).

The collapse of the traditional four-part dramatic structure also captures the postmodern sense of the compression of spatial and temporal worlds (Harvey 1990, p. 240). It would be hard to overestimate the role of the internet in this collapse of space and time, and in the creation of a virtual (and real) community of scholars, as well as among the families of vCJD sufferers who have joined internet support groups. By the end of February 2001, the mad cow web page
alone had registered almost a million hits. Newspapers, journals, and television also broadcast a torrent of information about the spread of BSE, new cases of vCJD, farmers’ protests, the statements of politicians and their opponents, and critical analyses of the government’s role in handling the crisis in Britain, France, and Germany. The “classical” narrative structure appears to have been destabilized by instantaneous exposure to data, analysis, and political activism.

Specialists on prion disease also provided readable accounts of the prion diseases for nonspecialists (Ridley & Baker 1998). Several publications presented a multidisciplinary approach to the crisis (Ratzan 1998, McCalman et al 1998), the latter a self-conscious exercise in bridging the “fragmentation and hyperspecialization of modern knowledge” said to have “given rise to the pervasive late twentieth century cultural paradigm of postmodernity” (1998, p. ii). In addition, the online edition of the Oxford English Dictionary now had an entry for mad cow disease, a French film-maker explored mad cow disease from the perspective of Hindus who hold a different image of the cow (Balme 1997), and a composition for clarinet and chamber ensemble composed by John Adams in 1996 had a segment called “Hoedown (Mad Cow)”, said to be a version of the traditional Western hoedown that addresses the fault lines of international commerce from a distinctly American perspective (Program notes 1997). A sense of postmodern pastiche and irony is compounded by references to mad cows, mad scientists, mad bureaucrats, and rogue and ghost proteins. Calling cows mad gives them human attributes and suggests that cows are viewed here as human surrogates, as does the paired image of the staggering cow and the dying vCJD victim in both video and print (Leach 1998, p. 127). This may provide cover for the compulsion to joke about the disease in cows, though not humans, concerning dementia, disability, and cannibalism. It may also be the stimulus for a poem entitled “Mad Cows and Englishmen” (Marsden & Dealler 2000), and a witty essay about mad cow disease from the viewpoint of the cow (Wallace-Crabbe 1998, p. 167). Mad cow jokes can be found on a number of websites, such as The Chemical Cow Home Page http://sis.bris.ac.uk/~mm7372.

Postmodernity or Risk Society?

Risk emerged as the key word for social analysis of the prion diseases and contemporary society, an approach foreshadowed in Garrett’s warning of the dangers to public health in a world out of balance (Garrett 1994). Poor risk communication was also a theme in much of the popular literature. Mad cow disease was said to be “one of the most expensive and tragic examples of poor risk management in the last twenty-five years” (Powell & Leiss 1988), and a lesson about the ways in which “pessimism, paranoia, and a misguided media are leading us toward disaster” (Cohl 1997). For ecofeminists, BSE was a salutary example of the globalization of nonsustainable and hazardous food production, and of industrial agriculture’s overstepping of the ecological boundaries that recognize the difference between herbivores and carnivores (Shiva 2000). The editors of PRWATCH,
a quarterly newsletter that focuses on manipulative and misleading practices of the public relations industry, cite BSE as another example of the need for regulations to counter the power of the modern “agribusiness” lobby (Rampton & Stauber 1997). Political scientists used the crisis in Britain to show that institutional arrangements had predisposed decision-makers to adopt a counter-productive approach to handling situations of scientific uncertainty (Jacob & Hellstrom 2000), reinforcing the Phillips Report that “at the heart of the BSE story lie questions of how to handle hazard” (Pallister 2000). A health policy analyst judged that the British government had erred in failing to enact more aggressive interventions to protect public health, even though the risk to humans from BSE was unknown (Lanska 1998).

In France, sociologists expressed their views in the daily press. Bruno Latour was critical of a division of labor that allowed risk evaluators (experts) and managers of risk (politicians) to exclude public participation in final decisions about the hierarchy of risks (Latour 2000). Denis Duclos considered the European response to mad cow disease in France to be a political diversion, allowing the French government to avoid dealing with Corsican terrorism, the price of oil, and the falling Euro. This “artificial psychosis” allowed the disaster to be blamed generically on human beings without naming scapegoats, provided a way of questioning the general workings of society, and revealed how we can destroy ourselves through the industrial destruction of other forms of life (Duclos 2000). In Portugal, the BSE crisis revealed a different balance between science and politics. The divide between scientists and policy-makers is said to have widened at a time when so-called “risk societies” demonstrate the need for greater local scientific input to political decision-making (Goncalves 2000).

The social theorist Ulrich Beck cites BSE as a textbook example of the workings of what he calls “risk society” (1999, p. 48), a new kind of society or “second modernity” in which the very idea of controllability, certainty or security, so fundamental in the first modernity, collapses. He challenges the belief that “the environmental hazards we face today can still be captured by nineteenth-century, scientific models of risk assessment and industrial assumptions about danger and safety” (Beck 1999, p. 148). Giddens also suggests that one distinguishing feature of late modernity is the increasing unknowability of the risks produced by technological innovations partly through unanticipated consequences (cited in Miller 1999, p. 1241).

A British writer and medical practitioner challenges Beck’s concept of risk society that links the issue of BSE and vCJD to the nuclear leak at Chernobyl and the dangers of genetic engineering. Elevating risk society caution to become the prime directive of human action would thus prevent any form of scientific or social experimentation (Fitzpatrick 1998, p. 57). A media analyst similarly uses the case of BSE to argue that the social production of risks in the public domain is not the inevitable consequence of late modernity or postmodernity, as Beck and Giddens would have it, but the product of the pursuit of definitional and material advantages in the context of already existing definitional and material conditions. The neglect of questions of agency has led theorists to present risks as inevitable concomitants
of technological and cultural developments, overlooking identifiable processes of "realpolitik." of nameable agencies of power and capital, thus leaving them in the grip of political quietism (Miller 1999).

Beck’s analysis of risk society had also used BSE to reveal the new political economy of uncertainty in a world characterized by the anarchy of international relations (Beck 1999). Aaltola, however, resists the temptation to formulate the relation between epidemics and international relations in new terms, noting that throughout history epidemics have had a direct impact on political interaction by vindicating, weakening, testing, and molding international relations. The present interaction between disease and politics is said to differ in degree in the sense of increasing the tempo of international interactions and the increasing scale of global threats, pointing to the risk of an increasing intensity of lethal epidemic diseases. The effects of the BSE epidemic on international relations were said to follow essentially "the same course of activity that has been observed in similar situations over the last two millenia" (Aaltola 1999, p. 236).

The discussion of risk society centers on the relationship of culture to nature, an old topic in anthropology. Risk society is said to be characterized by the loss of a clear distinction between nature and culture brought about by industrialization and by "the hazards that endanger humans, animals and plants alike" (Beck 1999, p. 145). Luttwak, a Bolivian cattle rancher and director of geo-economics at the Washington-based Center for Strategic and International Studies, notes that the BSE drama calls attention to the habitual malpractice of the cattle industries in Europe and North America, which resist the pace and limits set by nature. Moreover, bovines, unlike humans and pigs, are said to be pure herbivores. Their four-part ruminant stomachs break down cellulose in grass but cannot easily digest cereals and other concentrates containing high levels of protein without triggering a variety of diseases. Nearly all beef cattle in Europe and North America thus survive in a state of chronic, low-level sickness, treated with large doses of antibiotics (Luttwak 2001).

The theme that vCJD represents "the revenge of nature" and that such problems have arisen because we have "denatured cattle" (Rifkin 1996) is resisted by Fitzpatrick, who notes that there is no such thing as a "natural" method of farming. "Agriculture is by definition a violation of nature" (Fitzpatrick 1998, p. 60). Taking a position that departs from that of Luttwak, Fitzpatrick proposes that the controversy about turning cows into cannibals overlooks the fact that, like most mammals, cows are omnivores, capable of digesting animal as well as plant protein, and the feeding of animal protein to cattle long predates modern intensive farming. Despite his view that we face less threat from nature than at any time in human history, however, Fitzpatrick allows that "the popularity of the notion that the source of all our problems lies in the very attempt to increase human control over nature reveals the deep despondency of modern society and its extraordinary collapse of confidence in itself" (1998, p. 62). The BSE/vCJD epidemic thus appears to evoke the "spirit" of the era. It is also the product of societies fragmented and realigned in ways that to many observers seem unfamiliar.
An Agenda for Anthropology

This review reveals a tumultuous international discussion about what are perceived to be new kinds of epidemics, new social forms, and new states of consciousness. Participants in the discussion represent a variety of disciplines in medicine and the human sciences, but anthropology is not among them. During the 1960s historians appear to have responded to a call for further research into the social history of epidemics (Slack 1992, p. 1). A wave of important studies of past epidemics soon followed (Crosby 1972, McNeill 1976, Cipolla 1979, Brandt 1985, Rosenberg 1962, Ranger & Slack 1992, Watts 1997, Herlihy 1997). As descendants of W. H. R. Rivers, Evans-Pritchard, and Victor Turner, however, anthropologists studying health and illness turned first to the intricacies and subtleties of non-Western health beliefs and behaviors. Anthropologists also came late to the study of the AIDS epidemic perhaps because, in addition to textual and media analysis, ethnographic research depends on long-term fieldwork. By the time they began to analyze their data, they faced a field dominated by models of human motivation and behavioral change that obscured the way risk behavior is shaped by social and economic contexts (Singer 1998, pp. 14–15).

Just as the kuru epidemic profited from a multidisciplinary conversation, many aspects of the BSE/vCJD epidemic lend themselves to anthropological investigation. Study of the impact of the epidemic on individuals, families, and communities could convey the essence of the calamity in a way that is not furnished by television or the internet, which provide a false sense of immediacy and community mediated by the screen of technology. Day-to-day field research in afflicted communities can avoid the construction of social suffering at a safe distance without the social responsibility of real engagement (Kleinman et al 1997, p. xviii).

An ethnography of changing European diets could illuminate the links among commerce, agriculture, and ideologies about food and health, traceable to the mad cow epidemic. In the wake of wartime penury, for example, the French became Europe’s biggest meat eaters, and steakhouse restaurants appeared in major cities and in suburban shopping malls (August 2000). Responding to growing consumer resistance, however, three-star restaurants, representatives of agro-business, and even McDonalds have a new-found interest in “reasoned agriculture,” organic foods, and the creation of a vegetable cuisine, a shift with huge implications for the global production and marketing of food.

Long-term field research can also unravel the chains of relationships that prompt behaviors often framed in terms of risk, an epidemiological category that plucks behavior from context, and one that led to many misunderstandings during the first decade of the AIDS epidemic (Kane & Mason 1992). By examining behaviors embedded in complexes of relationships, ethnographers can trace the chains of risk that link local and more distant contexts, moving from individuals in families and communities to the fast food industry, perhaps even to the illicit traffic in beef and beef products investigated by the mad cow unit of the French police force (Comtex Newswire 2000). A political and economic reading of the epidemic would further
inquire into the benefits that flow from damaging alliances between certain industries and government agencies. In addition to the well-documented collusion between the beef industry and the British Ministry for Agriculture, Food and Fisheries, some consider the agro-chemical industry responsible for the disasters falling upon Mark Purdey, the organic farmer who first suggested that BSE was associated with the use of phosmet to treat warbler fly infection. Originally dismissed for his heretical views (as was Prusiner), Purdey’s research has now been published in a mainstream medical journal (Purdey 1996a,b, 1998) and is being rigorously tested by others (Wadsworth et al 1999; see also “Copper Consensus” on the Mad Cow Home Page). Following a newspaper article about his research, however, his farmhouse burnt down, his telephone lines were cut, and he is said to be trailed when he travels around the country to talk about his theory. Some propose that the death of his veterinarian and his first lawyer in road accidents, as well a car crash involving his second lawyer, may not be coincidence (Kail 2001). While this may suggest unwarranted paranoia, fear of industry retaliation seems to have been responsible for the absence of a press release or media report of a study of the risk of transmission to humans of chronic wasting disease in Colorado wild deer and elk. The “Mad Cow” Webmaster summarized the study and provided editorial comments (Raymond et al 2000).

Theories of disease causation that reject orthodox views lend themselves to anthropological analysis. Counter-narratives and structures of blame have been noted in other epidemics, where they are seen to be commentaries about cultural values and the perceived state of social relations (Arnold 1987, Farmer 1992, Lindenbaum 1998). Alternate hypotheses about the BSE/vCJD epidemic reflect anxieties about the environment, industry, the government, and the intrusion of outsiders. They include the suggestion that BSE might be carried in cow’s milk, in the soil (from cow dung), in water supplies (in some cases resulting from the spillage of BSE waste into floodwaters), and in dust particles emitted from rendering plants (www.mad-cow.org. Dec. 15, 2000). Echoing similar fears expressed during the AIDS epidemic, the families of vCJD victims have suggested that the government is covering up the military’s accidental release of a secret disease (J. Whitfield, personal communication). Social class is rarely mentioned except to note that infected meat is most likely to be found in the cheaper cuts of beef and is possibly associated with the introduction of self-service meals in some schools during the 1980s (Derbyshire 2000). It has also been proposed that there is no infectious agent responsible for kuru, BSE, or vCJD, which are stress-caused diseases in both humans and animals (T. Doré, unpublished data). Epidemics release marginal ideas and unmask opposed interests kept subdued in less critical times.

The study of epidemics provides a critical commentary on complex political and economic relationships at home and abroad. The spread of the BSE epidemic from Britain to continental Europe led to the erection of barricades to prevent beef from crossing national borders, to political pressure from opposition parties critical of their government’s handling of an issue of concern for public health, and to European governments blaming foreign governments for their own domestic
predicaments, a sign of the fragility of the European Union. The epidemic also provides a case study of the way in which a new brand of venture capitalists fund scientific research to study the role of proteins or to produce test kits that detect mad cow disease in animals before slaughter (Olsen 2001). Acquiring the licenses for research that hold the promise of huge profits, venture capitalists leave to governments the basic research that may be too expensive or too risky.

As this essay has shown, epidemics appear to share certain aspects of narrative structure, as well as a number of sociological features. Since they are mirrors held up to society, however, we need to distinguish the unique from the apparently universal in each epidemic, an exercise that the advocates of contemporary history propose as a contribution to health policy (Berridge 1992). Certain epidemics (and diseases) fade in and out of consciousness in ways that depend on more than matters of biology or demography (Rosner & Markowitz 1991, Crosby 1989). BSE/vCJD and kuru, already the subject of intense international discussion, have laid claim to our future attention. Analysts of risk society have identified a contemporary sense of anxiety about protecting our domestic space from the dangerous world outside the door. The fear of ingesting rogue proteins, or genetically modified (Frankenstein) foods, as well as our ambivalence about human and animal cannibalism, appear to express a more general sense of unease concerning control of our lives, framed in terms of society’s relationship to nature, said to be “the central debate in the coming years” (Duclos 2000). As this review attempts to show, the study of epidemics provides a unique point of entry for examining the relationships among cultural assumptions, particular institutional forms, and states of mind.

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