Chapter One
Pathological Lives – Disease, Space and Biopolitics

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> The diversity and geographical distribution of influenza viruses currently circulating in wild and domestic birds are unprecedented since the advent of modern tools for virus detection and characterisation. The world needs to be concerned (WHO, 2015).

> The number one risk on the [UK] Government's national risk assessment for civil emergencies, ahead of both coastal flooding and a major terrorist incident, is the risk of pandemic influenza (House of Commons Committee of Public Accounts, 2013: 6).

> We are left in the hands of the generations which, having heard of microbes much as St Thomas Aquinas heard of angels, suddenly concluded that the whole art of healing should be summed up in the formula: Find the microbe and kill it. And even that they did not know how to do (George Bernard Shaw, 1909: Preface to the *Doctor's Dilemma*).

Introduction: The Emergency of Emergent Infectious Diseases

In Western states, at least, emerging infectious diseases have become emergencies in waiting. The threat of a widespread and acute malady affecting people, or indeed the plants and animals on which they rely (to say nothing of the technical infrastructures or other living and non-living networks which sustain

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life), is a long-standing one. But it is the imagined and to some extent experienced interdependencies and vulnerabilities that people share with each other and with other living bodies that seem to have raised the stakes in the last few decades. So much so that we are, for some at least, 'teetering on the edge' of a major disease event or catastrophe (Webster and Walker, 2003).

Simplifying somewhat, this apparent emergency-to-come has two core elements. First, it is *socio-ecological* and based on the sciences of 'emerging and re-emerging diseases'. Here the focus tends to be on mutable microorganisms and the potential for those organisms to wreak havoc in a highly 'infectable' and densely interconnected modern world (Braun, 2007). Previously, and in the main, microorganisms had been understood as more or less fixed entities that would inevitably run their evolutionary course, becoming less significant over time (Methot and Fantini, 2014). The emergence of new infectious diseases, like AIDS (Acquired Immune Deficiency Syndrome) and SARS (Severe Acute Respiratory Syndrome), and the re-emergence of newly virulent scourges (like influenza and tuberculosis) in the later part of the twentieth century suggested that life, and microbial life in particular, was less fixed and so less predictable than we might have countenanced.

These new agents of concern could mutate and recombine, jump species, take advantage of new environmental conditions, and could move through the dense and rapid transit routes that circled the planet. Instead of being on the wane, microbes were back on the agenda. Along with climate change and global terrorism, they formed a raft of 'agents' that were regarded as mutable, indeterminate and generative of catastrophic events. For some at least, global connectivity and molecular mutability had combined to usher in a new age of plagues, epidemics and pandemics (Garret, 1994). Arguably, emerging diseases suggested that the world was now more 'infectable' than ever.

Second, this emergency-to-come is *governmental*. Here, emergency relates to a form of anticipatory or future-oriented government that seeks to highlight (even give greater emphasis to) potential breakdowns in social order. In this style of governance of and through emergencies – which has arguably become dominant in recent decades (Amoore, 2013) – the role of public and private institutions is to organise for events that are of sufficient magnitude that they demand foresight and preparation (Anderson, 2010; Collier and Lakoff, 2008b).

Pandemics, infectious animal diseases and food contamination events, for example, can all exact such far-reaching challenges to social and economic life that they constitute security issues, necessitating some kind of civil emergency planning in order to prepare for or mitigate their worst effects. Infectious disease, in this sense, has become part and parcel of a logic and practice of security. Indeed, the term biosecurity is often used in relation to the threat of emerging infectious diseases, and refers to the raft of measures and policies that governments, commercial and other organisations seek to put in place in order to reduce the risk of a disease event and/or prepare for the consequences of such an event

in terms of emergency response. Whether the resulting biosecurity practices are effective or make matters more prone to go wrong is a major question that we will return to throughout this book.

These socio-ecological and governmental aspects of emerging infectious diseases may well be mutually re-affirming. First, and most obviously, changes to the 'infectability' of the planet may be accompanied by shifts in approaches to infectious disease control, leading to the rise of biosecurity as a discourse and material practice. Second, the rise of a form of anticipatory governance clearly requires its own set of justifications. Mutable microbes form a convenient ontology or cause under which new kinds of human authority and control can be justified and normalised (King, 2002). For some commentators, a mode of life (a *modus vivendi* (Sloterdijk, 2013)) emerges in which control is predicated on accentuating certain threats. This may be more than ideological. Perhaps what is most interesting here is the possibility that, third, these forms of human control can in turn produce new microbial environments that may inadvertently be even more challenging. Spiralling efforts to counter microbial threats, or a hypertrophic approach to security, can seed further changes to rapidly evolving microbiomes (Landecker, 2015). So much so that a belief in human authority and control may well be part of the problem.

Pathological Lives engages with the disease emergency, its rise up scientific and political agenda, its formatting through biosecurity and, crucially, the extent to which the resulting foci of attention may well be making matters worse rather than better. We focus on the particular ways in which emergency diseases are constituted – how they are understood, marshalled, measured, generated and even ignored. Our method is at once geographical and based within science and technology studies. In taking these approaches, with their legacy of fieldwork and 'theorising empirically' (Mol, 2002), we are interested in the practical 'doings' of disease rather than the grand stories that are told about them. Only by investigating practices (what is done as well as what is said) can we assess the extent to which these doings may play a part in bringing about the emergency they seek to mitigate – or, indeed, may offer new openings for doing things otherwise.

This book is empirically grounded, and in being so it can make some claim to a better understanding of how communicable diseases are being managed and mismanaged and will aim to make some concrete suggestions about what it takes to do health and disease in ways that are better suited to the current predicament. It is based on fieldwork that we undertook across a range of sites and involving all manner of species (from farms to restaurants, from wildlife reserves to virological laboratories, and from factories to living rooms). Our methods are varied, though mostly ethnographic in character and sensibility, and our aim has been to allow the practices that we have observed, written down and questioned, to surprise us, to put our concepts at risk and to force us to think carefully and critically about the disease emergency.

Pathological Lives is also conceptual. In working across numerous sites and species, and in linking together those sites and species, our argument pulls together key geographical or spatial insights on the relations between people, animals, microbes, infrastructures and ways of governing disease. Rather than focusing on one part of the disease system, we are interested in what happens when you take the changing relations between hosts, microbes and their environments, as well as the emerging regimes of control or governance, as the key concern for investigation. Infectious disease in this instance, and for us, is not only a result of microorganisms infecting a host, but the multi-faceted outcome of the changing relations that make microbes more or less likely to be effective in generating disease.

The key question becomes, in this sense, how various matters (including not only microbes) combine with other conditions to produce disease. We make a distinction, then, between those approaches that focus on disease as a matter of discrete causative agents and those that view disease as a more relational phenomenon. In the first instance, approaches to infectious disease management or control that focus on microbes as pathogens tend to emphasise their absence and exclusion. They involve constructing and maintaining real as well as metaphorical walls (see Figure 1.1).

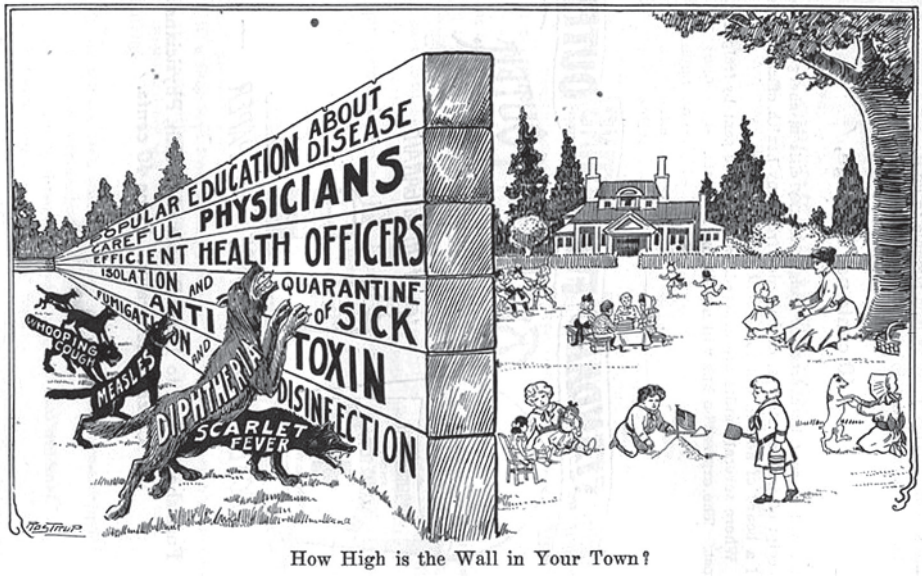

Figure 1.1 How safe is your town? – US Public Health Poster, undated. The divisions between a contingent wild world and a domestic culture are clearly marked as spatially exclusive. The existence of a single non-human on the right side of the wall, on two legs and with tail docked, is emblematic of this nature/culture binary that is in play. (*Virginia Health Bulletin*, 1908: 216).

This so-called 'ontological' approach to disease, with microbiological organisms as agents of causation, is often in tension with the second, relational or more 'physiological' and 'ecological' understandings of disease (Anderson and MacKay, 2014). In the latter, microbes may be just one component of a complex of matters that conspire to produce disease. Here, understanding disease is less likely to focus on a single agent and pathway to the host, but on a suite of issues, on biographical details (a patient or host's propensity to develop symptoms) and on the patient's social and ecological setting (relating to a population, its density, levels of immunity and so on). It may even stretch to consider the role of disease management and governance in the shaping of the disease.

In these ecological approaches, the focus may be less concerned with keeping matters out and more attentive to the multiple relations that make disease. How these relations are configured, spatially, becomes the key matter of concern. It is the constellation of matters that twist and turn bodies of all shapes and sizes into diseased relations that grab our attention. All life in that sense is more or less pathological. It is the quality of the relations that make those lives more or less liveable.

In order to make these spatial arguments we employ some key terms. First, in Chapter 2, we introduce disease diagrams, which we take to be ways of understanding and acting upon disease and health threats. For example, if disease is understood as a germ-borne menace, then exclusion is the spatial practice of choice. Conversely, if a more ecological or biographical approach is taken, then disease may be diagrammed as a matter of social inclusion and public health campaigns (perhaps by improving health services, availability of vaccines and so on). Diagrams then are the ways that disease is grasped and governed. They are spatialisations that affect the ways in which disease and health are understood and treated. For sure, these and other disease diagrams may co-exist and be in tension with one another. How one or other gains ascendancy or how they are mobilised at the same time and in the same place becomes a key resource for the interrogation of disease in practice.

The second term we adopt is disease situation (Chapter 3). This refers to the ways in which a specific combination of disease diagrams, as well as the suite of issues that make disease more or less likely (including, for example, host population characteristics, forms of governance, market pressures and so on), generate the conditions for living. This, in short, is an ecology or assemblage – a spatial arrangement or meeting of ideas, practices and materials. But more than this, a situation also alerts us to the possibility that this configuration or assemblage has a 'virtual power' to force thought, to make us think again about disease and health (Stengers, 2005b: 185). This power has to be realised, and one of the jobs of analysts is to help to bring that forcing of thought into being.

To be clear, in using the term ecology in this context we do not mean to signal a science of functions, or simply an adding together of 'factors'. The components of a situation will combine together in ways that are not easy to predict and

cannot be assumed to be simple additions. This is because, in the terms of Karen Barad (2007), matters will intra-act rather than simply interact. That is, they are relational and may alter each other as they go. So, the situations we describe are close to what Isabelle Stengers has described as an ecology as 'a science of multiplicities, disparate causalities, and unintentional creations of meaning' (Stengers, 2010a: 34). This space of crossings, folds and missed opportunities may, we argue, open up new ways of imagining and enacting the politics of disease and the definition of what counts as the disease emergency. It may, we suggest, help to empower the disease situation by redefining what counts as the emergency of emerging infections.

These terms and the approach to disease situations as possible sources for redoing pathological lives course through the book in its conceptual framing (Part I), its more empirically focused chapters (Part II), and in the conclusion. To spell out some of these possibilities and the approaches on which they are based, we next draw out four key moves that distinguish the approach that we take to the spatial politics of disease.

The Four Moves of Pathological Lives

There are four key moves that we make in this book that distinguish our approach to emergency disease. First, we revisit the emergent infectious disease thesis and justify the book's shift in focus *from forest edge to socio-technical diseases.* Infectious disease becomes, on this account, a networked matter involving markets, sciences, governments and so on. Second, we note how this refocusing of attention on socio-technical set-ups requires a rather different spatial imagination, as we move *from disease sites to disease situations*. Third, *from pathogens to pathogenicities*, we add to this spatial reconfiguration by expanding on a distinction between a pathogen-focused understanding of disease and one that is more interested in diseases as relationally produced. Finally, in *a politics of life*, we briefly discuss biopolitics, one of the key means through which the management of emergency diseases has been organised and conceptualised, and in doing so open up a conceptual frame that provides some resources for generating a new or different politics of life.

From Forest Edge to Socio-Technical Diseases

In the early 1990s, communicable and infectious diseases were back on the political agenda. They had been somewhat marginalised following the triumphant post-war pronouncements that the world was on the brink of an epidemiological transition. Communicable diseases would be relegated, so the optimists argued, to a relatively minor component of human morbidity and mortality through the use of antimicrobial medicines, improved hygiene and other modern

technologies (Omran, 1971). This technological and medical optimism was 'flanked by a belief in the natural decline of virulence' (Methot and Fantini, 2014: 218), or the gradual co-evolution of microorganisms and their hosts resulting in better adaptations or a shift from pathogenic to commensal relations. Yet, as the century neared its end, a raft of diseases started to unsettle the progressive narrative of continuous medical advance and infectious disease decline. Some of these diseases were new, while others had been persistent scourges for people in the Global South and were now threatening to infect the North (Farmer, 1999).

These new and neglected infectious diseases owed some of their rise to prominence in the Global North to a renewed fear that emerging infectious diseases had the potential to produce global pandemics. The concerns seemed to restage a rather ancient fear of contagion and connectivity in which certain parts of the world, certain social groups and certain practices are pathologised and demonised (King, 2002). The 'virtuous' Global North and the under-regulated and therefore contingent Global South seemed, in disease terms, closer than ever. The alarming rhetoric of cosmopolitan life out of control, common in international organisations (World Health Organisation, 2007) and popular science writing (Garret, 1994; Garrett, 2013; Quamenn, 2012; Wolfe, 2011) made use of familiar spatial imaginaries where 'modern' society is threatened by poorly governed, exotic, other-worldly, sexualised and often naturalised lives. The enemy figures of mutating, slippery, re-assorting pathogens, of free-roaming super-spreaders and patient zeros, of (largely non-Western) human-animal practices or interspecies intimacy (Shukin, 2009: 46) and of rogue practitioners in an otherwise 'orderly' system, are all portrayed as 'outsiders' in need of excommunication.

As a result, an 'Out of Africa' and or 'Out of Asia' mapping of emerging infections is common (Leach and Dry, 2010). Indeed, the emergence of the Human Immunodeficiency Virus (HIV) in the late 1970s was followed by the identification of an infective pathway that implicated initial human contact with non-human primates. Forest edges within central African states, and the hunting and consumption of bush meat, became key sites for virological research (Wolfe et al., 2007). Simian immunodeficiency viruses (SIVs) and Ebola Haemorrhagic Fever (EHF) provided similar geographies of emergence, with unregulated primate contact as the disease transfer event or first cause. Moreover, other diseases, including Japanese Encephalites, Nipah and Hendra, often with bats as wild hosts, tended to draw researchers to the newly opening borderlands between wildlife and human society.

These emergence and transmission narratives repeated a familiar story of human encroachment, ecological change and intensifying interactions with and/or disturbances to wildlife that together produced the conditions of possibility for the transfer of microorganisms from wildlife to people. While not new, these transfers now had more chance of circulating beyond the confines of the forest edge as a result of new transport infrastructures that were often associated with

military conflict, science, intensive forestry, mining or agriculture. Stephen Morse, the virologist who did much to popularise this etiology, coined the term 'viral traffic' as a means to capture the direction, increased reach and accelerating speed of viral movement (Morse, 1993). He also coined the terms 'emerging infectious diseases' and 'emerging viruses' to relay the sense of the effects of a combination of human-induced environmental changes, shifts in human–non-human animal interactions and increased transport and communications on the evolution and disease-producing capacity of microbial life.

The promiscuity of human and non-human lives, their mixing, movement and co-dependencies, seemed to drive a continuous 'spill-over' (Quamenn, 2012), where microbes that were once restricted to non-human species were able to transmute and transmit to people. The evidence was arresting. Roughly three-quarters of the emerging diseases of the last three decades were judged to be 'zoonotic' (infectious diseases that jump between human and non-human animals (Taylor et al., 2001)) and 60% of all known human communicable diseases were 'due to multi-host pathogens characterised by their movement across species lines' (AVMA, 2008: 3). At the turn of the new century, a wave of zoonotic respiratory diseases increased the stakes further (at least in the West and Global North), giving the emergency in waiting further credence. Severe Acute and Middle East Respiratory Syndromes (SARS and MERS) in 2002 and 2013, as well as Avian and Swine Influenzas throughout the 2000s and in 2009, seemed to testify to this upturn in infectious and often viral diseases that had multiple non-human hosts and or vectors and were associated with high mortality rates in people.

In terms of the geographies of infectious disease, these diseases started to shift the epidemiological gaze away from the forest edge. SARS seemed to be more urban and peri-urban in terms of its epicentre (Harris Ali and Keil, 2008; Schillmeier, 2013). The new wave of zoonotic influenzas like avian and swine flu were clearly related to socio-economic conditions and even to industrial practices (Wallace, 2009). Certainly, the geography of emergence and spread outwards from a hot spot in the Global South was always questionable to social scientists interested in the relations that make disease possible, but these epidemic and pandemic events made this geography even less convincing. The 2009 swine flu pandemic strain virus seemed, for example, to emerge within intensive pig raising facilities in North America and Mexico. Meanwhile, highly pathogenic avian influenza (HPAI) viruses seem to have both wild and domestic birds to thank for their emergence and continuing evolution. The focus of attention has therefore somewhat shifted from forest edges and wildlife to semi-domesticated and domesticated non-human animal hosts that are more centrally linked to food and farming practices as well as to the laboratory and regulatory practices that are associated with securing safe life.

This refocusing attention on the socio-technical disease set-up is further justified when we consider other disease emergencies. For alongside zoonotic infections, there are also diseases that affect often large and vulnerable domestic

animal populations, with devastating effects on animals, economies and the people who work with those animals. The disease pathways and mechanisms may be similar, often with wildlife hosts acting as 'reservoirs' for microorganisms and playing a key role in the cycling and recycling of disease. However, of equal concern here are the growing size and scale of domestic animal populations and holdings. In the last few decades the rise of both global livestock animal numbers, particularly for chicken, cattle and pigs, and a continuing growth in average carcass weights, amount to a ballooning global domestic animal biomass (see Figure 1.2). In terms of disease risk, this expansion of mass increases the magnitude, if not the frequency, of the risks of epizootic events, or widespread non-human animal diseases. The implications for animal welfare, food security and livelihoods are clear. Again, recent disease events that have affected national herds like Bovine Spongiform Encephalopathy (BSE), foot and mouth disease, Bovine Tuberculosis, Brucellosis, Porcine epidemic diarrhoea and others, are indicative of the kinds of vulnerabilities that these livestock operations face.

To add two more concerns, there are also food-borne diseases and the emergence of anti-microbial resistance. Food-borne diseases can develop within living animals or on animal products that support a diversity of life, and travel with those products through a convoluted pathway and complex food industry to reach consumers in forms that are difficult to monitor and control. The food industry itself becomes the site of emergence, so much so that microbiological life can flourish and mutate within its fabric and generate new forms of disease. BSE, *Campylobacter* (a bacteria associated with food poisoning) and *Escherichia Coli* 0157, all seem to have opportunistically combined rapid microbiological change with a complex and high-pressure food chain to produce new challenges to public health.

Finally, there is the spectre of anti-microbial resistance (AMR). The rise of antibiotic treatments has enabled highly successful control of bacterial infections in humans and non-human animals. But resistance to the effects of these naturally occurring and synthetic medicines is an inevitable part of microbial evolution. This process is accelerated by the misuse or poor stewardship of those medicines. The result is that there are now strains of bacteria associated with food and farming (*E. Coli*, Methicillin-resistant *Staphylococcus aureus* (MRSA) and *Campylobacter*) that are resistant to first-line treatments and broad-spectrum antibiotics. The circulation of resistant microbes and their mobile genes through the food and farming system and into the wider environment via human and animal wastes is a key concern (Wellington et al., 2013).

Taken together, these zoonotic, epizootic, food-borne and AMR emergencies not only shift attention from the forest edges towards socio-technical disease set-ups, they also suggest a shift in the role of social science (Janes et al., 2012). To put it simply, these set-ups involve a broader set of relations with non-human animals than might be found at the forest edge. The issue may no longer be the encroachment of people into wild spaces, but quite the reverse, the increasingly

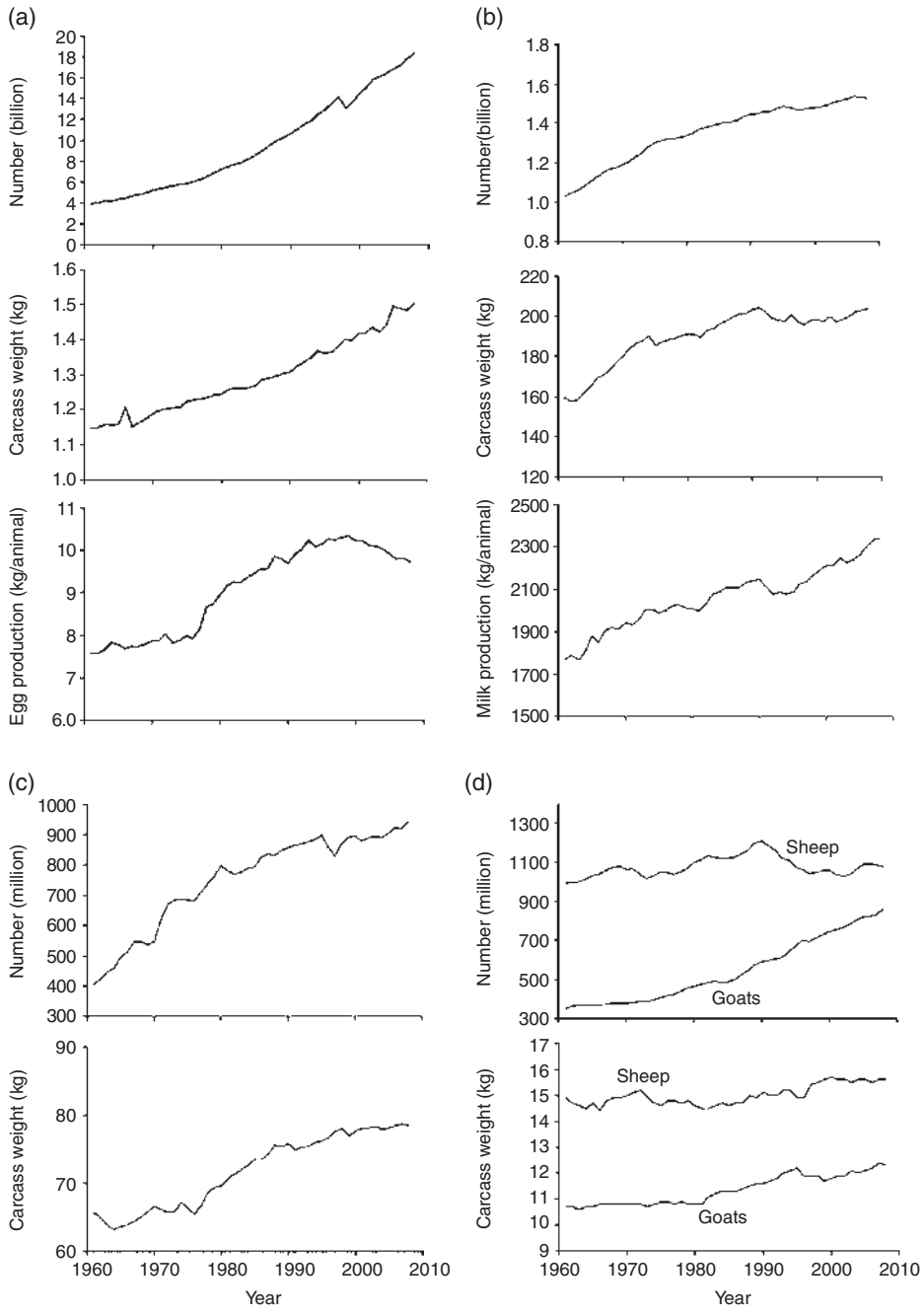

Figure 1.2 Global livestock production: (a) number of chickens, carcass weight and egg production per animal from 1961 to 2008, global; (b) number of bovines (cattle and buffaloes), carcass weight and cattle milk production per animal from 1961 to 2008, global; (c) number of pigs and carcass weight from 1961 to 2008, global; (d) number of sheep, goats and carcass weights from 1961 to 2008, global. (Thornton, 2010, http://rstb.royalsocietypublishing.org/content/365/1554/2853. Used under CC BY 4.0 https://creativecommons.org/licenses/by/4.0/).

obvious encroachment of non-human animal ecologies *on* people (Nading, 2013). In other words, there is a pressing need to focus on the effects of an expanding domestic animal ecology, and to give more attention to the human-animal and material ecologies that are being reformatted in current iterations of agriculture, food provision, regulation and science.

As a result we primarily deal here with the socio-technical aspects of infectious disease as they relate to food and farming, where the generation, amplification and subsequent transmission of disease can produce catastrophic effects, and where the control of disease risk can, we argue, make matters both better and worse. In making this our focus we nevertheless take a multi-sited approach, one that includes farms, laboratories, factories, wildlife reserves, restaurants and kitchens, government offices and public meetings. How to tie these various sites together requires us to say a little more about what we call disease situations.

From Disease Sites to Disease Situations

The responses of food, farming and policy sectors as well as scientific research to emerging infectious and food-borne disease are of key concern for future global health. Crucially, these responses are coloured by the operation of a raft of other pressures on food and farming. These include economic, environmental and regulatory pressures. We will run through some examples here before outlining how and why this matters for studying disease.

Responding to emerging diseases takes place against a backdrop of growing demands on the food and farming sectors to produce food for more people, at prices and with margins that are agreeable to consumers and producers. The production of animal protein is a huge growth area for many economies, and this growth is driving and responding to changing diets and lifestyle expectations. Increased livestock productivity is part and parcel of the new but somewhat familiar aims of sustainable intensification (Garnett and Godfray, 2012). Domestic livestock populations are estimated to have grown at around 2.4% per annum, with carcass weight per animal increasing year on year (Alexandratos and Bruinsma, 2012). Globally, 52 billion chickens are consumed annually (FAO, 2013). Worldwide pig production is struggling to match growing demand for pork in Asia in particular. Food networks are increasingly international and global financiers are investing in concentrated animal feeding operations (CAFOs) and livestock infrastructure on an unprecedented scale (Pew Commission, 2008; Wallace, 2009) as a means to meet this demand and of course to secure steady returns on investment.

This expansion of agri-food has numerous benefits, it is often argued, in terms of providing affordable food for a growing and developing human population in ways that might be expected to meet clear standards of production (McCloskey et al., 2014). Yet, it also faces large challenges, including ones that relate to environmental

externalities (not least greenhouse gas emissions, the throughput of finite resources and nitrate pollution) and animal welfare concerns. In terms of health and disease, the issues are not straightforward. On the one hand, there are arguments that increased concentration and enclosure (or modernisation) increases the ability of the food and farming system to exclude pathogenic materials. On the other, logistical and health challenges of a densely interconnected system look ever more difficult and prone to catastrophic failure. As global animal mass grows, as wildlife is simultaneously displaced and competes with agriculture for habitat, and as food systems increase in terms of network length and connectivity, the potential for devastating zoonotic, animal and food related diseases may well have grown. All of these concerns bear down on an industry that is increasingly under pressure to produce plentiful food, at low cost and in ways that are environmentally sustainable and healthy. The result is that there are often tensions that exist between safety and profits, biosecurity and food security, biodiversity and risk, consumer demands for affordable goods and food safety.

Expansion and internationalisation of the food and farming system also poses governance challenges at a time of widespread crises in terms of resourcing, organising and generating and maintaining trust in public and private institutions. Internationalisation may well be accompanied by a reduction rather than rising of standards as conglomerates and corporate bodies aim to improve margins by taking advantage of low-cost labour, cheaper inputs and less stringent regulation. At the same time, a general tendency to reduce the 'regulatory burden' on businesses and offset the public cost of dealing with disease events has led to a 'neo-liberal' style reorganisation of state and local state regulatory infrastructures (from veterinary services to food inspection, and from government-led science to national health provision) (Maye et al., 2012).

More specifically, there have been attempts to redistribute responsibility onto private actors so that they take charge of their disease risk. Farmers for example, in the UK and New Zealand, have been encouraged to form (albeit highly subsidised) limited liability companies in order to control Bovine Tuberculosis through culling of wildlife. There have even been attempts to make compensation for disease breakdowns dependent upon farmers having taken necessary steps to improve the biosecurity of their premises (Donaldson, 2008; Mason, 2014). In the US, following the avian influenza outbreaks of 2015, farmers are required to meet certain biosecurity standards in order to be eligible for compensation following future outbreaks. Meanwhile, under the same rubric of neoliberal approaches to governing, there are attempts to develop market opportunities in health and disease abatement.

This is an area where disease (as emergency in waiting) chimes with the prospect and marketing of scientific innovation and pharmaceuticals. The always inevitable and imminent emergency is a useful means to implore governments and businesses to invest in security, in frontline broad spectrum drugs, in disease resistant genetically modified or edited animals and so on. The market opportunity

of security adds another pressure onto the mix of issues that surround disease management and control.

The broader point is that the intensification and extension of international food supply chains has been accompanied by re-arrangements to public budgets, an increase in private health and security providers, a reformatting of animal and human health related sciences, and, arguably, an atmosphere of scepticism and mistrust of both public and private authorities.

Given these material, social, ecological and political tensions, how should emergency diseases be studied? We are interested in the interfaces between the regulation or management of disease and other concerns (costs, labour dynamics, food safety concerns, ecology, issues of countryside and wildlife), an interest that requires us to broaden the spatial vocabulary through which diseases are normally studied. Here we make a distinction between a site (or a location on a map like a specific forest, or a farm, or a factory) and a situation in which various processes, diagrams, materials and actors of all shapes and sizes that make that place are brought into view (Chapter 3). If the forest edge has often been depicted as a disease site, or a location where a zoonotic event took place, then the situation that is a socio-technical disease set-up, or any moment within that set-up (like a farm, a processing plant, the decision to hire a certain kind of labour, a laboratory where viruses are identified, the ways in which regulation is organised) is always shaped by a any number of issues and practices, many of which occur elsewhere.

A situation is at once grounded somewhere but also dispersed or distributed through the many interactions that make it possible and which it can also affect. For us, situations are meeting places, where numerous actors, bodies, species, pressures, flows, issues, decisions and so on are organised or brought together, or held apart or worked upon. They are heterogeneous (formed from their differences and relations), and dependent for their identity not only on what is meeting up but also how those meetings are configured. The way in which these meetings occur, and the ways in which actors and materials intra-act (for they can and do change one another in the process of relating to one another, see (Barad, 2007)) is of key concern to a social science of disease.

The way labour practices intra-act with poultry guts (Chapter 4), or changing farming practices intra-act with pig bodies and microbes (Chapter 5), or the way local authority budgets intra-act with food safety inspections (Chapter 6), or disease publics intra-act with health advice (Chapter 7) or birds and viruses intra-act with people (Chapter 8), all affect the disease potential of the situation. These intra-actions may amplify or reduce disease risk, they may mask one problem while generating another, they may, in short, intra-act in various ways and with various effects.

In order to study disease, therefore, we need to both take and develop a geographical imagination that is attentive to the spatiality of situations (Allen et al., 1998), and use an STS-style thinking that is rehearsed in studying the ways

in which different modes of ordering (Law, 1994) and human and non-human actors hold matters together, keep them apart and more broadly affect the disease situation.

So we need to be able not only to refocus attention on the socio-technical disease set-ups, but also understand these situations, which are infiltrated with other pressures, issues and materials. In this sense, we are not simply shifting the *location* of concern (from what disease ecologists call the hot spot of the forest edge to the hotspot of the farm), we are doing what anthropologists Brown and Kelly (2014) call *locational* research. We are interested in the multiple spaces, or spatialities, of disease, the meeting up and formatting of economic, technical, biological and political pressures that can amplify or indeed mitigate a disease emergency. In order to say some more about this situated, or geographical, approach we will now introduce a spatial critique of disease and through this discuss the concept of pathological lives.

From Pathogens to Pathogenicity, and Pathological Lives

Infectious disease understanding and disease control tend to focus on pathogenic (disease causing) organisms or viruses, their vectors and the wildlife reservoirs that may host them. Dealing with these through early warning, surveillance, pharmaceuticals, on-site hygiene or physical borders between domestic animal life and a less orderly (wild and microbiologically promiscuous) world have become significant components of what is called biosecurity (Chapter 2). Hard landscaping and barriers are coupled with maps that detail movement and incursion as a means to deliver least cost disease prevention (Chapters 3 and 4). In turn, relatively little disease-related policy attention has been paid to hosts or their (socio-technical) environments.

In contrast, and in this book, we adopt and develop accounts of disease that emphasise the entanglements of bodies, microbes and infrastructures, and thereby a relational understanding of disease. Our intent is to expand on the potential for a pathological understanding of life, and a more continuous, less dichotomous sense of health.

In this sense, we engage, albeit carefully and critically, with a counter narrative to the anti-microbial or anti-life tenor of disease response. In this alternative, pathogens, or the microbial world more generally, are very much a part and parcel of life wherever it may be. This is a world not so much threatened by the microbial outside but one where the manner in which lives are made, and the ways in which the inevitable entanglements between hosts, environments and microbes are handled, are key to any prospect for safe and indeed good life.

This diagramming (Chapter 2) of the spaces of disease and health in a globalised food and farming system is an essential task for re-conceptualising the disease emergency. In order to take this further, we are using the term *pathological*

lives to foreground our interest in socio-biological entanglements. We take the term from the philosopher Michel Foucault, and from Eugene Thacker's engagement with disease (Thacker, 2009), so it is worth briefly revisiting its initial use before outlining how we wish the term to be read.

Michel Foucault used the term 'pathological life' to register a shift in biomedical understanding that occurred around the turn of the nineteenth century. In his account, disease started to shift from being an external threat *to* life to one that was part and parcel *of* life. Disease and life started to be understood as 'bound together' (Foucault, 1973: 153). As a result, 'the idea of a disease attacking life [needed to be] replaced by the much denser notion of pathological life' (1973: 153).

Understanding 'morbid phenomenon… on the basis of the same text of life, not as nosological essence' (1973: 153) had spatial consequences. Inside and outside no longer supplied the spatial coordinates of life and disease. The result was an unsettling of the conventional mapping of bodies as discrete objects with clear boundaries. The 'familiar geometry' of the anatomical atlas with its 'lines, volumes, surfaces, and routes' (Foucault, 1973: 3) started to be undermined by this denser notion of pathological process. The map of the body, with it regions and borders, and with its voyages of disease entities into the centre, started to lose its explanatory power. For example, speaking of much later challenges that accompanied the growing knowledge of viral process, Foucault asked:

> Has anyone ever drawn up the specific geometry of a virus diffusion in the thin layer of a segment of tissue? Is the law governing the spatialisation of these phenomena to be found in the Euclidean anatomy? (Fourcault, 1973: 3)

The answer is evidently no, and the alternative is rather close to what we will refer to as a topological approach to disease (Chapter 3). The point is that a different spatial imagination for disease, one no longer constrained by conventional geometry, became both possible and important.

The immediate consequences of thinking in ways that refuse strict boundaries between microbes and hosts, or categorical demarcations between pathogenic and commensal microorganisms, are that disease becomes a relational achievement. It is an achievement in which *pathogenicity*, or the tendency to produce disease, is made through the particular configurations of microbes, bodies, environments and so on (Farmer, 2004). Pathogenicity is a process, rather than a fixed object. It involves the significant intra-actions of microbial populations, hosts, immune responses, and the particular entanglements of animals, people, microbes, economics and politics.

These relational achievements that produce pathogenicities are what we are calling disease situations. Good life no longer becomes premised upon the absence of illness, or of microbes or pathogens, but is the subject of specific interplays of bodies, microbes, infrastructures and practices. The result is a shift in

geographical imagination away from a topographical epidemiology of spread, of presence/absence and of disease barriers, to a topological epidemiology of bodily and molecular deformations, disease expression and more or less healthy lives.

From Governing Life to a Livelier Politics

A key analytical tool for understanding the approaches that are made to manage disease, to regulate human and non-human populations and to intervene in 'life' is biopolitics. The term has a long and chequered history (Lemke, 2011) but was notably adopted by Michel Foucault (1981) to mark a shift in emphasis, around the seventeenth and eighteenth centuries in Europe, in the government of human societies. In brief, biopolitics for Foucault signalled a broadening of the techniques and apparatus of government from the disciplining of individual bodies to the knowledgeable manipulation of a population, of statistics and, crudely, the use of precise mechanisms and processes associated with broad-scale changes as a means to affect the direction of those changes (Foucault, 1981: 137). It involved 'the coalescing of disciplinary codes, population surveillance mechanisms, and discourses concerned with the production and protection of (mostly human, mostly Western) "life"' (Nading, 2013: 66). The broad story is that nascent life sciences and statistics, many of them honed in plant and livestock management, entered or became 'intricate with' politics in the guise of a range of regularised processes that could be more or less effectively arranged 'so as to optimise a state of life' (Foucault, 2004: 246).

The commonly noted point is that the term biopolitics as a mode of governing applies largely to the management of human society, and seeks to render the material and non-human world as something to be manipulated. The latter becomes mere matter made fit for human ends. In this sense, disease management strategies and biosecurity, which involve the regulation and regularisation of non-human life, and of farming and food practices as a means to produce and protect (mostly human) life, are clearly biopolitical in terms of style and substance. They seem to suggest and are often written about in terms of the will to exert control upon and power *over* both human and non-human life (including non-human animals but also viruses, genes, businesses and so on).

And yet, biopolitics is rarely if ever that simple – for in seeking to govern 'a complex of men and things' (Foucault, 2007: 96; Lemke, 2015) a tension arises between encouraging more interactions with the worlds of others while trying to exert control over the resulting imbroglios of people, goods, services, ecologies and so on. In this sense, there is a well-known trade-off between attempts to encourage the proliferation and expansion of economic life while at the same time safeguarding its existence. Bluntly put, the flows and circulations of economic life can be both good *and* bad. Moreover, too much security or regulation of those circulations can affect not only the unwelcome elements of contact and movement,

but also those life affirming aspects that require the contingencies of contact. Life as a result can start to suffer (Dillon, 2007; Dillon and Lobo-Guerrero, 2008).

This conundrum is at the heart of *Pathological Lives*, which asks how these powers over life and powers of life are handled, regularised and organised? Again, how are the inevitable entanglements within and between lives understood and regulated? Is biosecurity, for example, as it is implemented through laboratories that seek to order organisms and within a food sector that pursues disease freedom, an example of an over-blown and self-defeating approach to the regulation of life? Are there alternatives that can make life safe in ways that are not predicated on a control over life?

The problem may be that, in conventional formulations and as a mode of analysis as well as a form of governance, biopolitics and the power to regulate or balance life, tends to invoke a division between worthy and less worthy forms of life, one that is rooted, many argue, in a Heideggerian foundational distinction between proper and improper life (Agamben, 2002; Campbell, 2011; Wolfe, 2013). It is a distinction that results in the separation of 'truly' human life from sub-human and animal life, and sanctions what Wolfe (2013) calls the non-criminal putting to death of human, domestic and wild non-human animals.

In this vein, biopolitics offers us something of a resource as well as a potential curse or at least a warning. The warning has two elements. First, making life safe always risks the very thing it seeks to protect. This is, it seems, inherent in the tension between proliferation and security and requires a watch over the tendency to assume a (human) mastery or power over life. Second, there is a continuous possibility that any affirmation of the powers of life (for example in celebrating the interactions between hosts, microbes and environments) can rather quickly be turned against itself. In asserting a positive aspect of life we risk, it seems, the re-elevation of the proper over the improper. Security, as Foucault conceived it, was never meant to be a stable rubric, identifying good and evil. Rather it was and is a continuously shifting, even 'grasping' (Lentzos and Rose, 2009), logic. The point to hold on to for now is that pathological lives are intended to be read against the grain of any tendency to homogenise, de-skill and disinfect the socio-technical disease set up in the name of security. But they also need to be framed in ways that are not reducible to new norms or re-configured powers over life.

The resources for avoiding this disqualification of the many (most lives) in the name of the few (proper life) are not easy to discern, but we draw in the main on two bodies of work. First, and within the biopolitical tradition, we use the immunitarian thinking of Italian philosopher Roberto Esposito to open up a broader account of good life. Second, we adopt the cosmopolitical approach of Isabelle Stengers as a means to specify the ecologies and practices that can re-diagram disease as a situated and more than human matter.

Esposito demonstrates how community is bound together with immunity (Esposito, 2008, 2011). In this sense, immunity is not a matter of violent defence

of the self against foreign attack, but instead is a matter of continuous communication. Immunity is a shared space, a learnt property that is conveyed through contact rather than separation. Self and other, human and non-human, are not, in this version of being, tightly bordered but intra-act. They form a kind of borderlands (Hinchliffe et al., 2013) and in doing so unsettle any foundational separation between the proper and the improper.

While this is attractive in that it disrupts any foundational or *a priori* identification of proper life, the problem may well be that we can flip from a triumphant anthropological account of human exceptional-ism, to a world of few if any distinctions. Living with all manner of others does little to specify *how* exactly those lives are to be lived. So while we are taken by the challenge of a continual process of building immunity within a shared space, it strikes us that the more pragmatic and minoritarian philosophical tradition that Stengers called cosmopolitics can offer us more resources for thinking through the practical and spatial politics of this relational being.

Unlike biopolitics, cosmopolitics for Stengers is expressly meant to refuse a potential unity or accession to some version of proper life. Cosmopolitics in this usage is not equivalent to the Kantian notion of a good life (Stengers, 2005b). It is not about using norms to define the good, or optimise life. Rather it is about using the slippages and challenges to life as a means to question those norms and to open up a political space for counter-norms.

As Michael Schillmeier (2013) makes clear, there is distinction to be made here between a Kantian cosmopolitics of health and what he calls a cosmopolitics of illness. While the former involves proposing a proper life in order to constitute a system of rights, the latter can invite us to pose questions about norms rather than insisting on their re-constitution. Following Canguilhem (1991 (1966)), illness for Schillmeier is not a deviation from the norm, or something that tends to expel sufferers from the polis. Rather, illness becomes a kind of messenger, the parasite a noisy interruption (Serres, 2007), and a time for re-configuring norms. In this vein, the emergency diseases with which we started become more than simply a challenge to established routines and practices – they urge us to question those norms and routines.

Cosmopolitics is, as Stengers observes, 'far more to do with a passing fright that scares self-assurance' (Stengers, 2005a: 996, see also Schillmeier, 2013: 35) than a self-assured re-constitution of proper life. These passing frights invite us to compose life differently, and in ways that take seriously the challenges to living that are posed by non-human beings and their human spokespeople (Stengers, 2010b). In other words, this is a form of learning that takes the obligations to, the hesitations before and relations with others of various kinds, as matters that are not simply vital for life but key for a re-constituted politics of living.

So our compulsion in this book is to both use the resource of biopolitical thinking to inform our analyses of pathological lives (or ask how have matters of life been governed), but also to question its foundations and limits (ask how have

these lives been thought and normalised). Certainly, the intrication of life and politics reminds us that life and liveliness are far from innocent terms, and are made and unmade through various interrelations. And yet, we are also aware that biopolitics may be a poor ally in working through a current politics of life, in which the distinctions between human and non-human lives are even less apparent, not least because of the rise of zoonotic diseases. Moreover, once we start to surrender the human-centred focus of biopolitics, it may well be that we start to question the assumed ends of such a politics (the optimisation of a particular version of life).

In this sense, Isabelle Stengers's 'cosmopolitics' (Stengers, 2010a, 2011) seems to allow a more significant role for the microbes, economic margins and other non-humans that inhabit the situations we report. More important still, those others have more of a chance, we would argue, of forcing us to rethink our current situation. They are not subject to more optimisation but are key players in shifting the terms of the politics that we find ourselves in.

This shift in the terms of engagement returns us to the emergency with which we started. Without denying the urgency that is the disease situation, we would like to critically engage the infectious disease emergency, disease emergence and other terms. The emergency in waiting will not disappear as this book proceeds, but we hope to shift the question or focus from dangerous pathogens to dangerous situations and in so doing open up what Bonnie Honig (2009) calls a new kind of emergency politics.

We now turn to disease diagrams and later to situations as means to further specify our approach to pathological lives.

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