

Allergy: the body as self-evidence

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Publication Date:

2011

DOI:

<https://doi.org/10.26190/unsworks/15158>

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Allergy: the body as self-evidence

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A thesis submitted in fulfilment of the degree of Doctor of Philosophy.

The University of New South Wales, 2011.

Originality statement

For my atopic family,
and for all the individuals who shared
their stories of allergy with me.

Abstract

In both the social and natural sciences, mind and body are conceptualised as distinct phenomena. Though viewed as closely connected, the body – the material substance of our biology – is understood to be separate from, and certainly prior to, those aspects of life typically deemed social, cultural, historical and psychical. This assumption, that biology and sociality are mutually exclusive, speaks to the disciplinary division between the social and natural sciences. The difficulty of thinking across this divide is evidenced in specific attempts to theorise their interface. For instance, social scientific studies of the embodiment of medical discourses and experiences of illness have yielded more sophisticated accounts of how biology and subjectivity, science and culture, life and knowledge, *interact*. However, the theorisation of this relation as an ‘interaction’ presumes that an essential, ontological difference underwrites the division of biology from sociality. Yet the authority and empirical purchase of medical discourses, to which these studies consistently draw attention, suggest that this idea of two discrete, communicating systems, is inadequate to account for life’s ontology.

Focusing on the phenomenon of allergies, this thesis investigates the Cartesianism that grounds contemporary biomedical accounts of the immunological body. As a condition in which what is social and what is biological cannot be easily differentiated, allergies present a concrete example of the contagion that constitutes the reality of being an embodied subject. Composed of three lines of inquiry, this thesis is defined by a general concern with the question of identity. Through detailed analyses of Clemens von Pirquet’s original theory of allergy, Donna Haraway and Ed Cohen’s critiques of the politics of immunological discourse, and the biology of allergy, it critically interrogates the concept of identity that grounds a biology/sociality or nature/culture division: a given, bounded, autonomous self. Taking issue with the notion that the biological body pre-exists its social and cultural contextualisation, this thesis argues that allergies empirically evidence the originary ontological (or ecological) entanglement of these apparently separate spheres.

Acknowledgements

This thesis was made possible by the assistance, advice and humour of so many colleagues, friends and family members. I owe particular thanks to my supervisor Vicki Kirby, whose guidance, critical feedback, support and interest have been invaluable to me as I've developed this research. Working with Vicki has taught me how to think, read and write all over again; she has helped me to discover the questions that motivate me and to work through these with patience and rigour. The energy she brings to academic work – her enthusiasm for critical inquiry – is inspirational and consistently reminds me of why this work is important and why I love doing it.

I am also very grateful to my co-supervisor Elizabeth Wilson, whose sustained interest in my project (even across the Pacific) has continually given me confidence in my ideas. Her support and encouragement, especially through some of the more difficult periods of the PhD process, were extremely welcome.

I would like to thank my friend Antje Kuenhast who, early in my candidature, generously volunteered to translate a number of German articles that became crucial to my thesis. I would also like to acknowledge the intellectual community at UNSW, and specifically, members of the reading and writing groups I participated in, for providing a stimulating environment to work in. Thanks go to Dom and Sue for hiring me as a peer writing assistant at The Learning Centre. Working with students at the centre has been by far one of the most rewarding learning experiences of my candidature, and contributed significantly to the development of my writing and teaching.

I have benefitted greatly from a number of strong friendships. The advice, intelligence and good humour of Demelza Marlin, have been such good, steady company for the past four or five years. My many conversations and collaborations with Florence Chiew have brought a renewed sense of energy to my work, and remind me that in academic work, the experience of dialogue is what is to be most treasured. And I could not have done without the warmth and sagely wisdom of my good friend

Patricia Morgan, whose clarity and presence always bring me back to where I am. I would also like to acknowledge Ash, Rebecca, Declan, Noela, Jen, Daniel, Craig, Anisha, Rhonda, Le, Ana, Emily, Claire and the all Redfern crew for their ongoing support, friendship and community. And to the lovely ladies of the casserole drive, especially Ash, for feeding me so well during the last week of writing!

A big thanks goes to my family – mum, dad, Andrew, Sue, Sophia and Dylan, for just being there, consistently.

Finally, I would like to thank Cam. In addition to always expressing an interest in my work, engaging with me about my ideas, and proof reading this thesis, his presence has steadied me for the past four and a half years. It is with his patience and love that I have been able to complete this project.

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Introduction

My interest in allergies is a personal, biographical one. For as long as I can remember, I have always experienced allergies. As a child, I suffered chronic, and sometimes severe episodes of allergy-related asthma. I distinctly recall the anxiety that accompanied these attacks, as well as the stress that it caused in those around me, especially my parents. My experience as a young adult has confirmed that allergies (or asthma) and stress go hand in hand. In situations of great anxiety or pressure, my asthma and other allergic responses (such as skin reactions) are noticeably heightened – I am literally more sensitive physically and emotionally. Or rather, in these moments I am reminded that the emotional is physical.

This correlation between social or emotional factors and the manifestation of allergic symptoms also holds for the opposite situation. On a number of occasions, I have been exposed to allergens that normally elicit a strong allergic response, but have failed to manifest any of the usual symptoms. For instance, I have always been quite allergic to dogs, and whenever I'm near one, within an hour my nose and throat itch, my nose and eyes stream, and I begin wheezing. The asthmatic symptoms often persist for a few days after being away from the dog. However curiously, whenever I visit a particular cousin of mine who has always had dogs, I never experience symptoms. In fact, I could sleep in the same bed with her dogs for a week and be almost symptom-free. The suspension of my allergies around this person is something I've always been genuinely puzzled by. Knowing that it has nothing to do with other factors, such as the breed of her dogs, the cleanliness of her home, or the city and climate she lives in, I can only attribute it to our relationship. But how could her presence or influence cause my body to respond differently to an allergen that routinely gives rise to the same allergic response? Or alternatively, if my exposure to dog dander doesn't consistently produce allergic symptoms, what causes this allergen, under other circumstances, to give rise to allergy?

This peculiar and inexplicable relation between the social/emotional and biological in allergic phenomena is by no means unique to my experience. Allergies

frequently carry with them stories of stress, anxiety, grief and other strong emotional states that are often connected with family relationships. Historically, they have been consistently related to emotions or ‘passions’ including anger, anxiety and fear (Jackson 2009, 139). Nowhere is this relationship more explicit than in the anecdotal evidence provided by individuals and their families about their experiences of allergy.

For instance, my partner once recounted to me the story of his grandmother, who suffered chronic eczema. Born into a family of anxiety sufferers, she herself experienced anxiety from a young age. In her early forties, she began to develop eczema, an allergic skin condition that was accompanied by high blood pressure and migraines. Her eczema was quite bad and covered most of her body; to alleviate the intense itching that accompanied it, she was treated with cortisone and spent long periods immersed in salt baths. In her mid sixties she began to develop Alzheimer’s disease (a common form of dementia), and by her early seventies, the condition had become so advanced that she was moved into a care facility. According to her family, it was around this time, and with the fading of her memory, that both her eczema and anxiety disappeared.

Since undertaking this research project, I have been inundated with stories of this kind. In doctor’s appointments and librarian consultations, at parties, barbeques and bus stops, the discussion of my thesis topic has prompted fascinating and sometimes sad accounts of allergies declared to be emotional, psychological, psychosomatic and familial in origin. While these are lay diagnoses, there is something about the sheer number of curious stories I have listened to, and about the willingness of individuals to share these intimate accounts, which suggests that a generally acknowledged truth about the connection between emotional (social) and biological life underpins these observations. These stories bear witness to a testimony offered by allergic bodies themselves – evidence of the complex interrelation of body and mind, or biological and social life.

These cases and others like them demonstrate that allergies are not strictly biological events, at least, not according to orthodox understandings of biology. If allergies can be triggered by social, emotional or psychological events or states, then the very notion of a pure biology that exists in isolation of these presumably very

different aspects of life, is raised as a question. When stress and anxiety manifest *as* allergic symptoms, the idea that emotional and biological life are ‘connected’ – that one causes an effect in the other – seems inadequate to account for the actual complexity of this event. Like common usage of the term ‘psychosomatic’ in labeling conditions that defy the conventions of biological explanation, the notion of connection implies an interaction between two discrete, mutually exclusive parts – mind and body, mental and physical. However, as I argue throughout this thesis, the logic of a linear causality and its presumption of initially separated domains (mind and body) cannot explain *how* one manifests as an effect *in*, or even *as*, the other. If anxiety is an eczema rash, it isn’t straightforwardly emotional or psychological *before* being biological. And if a relation of trust between two family members can suspend an allergic reaction to dog dander, then biology doesn’t exist independently of, or outside, the familial and emotional. Remarkably, these events gesture toward the emotional, psychological and familial complexity of biology itself. Put crudely, they seem to suggest that the body *is* social.

The relation between body and mind, nature and culture, or biology and sociality, forms the core provocation of this thesis. In order to critically address the etiological problematic that allergies manifest, this thesis examines the Cartesianism that grounds both contemporary biomedical understandings of the immunological body, and social scientific and critical-theoretical accounts of embodiment and subjectivity. Broadly speaking, this thesis takes issue with the assumption that biology and sociality are ontologically discrete domains – that biology pre-exists its social and cultural contextualisation. As such, it is centrally concerned with, and interrogates, the concept of identity that underpins a biology/sociality or nature/culture division, namely, a given atomic entity or bounded autonomous self. In the chapters that follow, I examine how this figuration of identity contributes to current understandings of allergy, as well as conceptualisations of biology, the body and subjectivity. What are the ontological implications of a notion of identity that takes separation and discretion as its primary characteristics? What conceptual, philosophical and empirical commitments does it maintain? And what is at stake in thinking nature and culture, or mind and body, holistically as different expressions of a single system or ecology?

This thesis, which takes an interdisciplinary approach to the subject of allergies, is composed of three main parts. In order to give context to contemporary biomedical understandings of allergy, the first part of the thesis deals with the discovery and conceptualisation of allergy within the history of immunology. Tracing its scientific foundations, Chapters One and Two examine the original concept of allergy proposed by Austrian paediatrician, Clemens von Pirquet, in 1906 – namely, ‘altered reactivity’. Remarkably, in its original formulation, allergy was offered as a general theory of immune responsiveness, *not* as a concept of pathology, as it is widely understood today. Pirquet coined the term allergy to describe the essentially mutable nature of the immune response, a concept that, provocatively, could not be reconciled with the distinction between normal and pathological immune function.

Chapter One attempts to make sense of the conceptual discrepancy between Pirquet’s notion of allergy and its mainstream definition. Outlining the rejection of Pirquet’s hypothesis by his contemporaries, this chapter contextualises this event in terms of the discoveries, dominant discourses and intellectual frameworks that defined immunology as a young science. I show that the investment of early immunologists in a notion of the immune response as an inherently benevolent, protective mechanism designed to defend the body and/or self demonstrates a commitment to a notion of organismic identity that could not be reconciled with Pirquet’s research. The belief in an atomic organism that authors its immune responses made it impossible to accommodate the idea that the organism naturally possesses the ability to harm itself.

Having highlighted the assumptions about the identity of the body, self or organism that underpin a conventional account of the immune response (and thus a reading of allergy as pathology), Chapter Two conducts a close reading of the allergy hypothesis, and works systematically through the logic Pirquet brings to the analysis of immune phenomena. It pays particular attention to his concept of reactivity and explains why it constitutes a very unorthodox framework for understanding immune events. In asserting that immune responsiveness is defined by a principle of mutation, Pirquet does not presume the existence of a fixed, atomic immunological self that anchors and directs its immune responses. Rather, his analysis, which takes the alterability of reactivity as its departure point, complicates and widens the parameters

of immune responsiveness. I argue that Pirquet's concept offers an account of organismic identity that captures, rather than reduces, its relational or ecological complexity.

While the first section of the thesis addresses the concept of identity that underpins conventional immunological definitions of allergy, namely, an immune self, the second section investigates how this scientific discourse has been critically engaged within the humanities and social sciences. Given that the logic of immunity is so central to understanding allergy, I examine the ways in which this concept of identity has been addressed outside the life sciences. Chapters Three and Four focus on two key social and political critiques that have been leveled at immunology's representation of the organism as a defended entity at war with others, namely, Donna Haraway's 'The Biopolitics of Postmodern Bodies: Determinations of Self in Immune System Discourse' (1989), and Ed Cohen's *A Body Worth Defending: Immunity, Biopolitics, and the Apotheosis of the Modern Body* (2009). In these texts, both Haraway and Cohen assert that the discourse of a defended, autonomous self affirms a view of identity grounded in the political values of war, defence and hostility – a concept they argue has negative political implications for the way we understand and experience social *and* biological life. In place of immunity, they propose a concept of community or connectedness as a political alternative we can aspire to.

What emerges most strikingly from these critiques is a moral opposition between immunity and community, or defence and connection, as different ways of interpreting or conceptualising life. Crucially, this oppositional stance is rooted in the assumption that life and its representation (or biology and models of biology) are distinct phenomena, that is, that we, as human agents, have the capacity to intervene in, and make decisions about, the biomedical concepts and discourses we adopt as our truths. However, as we shall see, in rejecting the discourse of a defended self, these critiques paradoxically recuperate the very model of identity they identify as politically dangerous. By arguing against the rationale of immunity, they demonstrate their dependence on the oppositional logic of immunity in the very form of their critiques.

The second section of the thesis concludes with a brief Coda that meditates on the paradox that Haraway and Cohen's analyses of immune system discourse present. Drawing on Georges Canguilhem's *Knowledge of Life* ([1965] 2008), and his theorisation of life and knowledge of life as proper to one system, the Coda offers a holistic account of the knowledge-life relation that recuperates representationalism as an expression of life. It posits an inclusive conceptual framework through which Haraway and Cohen's critiques can be productively reread as unique instances of life's entanglement. As such, this discussion offers a more substantial conclusion to Chapters Three and Four by suggesting a different point of departure from which to interpret these arguments.

The final section of the thesis returns to the original problem of allergy – the mind/body relation. Bringing together data from the fields of immunology and psychosomatic medicine, Chapter Five (which is divided into two main parts) conducts an extensive empirical investigation of allergy that attends to the question of its different causes. Part One focuses on the biology of allergy, and mainstream immunological accounts of allergy as a biologically or genetically based condition (atopy). This section critically considers the immunological evidence used to support the view that allergy is a straightforwardly biological phenomenon. Concentrating on the antibody commonly identified as its primary causal agent, immunoglobulin E (IgE), this section illustrates that the processes by which IgE is animated *as* a biological cause of allergy significantly complicate the identity of biology as a discrete domain that can be easily located (outside the social, emotional and familial).

Part Two critically examines studies of allergy in the field of psychosomatic medicine. It focuses on the meaning of the term 'psychosomatic', according to practitioners of this discipline, and explores how these definitions were operationalised as experiments and diagnostic techniques. Specifically, it looks at how immunological and psychotherapeutic methods were used *in conjunction* by these clinicians, and the implications of this method for locating the agency of mind or body. This section of the chapter argues that psychosomatic medicine, in its efforts to grapple with the mind-body division conceptually and empirically, demonstrates the entanglement of mind and body in the allergic symptom.

This thesis argues that allergies evidence the originary entanglement of biology with sociality. As the thesis title suggests, the allergic body is self-evidence in the literal sense of being proof of itself without need of further demonstration (OED 2011). In the symptomatology it manifests (or sometimes *fails* to manifest), the body is evidence of its own truth – that is, of the fact that the biological and the social are ontologically inter-implicated. In this sense, the biological and the social are not distinct or mutually exclusive domains that interact with one another; rather, allergies attest to the contagion that constitutes the reality of being an embodied subject.

Chapter One

Imagining ‘reactivity’: allergy within the history of immunology

Most people understand allergies to be an overreaction or abnormal response of the immune system to innocuous substances that are, for reasons unknown, misrecognised as foreign or harmful. This account of allergy, which is widely embraced as *the* authoritative scientific definition, is one derived from contemporary Western medicine, and specifically, the science and clinical practice of immunology. Within immunology, the branch of science and knowledge concerned with immunity,¹ allergy is figured as a pathological or misdirected immune response, a deviation or aberration of proper immune function. This notion of allergy *as* pathology is the direct product of a very specific conceptualisation of immune function, namely, one that views the immune system as an inherently defensive operation designed to protect the individual through an innate capacity to discriminate between the benign and toxic, or self and non-self.² Central to this formulation is an acknowledgement that immunological activity, by its very nature, implies the presence of a coherent biological entity or self, that is, a fixed locus around which this activity is organised. As such, the interpretive frame of an immunological self has come to dominate the ways in which immune phenomena, such as allergies, have been and continue to be investigated, understood and imagined.³

¹ Interestingly, the etymology of the term ‘immunity’ – which derives from the Latin term, *immunitas*, meaning exemption from public service or charge – reveals the conceptual foundation of dominant immunological perspectives. In *A Body Worth Defending: Immunity, Biopolitics, and the Apotheosis of the Modern Body* (2009), Ed Cohen argues that immunity was originally a juridico-political term belonging to ancient Roman law. Only in the late nineteenth century, he explains, was the term adopted by Western biomedicine as a trope for elaborating organism-environment relations (2009, 3). Immunity’s linguistic origin, with its emphasis on ‘exemption’ and ‘distinction’ (2009, 38-45), brings to the fore a concept of identity that is crucial to immunology: a body or organism that exists within, but separately from, a larger governing system or ecology. This notion of an autonomous self is an enduring theme throughout the history of immunology. For a detailed account of immunity’s etymology see Cohen (2009). The history of immunity as a juridico-political concept will be discussed at length in Chapter Four.

² For a discussion of immunology as the science of self-nonself discrimination, see Klein (1982).

³ A large literature exists within historical and philosophical studies of immunology dealing with debates concerning the existence and nature of ‘the immunological self’. These accounts include discussions of the metaphor of ‘self’, its translation into empirical research, and its relationship to alternative concepts of immune function and immunological identity. See Tauber (1994) for an in-depth discussion of the concept of the immune self. See Löwy (1991; 1992) for discussions of how the

Yet this idea of allergy, which is premised on a seemingly self-evident understanding of what constitutes healthy or normal immune function, represents a serious departure from its original formulation over a century ago. The term ‘allergy’ was coined by Austrian paediatrician, Clemens von Pirquet, to mean ‘altered energy’ or ‘altered biological reactivity’ (Jackson 2006, 10), and used specifically to describe the immunological phenomenon whereby an individual, upon exposure to *any* substance, experiences a change in his or her capacity to react. The original meaning of allergy was not limited to defining the spectrum of conditions that are today grouped under the rubric of immunopathology (for example, asthma, hay fever, eczema, and urticaria). In fact, the identification of these conditions as pathological phenomena obscures the specific insight demonstrated by Pirquet’s work and the unique view of immune responsiveness it championed. From Pirquet’s perspective, allergy offered a concept of the immune response and immune function that troubled the conventional model of healthy and pathological responses (and thus our understanding of the difference between them). As A. Barry Kay points out, Pirquet conceived of allergy as a general theory of immune responsiveness; thus, its introduction into the medical vocabulary signalled not a nosological contribution (the creation of another classificatory term), but rather the discovery of ‘a fundamental biological rule’ (2006, 557).⁴ Put simply, Pirquet viewed allergy as a phenomenon exemplary of the nature of all immune responsiveness.

This unique account of the immune response challenged immunological orthodoxy. Pirquet’s emphasis on the capacity of the organism to *change* in its responses directly contradicted the widely held view of the immune response as the logical expression of a static, given, biological organism or system (Tauber 1994). Importantly, it implied a radically different framework for conceptualising immunological identity – namely, one based on the mutability, rather than stability and consistency, of immune responses.

concept of ‘self’ has been used to enable and direct investigations of immune phenomena. See Anderson et al. (1994) for a critical account of how the concept of ‘self’ has shaped the construction of the discipline’s history.

⁴ In ‘100 years of ‘Allergy’: can von Pirquet’s word be rescued?’ (2006), A. Barry Kay states that strict usage of Pirquet’s concept of allergy would have meant replacing the term ‘immune response’ with ‘allergic response’ (2006, 557). Kay explains that Pirquet understood allergy as a generalisable concept of immune responsiveness.

The conceptual discrepancy between historical and contemporary definitions of allergy forms the departure point of this analysis, which interrogates the notion of allergy-as-pathology by revisiting and critically examining the historical narrative that underwrites this definition. In particular, it draws attention to the epistemological conditions and philosophical assumptions that support this concept. This chapter argues that implicit in these divergent notions of allergy (altered reactivity and allergy as immunopathology) are two very different interpretations of the immune response that correspond with different understandings of the immunological body or immunological identity. As such, it investigates why medical-scientific interpretations of allergy have differed so dramatically, and considers the historical, epistemological and philosophical implications of this disparity.

In order to understand why Pirquet's notion of altered reactivity was not taken up within mainstream immunology, this chapter details the intellectual environment in which his work emerged and the way his ideas were received. It contextualises the reception of the allergy hypothesis in immunology's history and intellectual heritage, and identifies the key concepts of organism, body and physiological function that were proper to immunology at the beginning of the twentieth century. In doing so, it illustrates why Pirquet's theory was perceived as conceptually affronting and scientifically unconvincing, and consequently, why it occupies a relatively minor position within histories of allergy and immunology.

This chapter argues for a reading of Pirquet's allergy hypothesis that has figured less prominently in its historical renditions. Although there have been some recent and quite generous engagements with Pirquet's work, most notably, Mark Jackson's *Allergy: The History of a Modern Malady* (2006), Benedikt Huber's '100 Jahre Allergie: Clemens von Pirquet – sein Allergiebegriff und das ihm zugrunde liegende Krankheitsverständnis, Teil 1: Leben und Werk' and 'Teil 2: Der Pirquet'sche Allergiebegriff' (2006b), and to some extent, Gregg Mitman's *Breathing Space: How Allergies Shape Our Lives and Landscapes* (2007), I suggest that Pirquet's hypothesis can be read as offering concepts of organismic identity and immune responsiveness that are distinct from – if not at odds with – those found in modern immunology. Specifically, I argue that Pirquet's work proposes a schema for

interpreting immune responsiveness that problematises and refigures an orthodox understanding of what constitutes normal and pathological immune phenomena. In challenging immunity's status as the locus for understanding all immune responsiveness, his model calls into question the very principle that anchors our ability to discriminate between normal and pathological: self-protection. In contrast to the idea that the organism is a bounded, atomic entity whose responses are predictable, Pirquet's allergy hypothesis implies a concept of the organism as open, unbounded and defined by the *alterability* of its responses to its environment. Consequently, his work disrupts a conventional understanding of healthy or normal immune function. If normativity in immune responsiveness is defined *as a capacity to fluctuate*, then what constitutes pathology? If normal immune function is inherently changeable or aberrant, then there is no immutable state (immunity) that acts as the physiological referent from which deviation (pathology) can be measured. If the only constant is change, then what constitutes the categories of 'normal' and 'pathological' needs to be rethought.⁵

Pirquet's concept of 'altered reactivity'

It is telling that 'the study of allergy sprang from studies of the unpredictable effects of immunization' (Moulin 2000, 393). Throughout the late nineteenth and early twentieth centuries, investigations of immune phenomena focused primarily on elaborating the physiological mechanisms associated with immunity.⁶ Following the success of Louis Pasteur's work with vaccination and Elie Metchnikoff's discovery of phagocytosis (which completed Pasteur's findings by identifying the biological mechanism in the host that accounted for the efficacy of vaccines), it was widely accepted that the role of the immune response was to affect immunity in the

⁵ The philosophical and conceptual underpinnings of allergy have been productively explored by Ohad Parnes (2003), who examines allergy's characterisation as 'trouble from within', and Ilana Löwy (2003), who gives an account of early understandings of allergy and anaphylaxis, and their relationship to studies of biological individuality. Additionally, there are a number of works that elucidate the evolutionary significance of allergy, for instance, Polly Matzinger's (2002) discussion of the danger model and Margie Profet's (1991) toxin hypothesis. Each of these critical commentaries makes a significant contribution to conceptual and philosophical engagements with allergy. However, the specific claims of these authors are not within the scope of this chapter, as they adhere to a definition of allergy as a pathological immune response. In reviving Pirquet's original allergy concept, this chapter explicitly interrogates the notion of allergy as pathology.

⁶ See Silverstein (1989) for details of these studies.

individual. At the time, scientists in this field had been conducting experiments into the effects of vaccination (both positive and negative) in the hope of discovering how immunity operated with respect to different infectious diseases, and thus how the body's innate protective capacities could be mastered. For instance, Charles Richet and Paul Portier's discovery of anaphylaxis in 1902 occurred accidentally whilst 'attempting to immunize dogs against marine toxins' (Kroker 1999, 273). Kenton Kroker notes the significance of the concept of immunity in the identification of all immune phenomena; he explains that Richet, when confronted with a reaction that was incompatible with the logic of immunity, named it "anaphylaxis", meaning "against protection" (1999, 273).

This early emphasis on the body's capacity for self-protection had an enormous impact on the way immune phenomena that appeared to challenge the principle of immunity were perceived. As the above example illustrates, the pervasiveness of this discourse made it impossible to conceptualise these phenomena in any other terms, as it was assumed that all immune phenomena could be understood with reference to immunity or some intending, biological 'self'. Reactions viewed as contradicting the notion of a defended, immunological self were frequently described in precisely these terms – as paradoxical reactions. Arthur Silverstein explains:

In the dawning years of the twentieth century, those investigators active in the young field of immunology had been brought up, with Metchnikoff and Ehrlich, to view the immune response as a superb Darwinian adaptation. It had evolved, presumably, to defend the organism against an outside world heavily populated by highly pathogenic organisms and virulent toxins. So deeply ingrained was this view of a benevolent immunity that the earliest observations that might have contradicted it were quickly attributed to other causes and mechanisms. (1989, 214)

However, simultaneously, the obvious problems presented by pathological and altered reactions forced some investigators to question immunity's status as *the* conceptual and physiological basis of all immune responsiveness. As Silverstein points out, some of the earliest discoveries relating to allergy and immunopathology were made

by physiologists, Charles Richet and Paul Portier (anaphylaxis), Maurice Arthus (local anaphylaxis), and paediatricians, Clemens von Pirquet and Bela Schick (serum sickness) – in other words, practitioners who ‘were not part of the classical tradition of bacteriological immunology’ (1989, 215). He argues that their training in different disciplines provided some freedom from an intellectual commitment to immunity, and allowed them ‘to speculate that these reactions might be an integral part of the “immune” response’ (1989, 215). Amongst these latter investigators was the discoverer of allergy.

The word ‘allergy’ first appeared in 1906 as the title of a short article published in the journal *Munchener Medizinische Wochenschrift* (Vienna Clinical Weekly Journal). Written by the highly acclaimed Austrian paediatrician and immunologist Clemens von Pirquet, this piece presented a series of reflections on what were regarded as anomalous and contradictory manifestations of the immune response. Pirquet’s interest lay specifically in a number of reactions that were described by the scientific community of the time as ‘paradoxical’ (Pirquet 1906, 1457). Evoking the entrenched immunity-centric perspective that governed work in this field, this characterisation foregrounds the extent to which studies and interpretations of the immune response were mediated by an implicit understanding of the immunological self as a self-identical being. It was precisely this paradox, that is, the self-contradictory nature of the ‘immune’ response, which Pirquet sought to investigate. In his pithy meditation, Pirquet puzzled over the very existence of these reactions, as their effects could not be easily or rationally reconciled with the general operation of immunity and the concept of organism exemplified by this model of immune function. Pirquet was perplexed as to how, and more importantly, in the service of what biological *purpose* inoculation could induce immunity and protection in some, and potentially dangerous, life-threatening responses in others. What logical processes would direct the body’s own armamentarium to generate harm (supersensitivity)⁷ in place of protection, and why? How could an inherently protective mechanism, in the service of the self, be responsible for self-harm?

⁷ In his article, ‘Allergie’ (1906), Pirquet uses *supersensitivity* as an umbrella term to include a range of altered responses, from hypersensitivity to hyposensitivity.

In addressing these questions, Pirquet reviewed his own clinical data alongside the findings of immunologists who had recorded similar reactions when conducting inoculation experiments with animals, and in comparing these results he observed the existence of a definite pattern or rule. Pirquet noticed something both unusual and specific: in certain cases where an individual or animal had been previously inoculated against a particular disease/toxin, they would, upon reinfection (*second* exposure to the toxin), exhibit an exaggerated and uncharacteristically different response to the one predicted. In other words, humans and animals that had been vaccinated against a disease and thus should have been protected from it, manifested unpredictable and often harmful reactions in place of the tolerant, non-pathological reactions typically associated with immunity. Furthermore, these deviant or altered responses seemed to represent a spectrum of changed immunological states, ranging from hypersensitivity (abnormally high and dangerous sensitivity to certain stimuli) to hyposensitivity (abnormally low sensitivity to stimuli), which varied in degrees of severity.

In an attempt to make sense of these anomalies, Pirquet advanced his own theory of immune responsiveness: he hypothesised that immunity and supersensitivity were in fact closely interrelated phenomena that could be interpreted as different outcomes of a common biological mechanism (Pirquet 1906). Pirquet proposed the need for “‘a new generalised term” which expressed the altered reactivity that followed contact with an antigen’ (Jackson 2003, 386), and suggested the word *allergy*; a combination of the Greek words *allos*, meaning ‘other, different or strange’, and *ergon*, meaning ‘energy, activity or work’. Though it has been variously interpreted as changed reactivity, ‘altered biological reactivity’ (Jackson 2006, 27), and an ‘altered capacity to react’ (Pulay 1945, 13), Pirquet used the term to capture the organism’s fundamental ability to *change in its responses*.⁸

This reinterpretation of the immune response was far removed from conventional ways of thinking about immune function and physiology generally, and as such, experienced a brief and unsuccessful reception. As Jackson explains:

⁸ Pirquet’s allergy hypothesis is elaborated in detail in Chapter Two.

...von Pirquet's...approach to immunity and hypersensitivity was not well received by many of his contemporaries, who tended to regard the meticulous laboratory experiments more highly than the insights to be gained from clinical observation at the bedside. In the first instance, critics scathingly dismissed von Pirquet's terminology. In promoting his own understanding of the precise mechanisms operating in anaphylaxis, for example, Charles Richet condemned the introduction of what he regarded as an unnecessary new term. Richet's rejection of the term allergy was echoed elsewhere. When von Pirquet's book was reviewed in the *Lancet* in 1911, the reviewer referred to the term as 'not a happy combination', and pointed out that Richet had already coined the word anaphylaxis to describe increased sensitivity to foreign substances. (2006, 40)

Jackson highlights the fact that 'allergy' was interpreted by the immunological community as merely a re-description of immunopathology, already sufficiently encapsulated in the concept of anaphylaxis. Pirquet's notion of an open and uncommitted responsiveness (a schema for organising *all* immune responses) was overshadowed by an interpretation of allergy as pathology. His critics tended to focus on only one subset of reactions covered by the allergy hypothesis (namely, hypersensitivity) and thus failed to recognise the broader scope of his studies and their empirical and philosophical implications. This point is echoed in the dissatisfaction with the term expressed by American immunologists Robert A. Cooke and Arthur F. Coca. Jackson states that from Cooke and Coca's perspective, 'von Pirquet's original definition resulted in the inclusion of "phenomena of such different nature as to make their association valueless if not positively confusing"' (Cooke and Coca in Jackson 2006, 40). Here, the terms 'valueless' and 'confusing' indicate the obscurity of Pirquet's ideas within that historical and intellectual moment.

In the context of a scholarly community that had worked hard to maintain a clear separation between immunity and disease, protection and pathology, the work of the self and the work of an-other (a foreign agent), the deliberate collapse of this distinction at a physiological level was perceived as a major transgression. Silverstein explains:

Just as Ehrlich's maxim of horror autotoxicus inhibited free speculation and progress toward the understanding of autoimmune diseases, so did the general Darwinian teleological view of a benign immune apparatus inhibit acceptance of allergic disease as another facet of the same response. The continuing desire to keep allergy separate from immunity fostered early suggestions that substances other than antibodies...were the immediate causes of these reactions. (1989, 215)

By incorporating immunity into the repertoire of changed immunological states identified as instances or *types* of allergy, Pirquet subordinated immunity to allergy, and instated the latter as the governing principle of immune responsiveness. The suggestion that there existed a more fundamental concept than immunity, or a more logical interpretation of this innate physiological response, was fundamentally incongruous with the view of the organism, body and/or self expounded by this discipline.

The rejection of the allergy concept demonstrates that the field of immunology was itself allergic to the implications of his findings (in the most conventional sense of the term). Within a discipline committed to the protective powers of immunity, the idea that the self could act against its own interests (its health) or that it expressed the potential to turn away from the task of self-protection, was perceived as pathological – that is, as very literally threatening the life and vitality of this newly established discipline. If an allergy is an inability to tolerate some-thing or substance as 'self', or a misrecognition of the benign as foreign and toxic, it follows that immunology was unable to accommodate (to accept as self) the wider philosophical and conceptual implications of altered reactivity. Immunology's early investment in an idea of the immune response as a unidirectional, purpose driven reaction meant that Pirquet's notion of an 'uncommitted biological response' (Kay 2006, 556) fell outside its discursive parameters. Here, we see the immunological concept of an embattled self being played out in disciplinary politics.

The discursive authority of immunity has long precluded the question of how the organism or body comes to exist as a clearly bounded entity – that is, how it acquires or establishes its borders (or biological identity) – in a world where these

physiological parameters *are negotiated rather than given*. Importantly, it is precisely this question that Pirquet's work addresses. His insistence on the fundamentally mutable nature of reactivity suggests a view of the biological body and its relationship to its environment that is at odds with the notion of a defended, immunological self entrenched in a context of otherness. In drawing a primary connection between protective and pathological immune responses, Pirquet challenges the idea that immune responsiveness is governed by a pre-existent purpose – that it mirrors the intentions of a fixed, stable immunological being. In not presuming a given self, his work proposes the immunological identity of the organism as a question.

Histories of allergy and immunology

The general response that Pirquet's hypothesis received at the beginning of the twentieth century is a position that has been maintained in critical and historical accounts of his work.⁹ The ways and extent to which his findings were recognised by his contemporaries tends to be mirrored in the historicisation of his work – that is, how it has been recorded, taken up, and critically elaborated with respect to immunology. Within histories of allergy and immunology, Pirquet's allergy hypothesis has not been extensively engaged. More apparently, the philosophical and theoretical implications of altered reactivity for immunological interpretations of organismic identity have remained largely unexplored. Although Pirquet's work with Bela Schick on serum sickness is cited routinely as one of the key early twentieth century discoveries of pathological immune responses (alongside anaphylaxis, local anaphylaxis, the Arthus reaction), Pirquet's particular theory of allergy occupies a more ambiguous space in the narration of the field's history.

The literature in which Pirquet's work appears most frequently can be divided into a number of genres or types. Firstly, Pirquet is cited in official histories of allergy and immunology that chronicle the key figures and discoveries in this discipline. This category includes accounts found in immunological textbooks and manuals (e.g. Golub & Green 1991, Klein 1982), articles devoted to figures and

⁹ The primary exceptions to this rule are Jackson (2006) and Huber (2006a, 2006b).

milestones in medicine (e.g. Bendiner 1981, Cohen 2002, Rapaport 1974, Wagner 1963), as well as more extended accounts within the history and philosophy of science and medicine that deal with the development of the discipline and its concepts (e.g. Moulin 1991, Silverstein 1989, Tauber 1994). Secondly, Pirquet can be found in more recent histories and studies of allergy that contextualise the phenomenon socially, culturally and politically, as well as scientifically (e.g. Jackson 2006, Keirns 2008, Mitman 2007). These historiographical contributions typically pay more attention to the negotiation of ideas and scientific controversies that define the emergence of allergy as a proper immunological concept. Thirdly, Pirquet is celebrated in articles devoted to anniversaries of the term allergy (e.g. Huber 2006a & 2006b, Kay 2006, Ring 2006).¹⁰

While there are a few exceptions to these categories, they are nevertheless indicative of the critical and historical contexts in which Pirquet's work has been engaged. In the above literature, Pirquet is conventionally cited as the father of the term 'allergy', or as establishing the foundations for the development of a more specific concept of this type of immunopathology. However, the particular implications of altered reactivity tend to be passed over, or else the term 'allergy' is re-interpreted in light of contemporary definitions of immunopathology (e.g. Porter 1997, 447; Ring 2006, 138). Pirquet is often listed as a minor figure amongst a host of proper names that have come to exemplify scientific progress in this field (e.g. Simons 1994, Unger 1960, Unger & Harris 1975).¹¹ Thus, despite widespread acknowledgement of Pirquet's work in historical texts, the insight that the allergy hypothesis provides into the problematic of immunological or biological identity has not been closely examined.

The lack of detailed engagement with the philosophical implications of Pirquet's concept within critical historical reflections on immunology has reinforced

¹⁰ Many articles of this style are published in German, Polish and other European languages. However, very few are available in English. This chapter deals only with texts published in, or translated into, English.

¹¹ This treatment of Pirquet's work is summed up in an editorial published in *Allergy and Clinical Immunology International - Journal of the World Allergy Organization*. Author, Johannes Ring, describes Pirquet's 'Allergie' (1906) as 'a "citation classic" of modern medicine' (2006, 138), meaning that it has become an essential reference within proper histories of the field. Pirquet's work has been engaged as an *historical reference* whose meaning is self-evident, rather than a text that remains open to critical reading and interpretation.

the perception of altered reactivity as an ‘early’ scientific concept. Its contextualisation within orthodox immunological histories has secured its identity as a novel concept that aided the eventual discovery of allergy’s correct (that is, contemporary) meaning. In *Genesis and Development of a Scientific Fact*, Ludwick describes early scientific concepts as ‘proto-’ or ‘pre-’ ideas ([1935] 1979, 22). For him, proto-ideas are concepts that may or may not have an empirical foundation, but which contribute to the realisation of facts that are later regarded as proper to the history of science. He explains: ‘Many very solidly established scientific facts are undeniably linked, in their development, to prescientific, somewhat hazy, related proto-ideas or pre-ideas, even though such links cannot be substantiated’ ([1935] 1979, 23). Pirquet’s hypothesis, as it figures in histories of allergy and immunology, takes the form of a proto-idea. In these narratives, altered reactivity is situated in a developmental stage of the discipline’s history, and as such, is positioned within an epistemological context in which the facts of allergy had yet to be deduced. Thus as a proto-idea, altered reactivity functions as a precursor to the contemporary, scientific definition of allergy.

The contextualisation of Pirquet’s work in these tomes raises the issue of the relationship between the work of history (the construction of historical accounts) and that of science (the discovery/construction of scientific facts). There is an intimate and complex connection between historical writing and the establishment and affirmation of scientific discourses and truths. As Jackson notes, official histories of allergy generally take the form of linear, progress narratives that frame the past as a series of basic but necessary insights that have enabled current scientists to access more correct scientific truths. In ‘Allergy and History’, he writes:

Most recent histories of allergy and allergic diseases have tended to adopt a positivist approach to the subject, regularly depicting allergy as a linear series of milestones or stepping stones of great discoveries, seminal publications and influential scientists that collectively freed the field of clinical immunology and allergy from a position of deep ignorance in the mid-nineteenth and early twentieth centuries to one of enlightened knowledge and therapeutic power in the modern world. (2003, 389)

Jackson emphasises that the histories we have are those whose narratives confirm the evolved and more advanced position of contemporary immunological research. Here, historical work and the production of scientific knowledge can be seen as different facets of the same project.

In ‘Toward an Unnatural History of Immunology’, Warwick Anderson, Myles Jackson and Barbara Gutmann Rosenkrantz discuss the ‘genealogies of “immunology”’ (1994, 579) referred to by Jackson, and argue that these histories are predominantly written with an eye to the key immunological theories of the mid twentieth century. Emphasising the non-neutrality of this model for presenting past events, they insist that in the context of science, linear history is a form of representation that embodies its own politics of truth. Anderson et al. are critical of widespread adherence to this model, and argue that this style of historical work presumes a position of enlightened knowledge from which the truth of things is naturally revealed through an objectivity provided by hindsight. They explain:

To position oneself at the end of history is no casual exercise. Rather, it is a powerful (if unwitting) means of defining the boundaries of one’s discipline, and of securing the legitimacy of one’s knowledge. Since Hegel, the end of history has implied a transition from a perplexing dialectical change to the rational functioning of Spirit – of immunological truth, in this case. (1994, 576)

Anderson et al. argue that intrinsic to a teleological picture of history is a connection between past and present work that grounds and further entrenches contemporary scientific achievements in a clearly identifiable, locatable ancestry. They explain that immunology’s history is often told using “a series of biographies linked by the principle of hereditary succession”, which act to ‘validat[e] the family’s legitimacy’ (Spiegel in Anderson et al. 1994, 582). These “filiative model[s]” of historical change’ (1994, 582) create the fiction of a pure and uninterrupted lineage that can be called upon to ground new findings and ideas, whilst actively prohibiting the intrusion of elements (concepts or events) that threaten its coherence. Hence:

A functional history will (for scientists) generally be one where the ancestors they read about can rewardingly be adopted as *their* ancestors, the ideas readily affiliated with *their* ideas; it will not be one that reveals the unnatural (or socially contingent) character of the field's boundaries. (1994, 582, original emphasis)

Consequently, the figuration of Pirquet's hypothesis in these histories foregrounds what is vitally at stake in the maintenance of these orthodox narratives: an enclosed defended organism, a self-centric model of immune function, and a correlative notion of the difference between health and pathology. The historicisation of Pirquet's work (as exemplary of the way alternative concepts are incorporated into these accounts) demonstrates that the concept of immunity constitutes immunology's master narrative. In order to understand how and why this concept achieves such prominence, it is worth revisiting the intellectual origins of this discipline (its formative events and ideas). This analysis will help us to identify the assumptions about physiological function, body and self that have come to define immunological thought, and thus illustrate the processes by which the notion of an atomic immunological body/self has emerged as one of the most resilient concepts in the field.

The conceptual foundations of immunology

The definitive concepts of immunology's history are almost always traced to a common, familiar legacy: developments in late nineteenth century bacteriology, and specifically, Louis Pasteur's discovery of vaccination (1879).¹² In the official historical accounts mentioned above, Pasteur appears repeatedly as an eponymous figure whose insights and achievements are widely recognised as foundational to immunology. This emphasis on Pasteur as a founding father means that his work has become synonymous with the birth of this discipline, and consequently, it is not

¹² For examples, see Golub & Green (1991) and Silverstein (1989). There have been attempts to critically rethink this historical narrative and complicate immunology's conceptual heritage. For examples, see Mazumdar (1995) and Tauber & Chernyak (1991).

unusual for his legacy to be evoked as a point of departure for reconstructing a proper account of its history (Cohen 2001, 198).

The perceived significance of Pasteur's findings for the establishment of immunology has undoubtedly been supported by the achievements of important forerunners (e.g. Edward Jenner's early work with vaccination against small pox) and descendents (e.g. Elie Metchnikoff's discovery of phagocytosis). His status as an historical figure is a product of the reconstruction of events and ideas surrounding his work. Yet despite this, Pasteur's contributions are frequently identified as an historical and epistemological turning point – the crucial moment of transition from bacteriology to immunology.¹³ Regardless of the fact that his vaccination experiments didn't in and of themselves establish the principle of immunity, his work speaks of a familial connection between these fields, a thread that is visible in the evolution of specific immunological concepts (e.g. immune response and immunological self) and the discursive construction of immunology's achievements. As such, the institution of Pasteur as a figure that bridges these disciplines has secured an account of immunology's history that locates its conceptual and intellectual debt in a stable, scientific origin: vaccination.

Immunology's development into a distinct discipline is thus tied to the inheritance of concepts that are typically traced to Pasteur's experiments and his background in bacteriology. One of the most important and basic insights to come from his work (or more accurately, from the historical moment of which his experiments and ideas have become exemplary) was the infective relation between the micro-organism and host body. Pasteur's studies of fermentation, anthrax and rabies demonstrated the existence of micro-organisms and their role in infectious diseases. These different investigations, which focused on isolating microbes, established a conceptual and ontological distinction between the host body and microbe – the *vessel* of disease and the *agent* of disease. This distinction proved central to the development of germ theories of disease, and thus to concepts of pathology, generally. The emergence of experiments able to prove that specific pathologies

¹³ Tauber & Chernyak (1991) argue that Elie Metchnikoff was the first to establish scientifically a theory of immunity, and as such, his work should be regarded as the origin of the discipline. For a detailed discussion of this contested origin, see Tauber & Chernyak (1991).

resulted from the presence of micro-organisms led to ‘a fundamental reorientation in how physicians thought about disease’ (Carter 2003, 127).

With respect to Pasteur’s work, I am interested in the function of the host-microbe interaction as a perceptual and conceptual framework for interpreting physiological events. In particular, I am curious about the concept of organismic identity that this legacy establishes as the foundation for immunological research and thought. The model of ecological relations that underpins both bacteriology and immunology – namely, an antagonistic relation between host body and microbe – is one based on a view of the world as a system of discrete, bounded entities. According to this framework, the organism exists as a monadic body that interacts with others that are similarly autonomous and physically contained (foreign organisms and substances). This account of organismic relations implies a view of ‘the self as a distinct, circumscribed *entity*...divorced from its environment’ (Tauber 2008, 225 original emphasis), whose primary mode of existence is an inherent opposition, difference or defensiveness toward others. Immunology, then, is grounded in a concept of ecology based on a strict demarcation of organism from environment, self from nonself, inside from outside, and native from foreign.

This rigid understanding of the organism’s natural integrity lies at the heart of some of immunology’s most basic concepts, most notably, its concept of the ‘defended body’ (Moulin 2000, 385) or immunological self. Alfred Tauber explains, ‘[s]ince immunology was born during the decipherment of infectious diseases at the end of the nineteenth century, immunologists have generally adopted an insular perspective, where an entity is *defended*’ (2008, 225, original emphasis). The defended body is a body that defines itself through an antagonistic or hostile relation with otherness – a relation predicated on intrinsic knowledge of what belongs to the self and what does not. From this position, all physiological events are subordinated to ‘a common purpose: the defense and representation of the self’ (2000, 395). This interpretation of biological function, which relates directly to the study of microbes

and their characterisation as foreign, external agents, forms the dominant discursive framework of modern immunology.¹⁴

Pasteur and the host body/micro-organism relation

From the beginning of his scientific career Pasteur was fascinated with the lives of micro-organisms. As a chemist turned microbiologist he devoted an enormous amount of energy to studying the characteristics of these smaller life forms. Throughout his lifetime Pasteur argued that the study of microbes was key to understanding physiological and chemical phenomena that continued to puzzle scientists of the time, for instance, the changed states of substances, such as fermentation and putrefaction. Importantly, Pasteur's major successes occurred at points when he was able to isolate the microbe and its effects to greater degrees. In the 1850s and 1860s he disproved the theory that fermentation was a chemical process and that ferments were inherently 'unstable chemical products', and instead, showed that fermentation was 'the result of the action of particular living micro-organisms' (Porter 1997, 431). Carter explains: 'By 1861 Pasteur was convinced that different forms of fermentation were associated with the life processes of distinct organized ferments' (2003, 64). These experiments, which identified the microbe as an entity existent within, but separate from, its environment, were the first steps towards proving Pasteur's belief 'that different organic processes...[were] caused by distinct organisms' (2003, 65).¹⁵

¹⁴ Pasteur is by no means solely responsible for the notion of a defended immunological self, and its corresponding vision of ecological relations. A much wider scene of scientific thought and practice has contributed to the persuasiveness and self-evidence of this concept. Nor is he the only figure that historians have nominated as a founding father of the discipline. As with any field, the precise origins of immunology constitute a subject of ongoing debate and contestation. Nevertheless, in this analysis the nomination of Pasteur as the father of a uniquely immunological perspective serves an important heuristic function: it allows for an examination of the philosophical and conceptual investments that a conventional immunological model of life secures. Interpreting Pasteur's work as a provisional origin of these ideas is useful in anchoring a discussion of how a specific conceptualisation of immunological identity emerges. In particular, his vaccination experiments are valuable in illustrating how the logic of infection (one discrete entity penetrating and contaminating another discrete entity) arises as a principle for interpreting immune phenomena.

¹⁵ Pasteur's demonstration of the existence of micro-organisms famously disproved the theory of spontaneous generation, the idea that life can arise from nonlife. Spontaneous generation was a doctrine that emerged within natural philosophy, particularly in Germany, and rose to prominence in the early nineteenth century (Farley & Geison 1974, 163). According to Farley and Geison, this theory was based on 'the notion that living organisms can arise independently of any parent, whether from inorganic matter (abiogenesis) or organic debris (heterogenesis)' (1974, 163). In scientific histories,

In the years following these pioneering insights, Pasteur turned his attention to the relationship between micro-organisms and disease, and in the late 1870s confidently hypothesised that ‘micro-organisms were responsible for disease, putrefaction and fermentation; that only particular organisms could produce specific conditions; and that once those organisms were known, prevention would be possible by developing vaccines’ (Porter 1997, 433). By 1879 this theory had been confirmed by a number of experiments that are now synonymous with the discovery of vaccination. Whilst conducting experiments with chicken cholera, Pasteur infected healthy chickens with “stale” cholera-causing microbes, two or more weeks old’, which produced ‘no serious disease’ (1997, 43). After failing to reinfect these same birds with a new virulent culture, he discovered they were protected from the disease. Confirmation of these results was achieved in a follow-up experiment that applied the same principle to anthrax in livestock. With these findings, Pasteur ‘established the general principle that an organism [micro-organism] can be altered (ATTENUATED) so that it does not cause disease but still retains the property of inducing immunity’ (Golub & Green 1991, 5, original emphasis). In other words, he had discovered that by lowering the pathogenicity of infective organisms and injecting these into animals one could induce lessened disease effects in the host, thus eliminating a pathological response to the same bacteria.¹⁶

The force with which the legacy of Pasteur is asserted in medical histories can be attributed to the enormous successes in bacteriology that accompanied these experiments. Pasteur’s demonstration of the role of micro-organisms in pathogenesis, paired with German physician Robert Koch’s research into the identification of bacteria associated with specific diseases (the creation of Koch’s postulates), contributed to the eventual establishment and acceptance of germ theories of disease. Germ theory, which is typically (though erroneously) evoked in the

spontaneous generation is often recounted in terms of the famous debate between Felix Pouchet, a French naturalist who put forward a version of this theory in *Hétérogénie* (1854), and Louis Pasteur, whose fermentation experiments were designed to directly disprove Pouchet’s hypothesis. See Farley and Geison (1974) for a detailed examination of the Pasteur-Pouchet debate, and an analysis of how Pasteur’s legacy has affected the perception of spontaneous generation as a scientific theory. Also see Pouchet (1854).

¹⁶ This brief sketch of Pasteur’s famous experiments with vaccination focuses on the broad conceptual and scientific claims they produced. For a detailed discussion and contextualisation of these experiments, see Carter (2003).

singular, emerged in the late nineteenth century and is regarded as bacteriology's defining contribution to medical science and practice. In *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865-1900*, Worboys notes that its significance is reflected in the fact that 'there are perhaps more celebratory histories of "the microbe revolution" than any other episode in medical history' (2000, 1).

Although Worboys reminds us that there were marked differences between specific germ theories (or accounts of disease causation),¹⁷ Carter argues that a common conceptual framework united these diverse perspectives. According to Carter, all germ theories adhered to 'the etiological standpoint' (2003, 1). Cited from the work of Koch, 'the etiological standpoint' refers to 'the belief that diseases are best controlled and understood by means of causes' (2003, 1). Put simply, it refers to a concept of disease that is intimately tied to the investigation of causes. For Carter, the legacy of germ theories for modern concepts of disease can be seen in the endurance and entrenchment of an etiological perspective, now evident in the intuitive, automatic connection made between the notions of 'pathology' and 'cause'. He explains that since the late nineteenth century, an 'interest in universal necessary causes' has been 'a defining characteristic of modern western thinking about disease' (2003, 1).¹⁸

Widespread adoption of an etiological standpoint radically altered understandings of pathogenesis in the scientific, medical and public imaginations. What emerged most explicitly from these conceptual developments was the establishment of a direct connection between the concepts of infection, causality and disease. From an etiological position, disease is envisioned as the product of an infection, whereby one body (a micro-organism or disease agent) infects another separate body (a host organism). Etiology refigures disease and its operation in/on

¹⁷ Worboys argues that monolithic interpretations of germ theory are an artefact of the way the overall achievements of this period are remembered. His text, which recognises the plurality of germ theories, complicates an overly simplified or generalised view of the development of these concepts. For a detailed discussion of germ theories, see Worboys (2000).

¹⁸ The self-evidence of causality as a model for interpreting pathology is a phenomenon Carter problematises in his historical account of the emergence of concepts of disease causation. He stresses the historical specificity of causality as an intellectual apparatus for interpreting physiological events. Carter states that at the time Pasteur and Koch were competing to be the first to demonstrate causality experimentally, the concept was still in its infancy. For more on the relationship between causality and disease, see Carter (2003).

the body in terms of a causal relation between the presence of micro-organisms and damage or harm experienced by the host body. Thus, this model of disease is one that presumes the prior existence of two independent bodies or entities that enter into relation with one another.

Anticipating immunity: the legacy of causal theories of disease

Pasteur's contributions to the development of an etiological framework for interpreting disease (his experimental proofs of disease causation and work with vaccination) have had direct implications for the way pathology is envisioned in an immunological context. In correlating the presence of micro-organisms with changed pathological states, Pasteur's work established infection, and its assumption of a foreign disease agent and a stable immunological body, as a basic model of disease. Thus, implicit in immunology's understanding of the body and bodily pathology is a material and ontological distinction between host and microbe, self and nonself, native and foreign, inside and outside.

A number of commentators have stressed that Pasteur's experiments with vaccination were driven *solely* by his interest in micro-organisms (Cohen 2001, 193; Moulin 1991, 47). Cohen writes that Pasteur's work 'focused almost exclusively on manipulating strains of bacteria that had been correlated with recognizable patterns of symptoms (a.k.a. "diseases") in the hope of mitigating the pathogenic effects produced and reproduced by their movements in the "external" world' (2001, 193-194). Pasteur viewed the microbe as the centre or locus of biochemical activity – a natural, given point of reference for the investigation and explanation of phenomena related to changed physiological states. In taking this position, he imagined all biochemical change to be in some way mediated by the activities of microbes. That is, Pasteur understood microbes as the primary site of agency and responsibility in relations among organisms and micro-organisms: he viewed them as the source of the agency that produces change within systems of organisms, and thus the key determinant of the ecological relations elaborated in his research.

However, in recognising the microbe as the principal source of agency in these events, Pasteur discounted the active role the host organism might play in disease processes. As Cohen explains, Pasteur imagined the body in stark opposition to the microbe as a passive, internal space. Drawing an analogy between the body and the laboratory, he interpreted the host body as a similarly neutral and uncontaminated space through which the lives of microbes could be studied. This abstract view of the body as a ‘medium of bacterial growth’ (Cohen 2001, 194) rendered the living processes of the host insignificant, and authorised a perception of the host body as a mere *vessel* for organismic activity, rather than a *participant* in these dynamic relations.¹⁹

In viewing the host organism purely as the microbe’s other – or the context of its actions – Pasteur’s interpretation of these physiological events was dramatically removed from any conceptualisation of the immune response, in the sense of an active responding on the part of the immunological body. ‘Pasteurian medicine’, writes Moulin, ‘doesn’t rely upon theoretical hypotheses concerning immunity, but on an empirical program of immunization which appeals to the attenuation of micro-organisms’ (Moulin in Cohen 2001, 196). Thus, Pasteur’s account of the conditions and processes that enabled vaccination did not factor in any theory of immunity or the immune response. Indeed, he did not conceive of host-microbe relations within his own experimental systems in terms of a *response* at all. In his understanding, the actions of the host always appeared as the *effect* of an external provocation, as purely ‘reactive’ (rather than ‘responsive’), mechanically determined, or lacking in the agency that presumably comes with intention, intellection and cognition.

Pasteur’s emphasis on the microbe’s role in determining pathological events firmly established a context – a concept of the environment or others – that the immunological body has arguably come to inhabit. In defining disease as a process catalysed by the intrusion of a foreign agent, he cemented a notion of pathology as something that does not properly or normally belong to the body, but which comes from ‘outside’ (consider contemporary definitions of allergy and infectious disease). Pasteur understood disease as ‘the ecological disturbances effected by a pathogenic

¹⁹ For a detailed analysis of Pasteur’s understanding of the host body/micro-organism relationship, see Cohen (2009).

agent within an organic “culture” (Cohen 2001, 193), in other words, an event of contamination that disrupts or changes a given, normative state. As such, he created a framework for discriminating between normal and pathological states, which relied on a view of the microbe and host organism as biological entities fixed in an adversarial relation. According to the logic of this distinction, the body that exists separately from the microbe is one naturally free from infection (or prior to contagion), in the sense of having had no previous encounter with, or knowledge of, its ecological other. In its state of inert passivity, it is an entity constantly acted upon, vulnerable to invasion and thus physiologically naïve. Consequently, the immunological body Pasteur conjures in his picture of disease is a body *in need of protection*.

In setting up this conceptual schema for thinking about the host body, Pasteur’s work laid the ground for immunology’s interpretation of immune responsiveness and its basic conceptualisation of *response*. From his view of organism relations – or what might be broadly described as ecological relations – response is figured as a predetermined interaction between stable, identifiable entities. It is imagined as the *outcome* of an encounter between discrete, pre-existent organisms, or a *consequence* that is already determined by the identities of the organisms involved. Here, response is reduced to fixed ‘responsible parties’ (either a disease agent or a malfunctioning immune system) and the disease-producing relation of pathogen and host – the conditions that make contagion or infection possible – is neatly resolved, or more accurately, deferred, as in Pasteur’s account of the microbe as the author of pathogenic events.

Pasteur’s emphasis on the microbe (as opposed to the host) raises questions about the structure of relations that constitute the microbe as the central player. Questions regarding the ecological complementarity of microbe and host – the very capacity of the former to be physiologically provocative for the latter – are inevitably buried under more pressing concerns to discover and eliminate the causes of disease. Pasteur’s commitment to a series of distinctions implicit in his understanding of pathology (for instance, organism/antigen, self/other, inside/outside, agency/passivity, cause/effect) means that he does not make sense of physiological disturbance or organismic identity in terms of the broader context of relations that give rise to these phenomena. In beginning with given entities, this interpretive framework obscures

the inter-implication of organisms, which constitute the necessary conditions of infection. As such, his work passes over the philosophical issue of the ontological entanglement of pathogen (foreign, external agent) and organism (defended, immunological body), and relies on a concept of response as essentially *reactive*.

Yet if we consider Pasteur's findings in a more generous conceptual framework than his own, it could be argued that he observed and was fascinated by the same phenomenon as Pirquet: the alterable reactivity of the organism. Although Pasteur and Pirquet approached their research from quite different perspectives, at a basic level, their interest was the same. For instance, through a program of experiments designed to attenuate micro-organisms, Pasteur showed that rather than being fixed, the relationship between microbes and host organisms is one that is open to change. He illustrated that this relation – the ecological 'fit' of microbes and host organisms – is in some sense provisional. By manipulating the outcomes of these encounters, Pasteur observed the organism's ability to change (or in this case, *be* changed) in its reactive capacities. Thus in discovering vaccination, Pasteur had done more than identify the catalyst of disease; provocatively, he had demonstrated that *the relationship between disease agent and host organism could be altered to produce a different response*. To put this in Pirquet's terms, he had effectively shown that the relationship between the immunological body and foreign organisms or substances was not fixed, but in fact, defined by its capacity to be changed.

How then, does this affect our understanding of bacteriology's legacy for immunology? In its simplest form, immunology comes to inherit a causal model of organismic relations via Pasteur – a dichotomous view of ecological phenomena that emphasises the autonomy of organisms from their environment and others, rather than their implication. Crucially, this interpretive framework rests on an inability to acknowledge the entanglement implicit in these relations. Indeed, if Pasteur's work is an historically specific, discursive inflection of a phenomenon Pirquet accounts for in his theory of allergy, then we could add that Pasteur's view of organism relations is grounded in the obfuscation of the alterable reactivity of the host organism. Over time, the work of Pasteur has naturalised an idea of the organism as atomic, and thus a concomitant view of physiological events as linear and causal. This view is one that renders all anomalous reactions (those that contradict, or are inconsistent with,

immunity) deviant or pathological, in the sense that they do *not* result from any action of the organism itself. Thus, inherent in the legacy of Pasteur's studies of vaccination is an inability to recognise the puzzle of reactivity in its true complexity.

Phagocytosis: the birth of the immune body

Although Pasteur's discovery of vaccination is said to herald the beginning of immunology, a number of historians emphasise the shortcomings of these experiments in terms of their theoretical formulation of organism relations. Pasteur's insights alone did not offer a theory of immunity: in his preoccupation with micro-organismic activity, he neglected to address the mechanisms by which the host organism comes to be protected from disease (Cohen 2001, 198; Silverstein 1989, 41; Tauber 1991a, 4). According to Tauber, 'as late as 1880, Pasteur argued that "immunity" was due to the inability of pathogens to find nourishment in a host previously infected' (1991b, 78). Pasteur continued to view the host organism as a neutral environment for pathogens, a perspective that inhibited his ability to scientifically account for the specific physiological effects of vaccination. As a result, the question of 'how bacteria might cause disease, and more fundamentally, the relation of host and pathogen from a physiological (organism) or evolutionary (species) perspective was left mute' (Tauber 1991a, 4). Pasteur's work presented only half the picture of organism relations and disease pathogenesis:

Even at the time of his [Pasteur's] greatest triumphs...there were indications that there might be difficulties with asserting the uncontested validity of Pasteur's analysis: there was neither an account of how infected organisms participate in disease processes, nor an understanding of how afflicted organisms survive an infectious illness, nor a way of explaining the enduring resistance to disease that inoculated, or recuperated, subjects maintained. (Cohen 2001, 198)

In order to justify his findings and transform them into an empirical program of vaccination, Pasteur required a theory that directly addressed the physiological effects of the microbe in the host (2001, 198).

It was Russian zoologist and embryologist, Elie (Ilya Illyich) Metchnikoff who devised a theory that would elaborate the significance of Pasteur's findings for the human body. Metchnikoff is renowned for putting forward the first concept of immunity (or the immune response) and properly establishing a scientific context for immunological thought (Cohen 2001, 198-199; Porter 1997, 446; Tauber & Chernyak 1991). Metchnikoff's theory, which he termed *phagocytosis*, can be understood as the origin of the immunological notion of a body that actively and innately defends itself against invasion from otherness. Importantly, phagocytosis explains the biological mechanism by which the host organism deals with pathogens. In simple terms, it is a system of self-protection that centres on the phagocyte or 'eating cell' – the specific cell responsible for host defence. Phagocytes are imagined as agents residing in the body that serve the dual function of identifying foreign bacteria and substances (including 'malignant', 'damaged' or 'senile' cells) and disposing of them by 'engulfing' them and 'killing the ingesta' (Tauber 1991b, 75).

Metchnikoff emphasised the *active* role that phagocytes play in defending the body and highlighted their importance in terms of recognising what should and should not be eaten, and by extension, what does and does not belong to the body. Phagocytosis describes an active and self-determining responsiveness, a kind of ongoing biological surveillance, that functions to both protect and define the self. According to Metchnikoff, the phenomenon of immunity was seen to arise from these 'active defence mechanisms of the host' (Tauber 1991b, 74), which play a crucial role in determining the integrity of the organism. As such, immunity, or phagocytosis, was imagined as the biological expression of a centralised self, and consequently, 'the "host" organism came to be imagined as a materially localized entity, inscribed within a recognizable frontier' (Cohen 2001, 199).

An alternative concept of pathology

It is worth noting that phagocytosis arose from Metchnikoff's studies of the pathology of inflammation (Silverstein 1989, 41). As Silverstein points out, 'at the time it was advanced...phagocytosis was less a contribution to immunological

thought than to the field of general pathology, which for 30 to 40 years had been debating the nature of the inflammatory response' (1989, 41). Metchnikoff's work made an important intervention into perceptions of the physiology of pathology. In the late nineteenth century, it was believed that 'the inflammatory reaction that accompanied infectious diseases and...traumatic wounds' (1989, 41) was injurious to the host, and that this harm stemmed directly from the actions of phagocytes (inflammatory cells). However, in 1883, Metchnikoff conducted an experiment whose findings contradicted this assertion. Placing rose thorns into starfish larvae, Metchnikoff witnessed phagocytes attacking the thorns (Tauber 1991b, 75). From this observation, he proposed that phagocytes served a defensive function within the organism, and that the resultant inflammation was *protective*, rather than pathological, in its effects (Silverstein 1989, 42). Metchnikoff argued that 'phagocytic cells, far from being harmful, in fact constitute a first line of defense in their ability to ingest and digest invading organisms' (1989, 42).

The theory of phagocytosis was considered radical in the field of pathology as it posed a remarkably different interpretation of the physiological purpose of inflammation. By identifying the phagocyte as the cause of this newly defined 'protective pathology', Metchnikoff reconceptualised its activity, and recuperated it as a representative of the biological self. In arguing for a view of the immunological self as an *agent* of bodily pathology, Metchnikoff complicated the Pasteurian notion of disease as something purely external and threatening to the body. This move enabled an analogous relation to be drawn between the behaviour of phagocytes and the intentions of the larger organismic structure to which they belonged. It is at this point that the first evocations of the immunological self emerge – the notion of a contained, agentic and self-determining physiological structure.

Intriguingly, both Pasteur and Metchnikoff's discoveries emerge from an interest in pathology. However, Metchnikoff's work, as a development of Pasteur's, signifies a shift in the perception of pathological events. Whereas Pasteur's understanding of pathogenesis relied on amplifying the role of the microbe, phagocytosis emphasised the body itself (its response) as the actual cause of injury. In Metchnikoff's view, the body is foregrounded as the arbiter of hostile organism relations, and the harm that arises from these adversarial encounters is seen as an

effect of that body acting out of self-defence. Here, there is a switch in the agent of pathology, or more accurately, a mirroring of the intention (to infect) ascribed to the microbe in the body's defensive response, which is, in itself, an anticipation of potential invasion. Thus, Metchnikoff maintains the separation of organisms from micro-organisms established by Pasteur, but complicates the linear causality of Pasteur's model by theorising the body as an equally offensive (or defensive) counterpart.

Yet Metchnikoff and Pasteur's findings rely on an identical ontology of organism relations. Both scientists attempt to confine pathology (that is, disease, toxicity, otherness, the foreign) spatially to a single localised entity. That is, both attempt to locate the agency responsible for disease in an entity that is separate from other entities. However, the necessity of both these theories to make sense of pathological phenomena speaks to the fact that pathology (or its *cause*) resides not with one body or another, but in the relation between host organism and micro-organism – a relation that undercuts their original autonomy entirely. Pathology cannot be explained away by redeploying the conceptual structure of 'conflict', because the mechanism through which disease is realised is evidenced in *both* bodies (a provocative microbe and a defensive organism); indeed, it conditions their meeting in the first instance. Here, again, we are presented with the puzzle of reactivity, and yet again, it is resolved in a reductive fashion.

Metchnikoff's phagocytosis theory and Pasteur's work on vaccination constitute a formative moment in the history of immunology. Together, they are responsible for establishing the key concept of immune responsiveness as self-defence and with it, the notion of a defended immunological body. It is at this moment, when the identity of the immune response as a biological object is confirmed, that a larger structure of interpretation brings a distinctly humanist perspective into play. The resultant equation of the immune response with self-defence animates the static, self-knowing subject that has grounded immunological thought ever since.

However, in light of the evidence that Pirquet's work presents – the mutability of reactivity – the works of Pasteur and Metchnikoff can no longer maintain their

apparent intentions. Reading their scientific achievements with reference to Pirquet's insights is an activity that foregrounds the different philosophical, conceptual and therapeutic investments that underpin their respective inquiries. Moreover, this task illuminates the discursive construction of immunology as a discipline. Pirquet's work shows that immunology is guided by an intention to discover a particular notion of self at a biological level, namely, one defined by immunity.

Refiguring immunological identity

As shown, immunology's investment in immunity and its conceptualisation of the organism as a defended isolate, can be traced to Pasteur's discovery of vaccination (his work proving a causal account of disease), and to Metchnikoff's demonstration of phagocytosis (the mechanism of the host organism's self-defence against pathogens). Both Pasteur's investigations of the role of micro-organisms in disease processes, and Metchnikoff's studies of the physiology of inflammation, presume a model of organism relations grounded in the prior separation of organisms from one another and from their environment. Together, their understanding of pathology as the product, consequence or effect of an infection – a causal interaction between different types of entities or organisms – confirms the view that the biological identity of the organism (or micro-organism) is given at the outset of life. The conceptual framework implied by this interpretation of disease is one that foreshadows the 'immune' organism: it prefigures a notion of the organism as a fixed entity vulnerable to invasion by foreign, external elements.

The immune self, along with its implications of atomism, discretion, autonomy and defendedness, is a concept that stems from the linear causal accounts of infectious disease that surfaced in the late nineteenth century. This emphasis on disease causation compartmentalises microbe from host, stimulus from response, both conceptually and materially, and in doing so, obscures the ontological entanglement of these terms: it negates the larger spatio-temporal context that conditions these divisions, or gives rise to these ecological pairs in the first place.

Consequently, the model of identity that forms the starting point of immunological work is a discrete entity whose material, responsive entanglement with the world is reduced to a series of predictable ‘reactions’. The organism’s identity is defined by its relation to pathogenic, microbial agents – by its position within a presumably given etiological schema. The dominance of this perspective has prevented recognition of alternative figurations of immunological and/or organismic identity.

In this chapter, I have argued that Pirquet’s allergy hypothesis proposes a reading of immunological identity, and thus also an account of the ontology of host organism-microbe relations, that goes against immunological orthodoxy. Rather than presuming an immunological self, altered reactivity suggests that the organism’s identity is defined by a principle of mutation – a principle that radically refigures the organism-environment relation such that the organism emerges *as* a constant instantiation of its environment. Pirquet’s theory does not assume a fixed referent from which different responses can be adjudicated; for him, there is no ‘self’ that anchors reactivity absolutely.

Pirquet’s formulation is not governed by the conventional binary structure of normal/pathological, self/other. Because the very nature of the referent *is* a tendency to change and evolve, there is no point of departure from which to deviate, and as a result, the very notion of pathology comes into question. That is, Pirquet’s suggestion that the stability of immunological identity lies only in the perpetual fluctuation of reactivity requires us to rethink the terms and categories through which immunological identity is interpreted (normal/pathological, self/nonself, action/reaction). If the organism’s responsivity cannot be explained with reference to a governing self – if what constitutes the self is always only provisional – then the conventional framework of normal versus pathological lacks a meaningful foundation.

As the following chapter demonstrates, altered reactivity captures, rather than reduces, the ecological complexity of immune responsiveness and organismic identity. By beginning with an *open and uncircumscribed reactivity or response-ability*, Pirquet’s work significantly complicates the possibility of a pure identity or

fixed origin (a discrete, monadic immune self) that grounds immune responsiveness. Indeed, his work makes it necessary to ask the question of how a self emerges *as* itself. In imagining a response as something open and uncommitted – the inherently unstable and changeable relation of the body with its environment, or indeed, of the body with itself – Pirquet's account of immune responsiveness is one that begins with the volatility, dynamism and mutability of identity. It doesn't presume it.

Chapter Two

Allergy: Clemens von Pirquet's ecological concept of immune responsiveness

In the previous chapter, I argued that allergy, in its original formulation as altered reactivity, emerged in the context of a discourse of body and self that was fundamentally at odds with the unique view of the immune response presented by Clemens von Pirquet. Pirquet's account of immune responsiveness as a characteristically open-ended, rather than unidirectional capacity of the organism to respond, contradicted the humanist vision of immunocompetence: a physiology that functions intuitively to protect and maintain the self. Allergy, and the decentred, plastic self that it implied, could not be reconciled with the notion of organismic identity that the work of figures such as Louis Pasteur and Elie Metchnikoff had firmly established as the basic conceptual premise of immunology as a science.

The theory of altered reactivity presents a remarkably different and innovative conceptualisation of immune responsiveness that works to revise and transform the frame of reference, and point of departure, for immunological work. Concentrating on the mutability of reactivity, Pirquet's concept is one that insists on the ecological interrelationships that constitute organismic existence as *always* a complex form of co-existence. In the previous chapter, I suggested that this perspectival shift from the observation of specific, isolated entities, to a view of immune responsiveness as a phenomenon of a much wider ecological field (of which these entities are momentary expressions), offers a radical refiguration of identity (how any thing emerges as an individuated entity). The notion that the immunological body fluctuates continuously with respect to an equally changeable environment implies that the organism's existence is primarily *dialogic*, and consequently, its identity is neither fixed nor essential. This view of identity has direct implications for how we conceptualise immune responsiveness as it problematises the act of drawing any definitive distinction (spatial or temporal) between entities or moments in this system, and as such, underscores the fundamentally contingent and relational nature of these entities.

Chapter Two continues this investigation of Pirquet's theory of allergy by providing an in-depth critical reading of his hypothesis that interrogates and grapples with its scientific and conceptual detail. This analysis focuses on two primary texts, Pirquet's original article 'Allergie' (1906) which contains his preliminary hypothesis, and his monograph *Allergy* (1911) where this concept receives its clearest and most sustained elaboration.²⁰ It also works closely with one major secondary text, Benedikt Huber's '100 Jahre Allergie: Clemens von Pirquet – sein Allergiebegriff und das ihm zugrunde liegende Krankheitsverständnis, Teil 2: Der Pirquet'sche Allergiebegriff'²¹ (2006), which gives a considered interpretation of the allergy theory based on a comprehensive survey of Pirquet's writings published in European medical journals.²² This chapter offers a clear explication of the allergy concept, and Pirquet's proposal of altered reactivity as a theory of immune responsiveness. By working systematically through the logic Pirquet brings to the interpretation of immune events, it identifies the questions and problems that energised his inquiry into the nature of immune responsiveness, questions that, in the previous chapter, I argued are fundamentally at stake in the discipline of immunology. In doing so, it draws out the implications of altered reactivity for understanding the ontology of organism-environment relations.

This chapter is roughly divided into two sections that deal with the two major concerns in Pirquet's work: reactivity and sensitisation. The first section gives an account of the concept of reactivity, as articulated in Pirquet's studies. It demonstrates that Pirquet's work is defined by a tension between two readings of reactivity or applications of this concept. On the one hand, reactivity is understood in the most common sense of a reaction – a discrete, isolatable immune response that issues from a given organism. On the other hand, it is described as an event whose

²⁰ Of Pirquet's numerous publications, this chapter deals principally with two texts: his original article 'Allergie' (1906) and monograph, *Allergy* (1911). In these texts, and especially the monograph, Pirquet outlines his original investigations of altered reactivity and the development of a scientific schema for interpreting different forms of allergy. Importantly, it is in these writings that the conceptual and philosophical issues raised by Pirquet's studies – its implications for our understanding of organismic identity and the concept of pathology – are most starkly demonstrated. For a list of other writings by Pirquet, see Huber (2006a, 2006b) and Wagner (1968).

²¹ '100 years of allergy: Clemens von Pirquet - his concept of allergy and his basic concept of disease 2: the Pirquet concept of allergy'

²² As mentioned in Chapter One, Huber's article is singled out as an important secondary source because it critically engages with the detail of the allergy theory, and is itself evidence of a close reading of Pirquet's writings. This style of engagement differentiates it from other literature on Pirquet, which is principally descriptive and historical (see Chapter One for examples).

scope encompasses a number of different entities (organism and antigen) and the larger spatio-temporal context of their interaction (an ecological scenario). Following Pirquet's own struggle to negotiate these competing viewpoints – to settle the tension in his analysis, such that a coherent account of allergy can be presented – this section explores the paradox of reactivity that Pirquet's investigation renders explicit. In particular, it pays attention to how he manages, both empirically and theoretically, his clinical analyses of reactivity. What does Pirquet determine reactivity to be? How does he conceptualise it as an event for the purposes of study? And what kind of immunological body does this research presume or work towards?

In the first section, I argue that the concept of reactivity expands and complicates the *scene* of immune responsiveness. By insisting that the host organism and foreign agent are both implicated in the event of response, Pirquet's work suggests a reading of where (in which entity?) and when (at what point?) a response takes place that requires us to rethink the very nature of response. In recognising that the *site* of response is, in reality, unconfined and diffuse within a much wider field (of entities or influence), Pirquet offers a way of thinking about response that inadvertently captures its essential paradox.

As we shall see, Pirquet's clinical studies of changed reactivity lead him to investigate the phenomenon of sensitisation: the series of exposures of an organism to an antigen (foreign substance or micro-organism) that triggers or animates its responsive capacity in that direction. In order to explain how an organism alters its response to something, Pirquet discovers that he needs to address the more difficult and elementary question of how an organism comes to respond to that thing – or anything – *in the first instance*. Put simply, sensitisation describes the process by which a substance becomes a stimulus for a specific body, how it develops or acquires the ability to elicit a response (the making-responsive of that body). Crucially, it is a phenomenon that confirms the fact that immune responsiveness is inherently open to change, and that this change refers to a physiological process that may be initiated at *any* point during the course of life.

The second section of this chapter illustrates that Pirquet's studies of reactivity are in fact experiments into sensitisation. Across them, we see him trying to locate

the origin of response within an entity or biological property as a means of identifying the *causes* of changed reactivity. Pirquet's attempts to make sense of the confounded identities of antigen and organism, or stimulus and response, show that he can only make sense of their entangled relation by introducing a third term that will fulfil the role of an intermediary: the antibody. With reference to his discussions of the function of the antibody in facilitating changes in reactivity, I argue that Pirquet's work empirically demonstrates that the properties of stimulus and response – which we take to be materially inherent to bodies and substances – are characteristics of substances that manifest *only through lived relation*. This chapter shows that Pirquet's work grapples with the ontology of ecologies – how different organisms and substances come to exist as organised systems of co-dependent or co-implicated elements. It suggests that Pirquet's hypothesis presents a view of the immune response as a specific instantiation of the dynamics that inhere within, and constitute, a larger ecological frame. I argue that the reactivity of the organism and the provocative status of the antigen empirically evidence the profound interrelationship of organisms and their environment, such that the very biological substance of these entities is relationally determined.

The allergy hypothesis

As discussed in Chapter One, Pirquet introduced the concept of altered reactivity in 1906 in a short article simply titled 'Allergie'. In this text, he outlines the need to break with orthodox disciplinary perspectives and expresses frustration with the limitations of immunology's theoretical framework, in particular, its inability to account for changes in patient reactions observed by himself and acknowledged widely by other scientists. He explains, 'in the course of the last few years a number of facts have been collected which belong to the domain of immunology but fit poorly into its framework. They are the findings of supersensitivity in the immunized organism' (Pirquet in Kay 2006, 558). Pirquet's major problem with this framework is its dissection of the immune response into the polarised (and morally invested) categories of immunity and supersensitivity. To briefly reiterate, Pirquet was preoccupied with the question of how and why vaccination (the repeated injection of foreign sera) would induce immunity and protection in some, and potentially life-

threatening, anaphylactic reactions in others. In this piece he suggests that what is *common* to immunity and supersensitivity – a change in reactivity – is obscured by the terms themselves. Here, Pirquet's frustration is played out at the level of semantics: in the process of trying to relate immunity and supersensitivity to one another to uncover their similarity, Pirquet highlights the inherent contradiction of their coupling. Having proven that these responses are 'most closely inter-related', he argues that 'the two terms contradict each other' and that 'their union is a forced one' (Pirquet in Kay 2006, 559). The incommensurability of these outcomes suggests that immunity and supersensitivity have become virtually synonymous with the concepts of health and disease (normal and pathological) respectively, and to attempt to imagine them in any sense other than *opposed* seems to defy the most basic understanding of what a body *is*.

The prohibitive function of these semantic and discursive boundaries prompts Pirquet to introduce a new term, free of these now-intuitive associations. Allergy was Pirquet's way of overcoming the inadequacy of a pre-existing conceptual schema for the purposes of studying the immune response differently and allowing for the inclusion of anomalous reactions. Benedikt Huber explains: 'All previous terminology seemed [to Pirquet] to have only a one-sided meaning, and he believed in the importance of studying the clinical reaction-ability of the organism without preconceptions' (2006b, 719). As such, the creation of this new term enabled Pirquet to suspend his assumptions and observe these reactions with a naivety that he regarded as necessary and illuminating. It allowed him to examine changed reactivity as a general phenomenon, outside its specific physiological outcomes (its classification into a series of normal or pathological states). This goal is reflected in the following statement in his monograph: 'we might rightly use the word "allergy": from *ergeia*, reactivity, and *allos*, "altered", a changed reactivity as a clinical conception without being prejudiced by the bacteriological, pathological or biological findings' (1911, 260, original emphasis).

In 1910, Pirquet published a monograph devoted to elaborating allergy, in which he works methodically through an exhaustive review of animal experiments and clinical observations that demonstrate different changes in reactivity, such as

serum disease, vaccination reactions and forms of food idiosyncrasy.²³ His primary goal in this text is to illustrate the logic of the allergy theory with reference to his own studies, as well as the findings of other scientists: through a long succession of examples, he shows that the immune response is capable of change and that the patterns and parameters of that change can be mapped.

In order to demonstrate that changed reactivity is a law that governs immune responsiveness generally, Pirquet begins with the example of immunity. As Pirquet explains, it is commonly assumed that if an individual is immune to a specific disease then reinfection with that disease produces no reaction (because the individual is protected). However, citing the example of cow pox, he shows that even the immune individual experiences a change in reactivity. Outlining an experiment in which two individuals are inoculated with lymph containing cow pox, one who has never encountered the disease, and one inoculated with cow pox two years earlier, Pirquet describes the results as follows:

...both persons, after the infection with cow pox, react, the one sooner, the other later, one with a papule, the other with a pustule, one hardly noticeable, the other with considerable symptoms. The “immune” person does not become insensible to inoculation, but the time, quality and quantity of his reaction is changed. (1911, 260)²⁴

In other words, the immune organism still reacts to the infection, however this reactive capacity has shifted in direction and intensity.

Pirquet then shows that the events of vaccination are paralleled by the events of hypersensitivity and anaphylaxis, in that the individual’s reaction to a substance is similarly altered, but takes a pathological, rather than a protective, course. Citing examples such as Charles Richet’s observation of anaphylaxis and Maurice Arthus’ experimental studies of local anaphylaxis (1911, 261), Pirquet asserts that the same

²³ Pirquet’s monograph was originally published in German in 1910. Its English translation was published in 1911 in the journal *The Archives of Internal Medicine*. Throughout this chapter, I refer to the English translation.

²⁴ A papule is ‘a solid elevated lesion’ on the skin, whereas a pustule is ‘a superficial and elevated [lesion] containing pus’ (Beers & Berkow 1999, 781).

process of repeated exposure to a foreign substance or micro-organism produces *both* supersensitivity and immunity. As such, each case that he documents confirms his finding – that upon second exposure, the organism alters its response.

The suggestion that immunity and supersensitivity are achieved via a common mechanism problematises the nature of the difference between them, allowing Pirquet to argue that these categories of response are not physiologically or functionally discrete. For him, these categories are in fact distinct instantiations of the *same* phenomenon, namely, an undefined responsive capacity of the body. As such, allergy disrupts a conventional reading of immune function, as it refigures the conceptual basis of the immune response in such a way that we are forced to re-evaluate what immunity and supersensitivity *mean* as both innate bodily responses, and intellectual or scientific categories. The notion that mutability is an essential characteristic of the immune response emerges as an argument against the view of these phenomena (immunity and supersensitivity) as radically different, and indeed, against the ontological and moral investment in their seemingly unambiguous, natural opposition (protection versus pathology). Moreover, Pirquet's conceptual intervention questions immunology's investment in a rather simple notion of identity (atomic, autonomous) of any sort – its central claim as a theory is its dispute of the very givenness and coherence of the organism.

Reactivity: an object of clinical study

It is of critical importance to my argument that Pirquet's research into immune responsiveness and the operations of disease centred on intense clinical observation and study of the reactivity of the human organism. Pirquet's understanding of pathological and immune phenomena was marked by an intimate attentiveness to the fluctuations and patterns exhibited by the reactions of patients, an awareness that came from his daily presence in the clinic. As many accounts of Pirquet's career suggest, his direct involvement with the hospital and commitment to maintaining regular contact with patients established the unique conditions that gave rise to the observation of reactivity (Chick 1929, 625; Cohen 2002, 723; Rapaport 1973, 468). Mark Jackson explains, 'Pirquet's scheme for understanding and exploring biological

reactivity was closely framed by his clinical experience of the natural history of infectious diseases and vaccination reactions evident in patients in the children's wards in Vienna' (2006, 27).

The significance of clinical work to Pirquet can be seen in the progression of his career. Although Pirquet is well known as an immunologist, he is more widely recognised for his work as a clinician and paediatrician. Indeed, Pirquet was regarded as 'the best known paediatrician of his day, one of Europe's shining lights in the medical sciences' (Rapaport 1973, 468): his notoriety was such that, at age 32, he was simultaneously offered two prestigious appointments – 'an experimental laboratory based position' at the Institut Pasteur in Paris, and 'Professor of a newly created independent Department of Pediatrics at Johns Hopkins Medical School in Baltimore' (Cohen 2002, 722-723). Accepting the latter offer, Pirquet spent one year at Johns Hopkins before returning to Europe to head a number of paediatric departments, most notably, the Kinderklinik at Vienna University where he took over the position of his mentor, Theodor Escherich (Cohen 2002, 723; Jackson 2006, 38-39; Rapaport 1973, 468). This brief account of his professional history shows that early in his career, Pirquet shied away from laboratory research in favour of clinical work, and especially, paediatrics. Jackson states that Pirquet declined the position at the Pasteur institute 'primarily because of the absence of a clinical appointment attached to the post' (2006, 38).

The distinction between clinical and laboratory based study is noted explicitly by Pirquet himself. In the opening paragraphs of his monograph Pirquet laments the fact that the study of infectious diseases has been dominated by 'microscopic observations and animal experimentation, while the study of clinical phenomena has been comparatively neglected' (1911, 259). In the text's conclusion, he is unequivocal about his preference for clinical work and clearly states that the observation of reactivity derives from this method of study:

This whole study has been directed toward the establishment of new conceptions with regard to the clinical phenomena of certain diseases. I have deviated from the methods by which an explanation of these phenomena has been sought, disregarding to a great extent microscopical studies and test-tube

experiment. I have replaced these methods by studying the changes in reactions which occur in the organism during an infection, or after having passed through an infection or an intoxication of some kind, studying these changes in the organism itself. As a result it is seen that in a great many diseases it has been possible to demonstrate an altered reactivity of the organism, which I have called “allergy”. (1911, 425)

And again, in discussing his approach to the study of antibodies, he reiterates: ‘The method I have introduced to prove the existence of antibodies dispenses entirely with the microscope and the test-tube and depends solely on the vital reaction’ (1911, 426). In both these quotations, Pirquet’s expressed interest in studying immune phenomena by means of observing the organism itself, or changes in its ‘vital reaction’, affirms the centrality of clinical practice in facilitating the emergence of reactivity as a scientific object.

Pirquet treated his clinical practice *as* a scientific endeavour. He believed that the daily experiences and observations made by himself and other hospital staff offered valuable contributions to understandings of infectious diseases – insights that were arguably precluded by the very different circumstances and methods of microbiological research (Chick 1929, 635; Rapaport 1973, 469-470). Pirquet viewed the paediatric hospital as a laboratory and its therapeutic procedures as experiments, in the sense that they continually yielded evidence of the organism’s reactivity and its relationship to specific infectious diseases and other conditions. Huber explains:

Simple and everyday clinical [phenomena] which had been passed by generations [of doctors] as being insignificant, provided a treasure trove of insight [for Pirquet]. The observations of his daily clinical work offered him not only insight into physiological and pathological events – he understood them as experiments [using them to develop his theories]. In particular, vaccination and popular serum therapy gave him the opportunity to conduct diverse investigations which, for the completion of his results, he would also experiment on himself. (2006a, 574)

In the context of his own practice, Pirquet did not differentiate between clinical/therapeutic and scientific work: in his role as a paediatrician he never stopped being a scientist. Approaching his work *holistically*, Pirquet viewed medicine and science as different ways of understanding, or modes of practicing, the same vocation.

Pirquet's holistic approach to medical practice is clearly reflected in the clinical, professional environment where he spent the majority of his career, the Vienna Kinderklinik. Many commentators note the significance of this specific hospital in providing the conditions necessary for Pirquet's unique understanding of immune events (e.g. Bendiner 1981, 153; Chick 1929, 625-626; Cohen 2002, 723; Rapaport 1973, 468). The Vienna Kinderklinik was reputed as an unusual and innovative paediatric facility, a reputation largely due to Pirquet's active involvement in reorganising the operations of the hospital, both medically and interpersonally. As well as introducing a number of inventive therapeutic and prophylactic measures – for instance, he 'designed isolation cribs with glass walls' to prevent the spread of diphtheria and whooping cough, and 'turned the roof of the hospital into an "open-air ward"' (Bendiner 1981, 153) for children suffering tuberculosis²⁵ – Pirquet instituted numerous strategies for breaking down the rigid professional hierarchy between doctors, nurses and other staff, to promote better communication and patient care. Sheldon Cohen writes:

Pirquet molded the Kinderklinik into an integrated teaching and research institution... He transformed ward maids into nursing assistants, nurses into scientific associates and the kitchen into the expert function of a department of nutrition. Every detail was designed to provide assiduous attention to the well-being, welfare, and utmost in care of the children given to his responsibility. (2002, 723)

Pirquet's inclusion of all staff within the ambit of primary care is also outlined by Huber, who emphasises the great lengths to which Pirquet went to create an integrated

²⁵ Amongst Pirquet's many achievements in the Kinderklinik was the establishment of his 'Nem' system. The Nem was the basic unit or measurement (equivalent to one cubic centimetre of milk) of a nutrition system invented by Pirquet for feeding infants and children according to their specific needs. The Nem system is one of the most lauded contributions of Pirquet's career. See Chick (1929) and Wagner (1968).

care structure. According to Huber, Pirquet valued the role of nurses highly, and specifically, their ability to detect problems through ongoing patient contact (2006a, 575). Believing that the establishment of a stronger connection between doctors and nurses would allow both to do their work more effectively, Pirquet made all doctors do compulsory nursing courses. Moreover, he frequently developed clinical methods and theories in consultation with nurses to strengthen their sense of responsibility (2006a, 575). These reforms produced an environment in which different staff members were deeply involved in each other's roles, or rather, where the overlap between these positions meant that there were no fixed or given roles. In this setting, it was not clear that any role was strictly definable as all hospital employees were medical practitioners working towards a common goal.²⁶

Pirquet's genuine commitment to the scientific value of clinical practice, which extends to his innovative transformations of the hospital environment, demonstrate that the concept of reactivity emerged from a specific kind of close clinical work. At a practical level, Pirquet's studies of immune phenomena emerged from *the repetitive practice of being at the bedsides of patients* – that is, from observing individual responses to different therapies, and charting the development of symptoms and conditions in patients, over extended time periods. This immersion in the rhythms of the clinic intimately informed Pirquet's understanding of the role of time in the production of different reactions. Within the therapeutic milieu he created, the identity of each reaction emerged as a deeply contextualised phenomenon. The changed reactions of different patients were inevitably observed side by side, and the responses of individuals were always read with reference to their personal

²⁶ In his biography of Pirquet, Richard Wagner emphasises Pirquet's commitment to fostering an interdisciplinary medical environment at the Vienna Kinderklinik. Wagner states that Pirquet was equally dedicated to maintaining the Kinderklinik's role as both a teaching and research institution and a hospital (1968, 100). Pirquet's interdisciplinary approach is clearly demonstrated by the measures he put in place to overcome the fragmentation of knowledge caused by increased medical specialisation. Wagner writes: '[Pirquet] was one of the first to realize that...the early twentieth century was a period of transition from art to science. Discoveries were being made so rapidly that one man's knowledge could no longer encompass all branches of medicine. Each of the assistants in the *Kinderklinik* was trained in one of the pediatric subspecialties – hematology, metabolism and endocrinology, neurology, psychiatry – and when a suitable case was presented von Pirquet would step from the platform while an assistant discussed a problem which concerned his subspecialization' (1968, 100-101, original emphasis). Thus, in order to create an environment in which all problems and challenges could be dealt with collectively, Pirquet divided the specialisations among his assistants and established forums in which their knowledge could be shared, namely, student lectures that were held three times a week (1968, 100). For more on Pirquet's involvement in teaching and research, see Wagner (1968). For more on his reforms of the Kinderklinik, see Chick (1929), Bendiner (1981) and Rapaport (1973).

immunological history of infections, vaccinations and reactions. In other words, the organisation of the clinic meant that any single observation was always carried out against a backdrop of other immune phenomena (both within a single individual and amongst different individuals).

Pirquet's daily engagement in clinical work established a frame of reference for studying immune events that was by nature *inclusive, ecological and holistic*. Together, the continuity of the work itself and the physical and professional organisation of the clinic seemed to resist the perception and treatment of reactions as separate, individual events: it literally confronted Pirquet with the impossibility of treating reactions as isolatable, in any sense. Every symptom appeared inhabited or infected by its larger context such that no element or aspect of a reaction could be set cleanly outside the frame of study. As such, the clinic functioned as a tool that allowed Pirquet to view immune phenomena with a greater sense of their contextual, social complexity.

This inclusive approach made the observation of reactivity an unusual, innovative method of inquiry that distinguished it from the conventional, reductive interpretation of the immune response as a discrete, stand-alone event (typical of scientists such as Pasteur and Metchnikoff). Pirquet's expressed preference for clinical observation over microbiological and test-tube experiments demonstrates his commitment to an understanding of immune phenomena as contextually embedded. As we shall see, this tendency to examine the context of reactions *as a whole* is an enduring theme in Pirquet's work.²⁷

²⁷ The holistic perspective that characterises Pirquet's work as a clinician and a scientist can also be seen in an unfinished project he was working on up until his death in 1929. At the end of his career, Pirquet returned to the concept of allergy and proposed the idea of 'allergy of the life-age' (Huber 2006b, 725). Based on an extensive study of mortality statistics, Pirquet 'suggested broadening the concept of allergy to include changes in human hypersensitivity at different age periods' (Rapaport 1973, 468). He extended his interest in the mutability of reactivity to a study of the organism's lifespan – and engaged in an epidemiological investigation that attempted to chart changes in reactivity at a population level, and correlate these with patterns relating to age, diseases and other factors. Whilst this later research furthers the concept of altered reactivity, it is largely disconnected from Pirquet's early work on allergy and the immune response, which forms the primary subject of this chapter. 'Allergy of the life-age' is a project that unites many of the different disciplinary commitments that defined Pirquet's career: immunology, the study of infectious diseases, and his interest in patterns of health and disease across populations. For more on this aspect of Pirquet's work, see Wagner (1968), Huber (2006b) and Rapaport (1973).

The paradox of reactivity

In his monograph, Pirquet attempts to map reactivity as an object through a systematic, empirical study of the many forms that changed reactivity takes with respect to a range of infectious diseases. He writes, ‘my plan is to take all the morbid entities [diseases] in which symptoms of allergy are to be found one after another, and then to collect those facts which all of them have in common’ (1911, 263). Focusing on ‘serum sickness, vaccination reactions and experimental anaphylaxis in animals as paradigmatic forms of allergy’ (Jackson 2006, 39), the monograph aims to present an accurate picture of the scope of organismic reactivity by classifying responses into three categories: altered reactivity according to time, quantity and quality (1911, 426). Pirquet explains, ‘the change in reactivity, that is, the allergy, expresses itself in the intensity of the reaction, or quantitatively, in the kind of lesions produced, or qualitatively and in its time relations’ (1911, 284-285). As such, he proposes a taxonomy of possible reaction-outcomes, encompassing everything from anaphylaxis to immunity.

This classificatory approach to reactivity is summed up in the monograph’s conclusion, where Pirquet organises all forms of altered reactivity in a table titled ‘Divisions of Allergy’ (see Figure 1). This table, which distinguishes between reactions on the basis of time, quantity and quality, shows that Pirquet regarded reactivity as the common denominator of the immune response: in it, all responses are characterised as specific instances or manifestations of reactivity. Put simply, he represents immune responsiveness as a *schema* of reactivity. Consequently, this concept emerges as a diagnostic tool for revealing the various proclivities of the immune response.

Interestingly, Pirquet’s table suggests two quite different interpretations of reactivity. It evidences a tension between Pirquet’s attempt to systematically categorise all forms of reactivity, and the object of study from which this classificatory model arises (the alterability of reactivity). On the one hand, Pirquet’s table demonstrates a view of the immune response as a particular manifestation of reactivity; according to this perspective, reactivity refers to the sequence of separate

immune responses that define an organism immunologically (its immunologic history). This idea of reactivity as a schema in which all individual reactions have a place implies a reading of the immune response as an isolatable event. However, on the other hand, the object of Pirquet's investigation is *altered reactivity* – the way immune responsiveness shifts and changes over time. Here, reactivity does not refer to a fixed, enclosed immune event – rather, it is a concept that highlights the temporality or temporal openness of immune responsiveness. This emphasis on time implies an understanding of the immune response as contextually embedded. For Pirquet, the mutability of reactivity suggests that the immune response cannot be sequestered from its larger ecological frame. At this point, I would like to briefly explore these competing views of reactivity.

Towards the end of his monograph, Pirquet reflects candidly on the significance of the clinical and experimental cases of allergy documented in his text. Outlining his departure from orthodox accounts of infectious disease, he explains that 'generally accepted theories [regarding] the incubation time of infectious diseases' (1911, 405) were incongruous with the phenomena he observed in serum diseases (one of the key examples of allergy he explores):

I had been taught that the incubation time was dependent on the development of the *micro-organism*, and that only after its toxins had reached a certain point of evolution within the human body, was it powerful enough to elicit symptoms of a general reaction... But I had seen that the symptoms of serum disease appeared more than a week after a first injection of horse-serum in man, while, after a second injection, these symptoms appeared immediately. This was entirely contrary to every rule with which I had been familiar. It appeared to me, therefore, that the whole question should be approached from an entirely new point of view. The first outbreak of serum disease could not be due to an evolution of any constituent of the injected serum; it must be that *the organism had to take part in the reaction* by the formation of an antibody. (1911, 405-407, emphasis added)

In this statement, Pirquet attributes the cause of changed reactivity in cases of serum disease to the host organism. Contrary to the view that the introduced micro-

organism (or antigen), and its growth within the organism, is responsible for disease production, Pirquet argues that the *organism* is the agent of the pathological response provoked by the antigen.

This emphasis on the host organism as the author of allergy is reiterated by Pirquet in the monograph's conclusion:

It has been shown that the symptoms for instance of infectious diseases are not entirely due to the action of the micro-organisms *per se*, but that in many diseases the organism itself takes an active part in the production of most of the symptoms by an interaction of products of its own with products derived from the infecting agent. The products by which the organism participates in the reaction are the so-called antibodies. (1911, 426, original emphasis)

In both these quotations, Pirquet describes the immune response as a physiological phenomenon (a set of symptoms) that manifests in the host organism as the result of an encounter with a foreign entity or antigen. He argues that the organism 'participates in the reaction' through the production of antibodies. In correlating the presence of disease with the action of the organism's antibodies, Pirquet suggests a reading of reactivity as a reaction that is consonant with, or an extension of, the will, agency or capacity of the organism.

The equation of reactivity with a direct biological action of the organism makes it available to the kind of taxonomic treatment it receives from Pirquet. In characterising allergy in terms of a physiological capacity of the host organism, and its expression of certain symptoms, he suggests that reactivity is something that takes place within the body of the host. This physical and conceptual confinement of reactivity to the organism allows Pirquet to view reactivity as a discrete, observable, classifiable phenomenon, whose boundaries can be uncovered through exhaustive clinical and experimental investigation.

This organism-centric notion of reactivity has significant implications for Pirquet's account of the ontology of immune events. In interpreting reactivity as an action that issues from, and is localised within, the host, Pirquet conceptualises

allergy within the framework of a linear causality. That is, he suggests a thoroughly *mechanistic* account of immune events: organism and antigen (or organism and environment) are imagined as autonomous entities that embody their own intrinsic properties, and are given in time and space.²⁸ As such, the negotiation of organism and environment takes the form of a causal interaction – an encounter between separate entities that gives rise to a change in response. Yet this linear causal explanation of immune responsiveness does not account for the conditions or events that must prefigure the organism-antigen encounter such that an encounter may occur at all. The conceptual framework of a linear causality presumes the givenness or self-evidence of the encounter, and as such, it precludes the question of what enables or causes the encounter itself.

The idea of reactivity as an isolatable reaction authored by the organism is most clearly illustrated at points in Pirquet's monograph where the term allergy is employed as an adjective to identify certain organisms and substances. For example, in outlining an experiment by Frederick Gay and Elmer Southard, Pirquet explains: 'They showed that the serum of allergic guinea-pigs sensitizes other fresh guinea-pigs; it contains therefore the sensitizing substance' (1911, 272). Here, 'allergic' is used as a synonym for 'sensitized', meaning that a guinea pig becomes allergic after it has been exposed to a substance that triggers an alteration in reaction. Allergy, in its ability to be transferred between animals, is conceptualised as *a property of biological matter*. In these instances we see the capacity for changed reactivity crystallise in a material entity: it is shown to congeal in a particular body and substance (guinea-pig

²⁸ To help us understand this point, some insight can be gained from thinkers whose works explore the question of the relationship between part and whole, entity and system, and more specifically, how seemingly individual elements are constituted systemically. In the field of quantum physics, this issue has been addressed by David Bohm. In his essay 'The enfolding-unfolding universe and consciousness', Bohm distinguishes between two different ways of conceptualising 'the order of the universe' – mechanistic (or explicate) and implicate – which each elaborate different principles of part-whole relations. His description of the mechanistic order resonates with a conventionally causal interpretation of immune events. The mechanistic order, he explains, is 'constituted of entities which are *outside of each other*, in the sense that they exist independently in different regions of space (and time) and interact through forces that do not bring about changes in their essential natures' (1980, 219, original emphasis). Importantly, Bohm characterises space in the mechanistic order in terms of its internal divisions, and emphasises how space distributes and separates its inhabitants. In contrast, Bohm posits the notion of an implicate order in which regions of space are not separate or strictly exterior to one another, but radically implicated. According to this model, it is no longer possible to maintain a sense of space as Euclidean, as the distinction between interiority and exteriority is utterly confounded. See Bohm (1980). These ideas are also discussed in Karen Barad's *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (2007), in terms of the difference between the basic principles of Newtonian physics and quantum physics.

and blood serum). Consequently, allergy – a potentiality of the organism that is animated through contact with an-other – is seen as a material or biological characteristic that is *acquired* by the organism through a process of specific sensitisation.

The perception of allergy as a property of matter is further established in Pirquet's discussion of a series of experiments by R. Doerr and V. K. Russ, which attempt to isolate the allergic property of sensitising substances (1911, 272). By heating animal serums, Doerr and Russ explore the different temperatures at which 'the sensitizing, toxic and antianaphylactic properties of the serum' (1911, 272) are eliminated. In other words, they aim to disaggregate serums into the individual material components responsible for different forms of changed reactivity. Pirquet's reference to this experiment and others like it suggests an imperative to locate allergy in a biological substance – as though the capacity for changed reactivity could be physically captured and studied, and thus transmitted from one entity to another. In identifying allergy with a material entity, Pirquet suggests that reactivity is something that emanates from an existent biological *source*, and as such, can be investigated etiologically.

Yet alongside these assertions, Pirquet's study simultaneously demonstrates that reactivity *cannot* be confined to a single material entity (organism or antigen) or moment in time. His interest in the dynamic nature of reactivity forces him to approach immune responsiveness as a wider spatio-temporal scene. In order to study allergy, Pirquet has to adopt an experimental framework that takes account of *multiple* organism-antigen encounters. Paradoxically, then, his attempts to anchor reactivity in a fixed immunologic entity emerge within the context of a study whose design presupposes a reading of reactivity as an extended immune event – a processual entanglement – that encompasses a series of infections (organism-antigen encounters) and the length of the interval between them.

This notion of reactivity as an ecological event with expanded spatio-temporal dimension is most clearly evidenced in Pirquet's interest in *time*. In the monograph's opening discussion, Pirquet explains how he came to be interested in the incubation time of symptoms that follows the infection of an organism with a foreign entity or

substance. Reflecting on previous scientific observations of altered reactivity – namely, anaphylaxis (1902) and local anaphylaxis (1903) – he argues that both cases demonstrate a significant difference in the time period between the first injection and onset of symptoms, and the second injection and second onset of symptoms (1911, 261). Pirquet notes that while the scientists who identified these phenomena claimed that repeated injections give rise to a changed reaction, they failed to notice the relevance of time difference in the production of reactions:

Arthus did not consider the interval of time between the injections as very significant, but the repetition of injections. Von Pirquet and Schick showed that the previous treatment with one injection is sufficient [to induce changed reactivity], and that *time is the principal factor in the development of allergy*. (1911, 268, emphasis added)²⁹

For Pirquet, what is most striking about these experiments is the difference in time between the first and second injections, and the relationship between this interval and the symptoms produced by each injection.

Pirquet explains that his observation of the importance of time led him, in collaboration with his colleague Bela Schick, to conduct an extensive examination of serum disease (in 1903). This study, which constitutes one of Pirquet's most recognised scientific contributions, successfully established 'the difference between accelerated and immediate reactivity' (1911, 262). Importantly, Pirquet's interest in the incubation time of symptoms was cemented by this investigation, whose results directly precede his proposal of the allergy hypothesis. Reflecting on the significance of this study as a preliminary investigation of allergy, he stresses that 'the main point of the theory' regarding serum disease was '*the difference in the time of reaction*' (1911, 262, emphasis added). Thus, from the outset, Pirquet establishes that the founding insight of the allergy project is 'the difference in the time of reaction' which he connected with the duration of the interval between injections.

²⁹ For further discussion of the difference between Arthus and Pirquet and Schick's observations, see Wagner (1968).

An object of great curiosity for Pirquet was how variations in time difference between injections translated into the rate, quality and intensity of the organism's response upon reinfection. He stressed that the key to explaining changed reactivity lay in *the length of time required for symptoms to manifest* – the latent period in which the co-mingling of organism and antigen (an infection) takes place. Pirquet associated this interval with the production of antibodies: 'the disease-producing organism [antigen] calls forth symptoms only when it has been changed by antibodies; the time [of] incubation is the time necessary for the formation of antibodies' (1911, 261). As such, he argued that changed reactivity results from the interaction of antigen and *antibody* – a theory that implicates a separate, initial organism-antigen encounter in the phenomenon of reactivity.

In highlighting the relevance of this time period as a determinant factor of the outcome of reactions, Pirquet suggests that reactivity cannot be confined to the boundaries of a single encounter. The emergence of time as a variable formative of the alteration of response challenges the conventional notion of an encounter – namely, a conjunction of organism and antigen, stimulus and response, or pathogen and host. If time affects the nature of organism-antigen encounters, then it cannot be simply understood as an external context within which the meeting of these entities occurs; rather, it is intrinsic to the way specific encounters unfold. In this sense, Pirquet proposes a view of immune responsiveness as a complex ecological scenario involving a series of organism-antigen encounters, and immunologic entities – organism, antigen and antibody, that are actually entangled with/in one another.

This notion of reactivity is clearly communicated in a series of graphs that appear at the end of Pirquet's monograph. Pirquet's illustrations, which 'carefully [chart] specific patterns of biological reactivity' (Jackson 2006, 39), depict allergy as a phenomenon that encompasses a range of immunological entities (antigen, antibody and toxic body) and occurs over a period of weeks (see Figure 2). These visual diagrams capture the conceptual framework Pirquet used to study reactivity: they show that he approached the scene of reactions *as a whole*. In sharp contrast to the points in Pirquet's text where allergy is isolated as a property of substance, these illustrations suggest that no element is absent from, or set outside, the frame of reactivity. Here, the different components of the immune response are not separate

factors that together form an assemblage or multiplicity. Pirquet's diagrams infer that every factor or element imaged is *constitutive* of reactivity, and therefore unable to be simply disaggregated from this spatio-temporal involvement. In representing reactivity as a scene of interrelationality, Pirquet proposes a framework for understanding immune responsiveness that, remarkably, accounts for the *impossibility* of separating it into component parts for the purposes of locating its source.

The grammar of immunology

So far, I have established that reactivity presents a paradoxical view of the immune response: it refers equally to a phenomenon physically confined to the boundaries of the host, but also to an intellectual heuristic that challenges and widens the parameters of the immune response. In Pirquet's account, reactivity emerges simultaneously as a direct expression of the human organism – a response authored by the organism, *and* a phenomenon that can only be said to originate within a broader ecology of which the organism is a specific expression. The condensation of these readings in a single concept – allergy – is noteworthy as it requires us to consider the entanglement of organism and environment that produces different forms of reactivity, as having the same etiological priority as the *entities* normally viewed as the origin of these effects. That is, reactivity offers a means of conceptualising reactions that does not straightforwardly privilege individual entities over their complex interrelations as the loci, or starting point, of immune events.

In this sense, Pirquet's notion of reactivity proposes a conceptual structure for immunological work that problematises the notion of an entity as given in itself (e.g. organism, antigen). The paradoxical status of reactivity as both localised *and* systemic (an isolated reaction and an ecological expression) suggests that no element or aspect of the immunological system can be understood as truly autonomous or individual. Implicit in the concept of reactivity is an acknowledgement that the conditions which guarantee the autonomy of any entity are its complex, overdetermined relations with other entities. Pirquet's inquiry is thus grounded in a scientific object that actively interrogates the identity of the basic units of this system. Oscillating between two readings of reactivity – or two points of departure (unit and

system) – his work poses the question of what unit properly anchors immunological thought. It evokes the puzzle of identity as primary in studying and understanding immune phenomena.³⁰

As such, reactivity draws attention to the conceptual infrastructure or framework of knowledge that facilitates a basic, common sense understanding of the immune response. As mentioned earlier, Pirquet's diagrams, which document specific processes of changed reactivity, show that he conceptualised reactivity as an ecological scene involving several different entities or components of the immune response. These illustrations reveal that Pirquet viewed immune responsiveness not as a phenomenon produced by the causal interaction of separate parts, but as a systemic movement – an evolving complex of variables that could not be disaggregated from one another. This perspective on immune responsiveness – as thoroughly embedded in, and contingent on, its material and temporal context – highlights the logic that underpins mainstream immunological discourse and makes it meaningful. In emphasising how different immunological elements operate as a system, reactivity animates the systemic interrelations implicit in basic immunological terms and concepts. In short, reactivity illuminates the grammar of immunology.

It is worth reiterating the concept of the immune response that defines mainstream immunology, and which permeates its language and metaphors.³¹ As

³⁰ The puzzle of identity discussed here borrows heavily from two critiques of Ferdinand de Saussure's *Course in General Linguistics* (1974), namely, Vicki Kirby's 'Corporeal complexity: The matter of the sign' (1997) and Samuel Weber's 'Saussure and the apparition of language: The critical perspective' (1976). These two texts give detailed accounts of Saussure's theory of the sign and its operation within the semiotic system of language. They focus on how Saussure grappled with the dilemma of trying to properly demarcate the object that would 'establish linguistics as an authentic and rigorous *science*' (Weber 1975, 915, original emphasis), namely, the linguistic sign. As outlined in these critiques, Saussure's difficulty in elaborating the relation between unit and system resonates with Pirquet's struggle in conceptualising the object and task of immunological inquiry. Just as Saussure maintains that the value of the linguistic unit (its identity) arises from its position in relation to other signs – from its function within the system of language *as a whole* – Pirquet's effort to decipher and classify reactivity as the most elementary of immunological phenomena, inevitably evokes the wider ecological context, or system of immunological components, to which reactivity belongs. Both Saussure and Pirquet's projects evoke the problematic of identity – the relationship of unit to system, or the entity's existence as an autonomous, bounded, unit whose unique identity is the individuated expression of a whole system. For further elaboration of Saussure's work, and the problem of identity, see Kirby (1997) and Weber (1976).

³¹ The defensive metaphors of modern immunology – its conceptualisation of the organism as a being that can only relate to others in a predictably hostile way – has been examined in detail by a range of

outlined in Chapter One, the science of immunology has been dominated by the discourses of the defended immunological self and self-nonsel self discrimination. Central to these discourses is a belief in the given existence of the organism, a departure point which suggests a reading of immune responsiveness as a composite of contained entities (e.g. organism, antigen, allergen) and events (e.g. reaction, response, infection). This point is affirmed by Alfred Tauber, who explains that ‘the development of [immunology] reflects a deep-seated conceptual orientation to an individual-based biology...the organizing model of immune function for the last half century has been cast as the discrimination of a ‘self’ from the ‘other’ (2008, 225). This disaggregation of immunology’s ecological complexity into separate identifiable units means that the complex interrelations of organisms and antigens, which Pirquet regarded as central to reactivity, are recast in a form consistent with their emergence as isolates. As a result, the immune response is viewed as a linear, causal interaction between discrete, pre-given entities.

As we shall see, Pirquet’s notion of reactivity offers a perspective on the immune response that disrupts, and renders explicit, the restrictive intellectual conventions that govern an orthodox interpretation of immune phenomena. In his attempt to capture reactivity scientifically – to define it as an object – his investigation reveals what is intrinsic to, but fundamentally obscured by, dominant immunological discourse: how its individual elements constitute a system. Pirquet’s framework highlights the ecological interrelations that make immunology a semiology. His approach to studying immune phenomena demonstrates that a crucial aspect of thinking immunologically, in a conventional sense, involves an appreciation of the ecological or relational complexity exemplified in and by its primary terms and concepts.

Identifying the cause of changed reactivity

thinkers in the humanities and social sciences. Scholars such as Donna Haraway (1989), Emily Martin (1994) and Ed Cohen (2009) have each offered sustained critiques of the politics of immunological discourse and its implications for the embodiment of health and illness and concepts of subjectivity. This literature will be analysed at length in Chapters Three and Four.

The ambiguity surrounding reactivity derives from the fact that Pirquet's investigation of allergy adheres to the conceptual and methodological conventions of an empirical, etiological study. While he recognises the impossibility of decontextualising the organism in the event of a response, his study as a whole is inevitably geared towards identifying the origin of allergy within a specific causal entity (organism *or* antigen). This incongruity between Pirquet's object (reactivity) and method (isolating final causes) means there is some uncertainty about the direction his inquiry takes and what he is trying to prove.

In '100 Jahre Allergie: Clemens von Pirquet – sein Allergiebegriff und das ihm zugrunde liegende Krankheitsverständnis, Teil 2: Der Pirquet'sche Allergiebegriff', Benedikt Huber presents a critical analysis of the allergy theory that responds directly to this indeterminacy in Pirquet's texts. Arguing that Pirquet's theory posits an *organism-centric* (rather than relation-centric) view of immune responsiveness, Huber insists that the single underlying characteristic of all Pirquet's work is an 'orientation toward the organism' (2006b, 719). In other words, Huber reads reactivity as an expression of the agency of a confined, autonomous organism, and equates the *cause* of changed reactivity with the organism that experiences allergy. His commitment to this interpretation is noteworthy, as is the close attention he pays to Pirquet's descriptions and explanations. As a paediatrician himself, Huber inadvertently foregrounds the aspects of Pirquet's studies that are most intelligible to, and relevant for, the medical practitioner. His analysis favours an orthodox immunological reading of allergy; it demonstrates how Pirquet's findings are likely to be interpreted by other thinkers and practitioners in the field, and flags the sorts of assumptions that might be brought to his work. For this reason, Huber's analysis is instructive and can be read meaningfully alongside the original writings of Pirquet as a kind of primary text in itself.³²

Huber's reading of allergy says as much about his own professional training, investments and motivations as it does about the details of Pirquet's work. In keeping with the etiological imperative of his disciplinary training, Huber works to resolve,

³² Throughout this chapter, I refer to quotes from Huber's article (2006b). As mentioned earlier, Huber's text is one of the only critical readings of the allergy theory available. His article is particularly useful because it demonstrates the equivocation in Pirquet's writings, and how these points of ambiguity are resolved, rather than explored, within a conventional immunological frame.

rather than hold, any ambiguity and contradiction surrounding the allergy concept. That is, for Huber, the empirical evidence could not attest to this ambiguity. For instance, referring to Pirquet's claim that allergy describes 'the change of state that *the organism experiences through contact* with any (...) poisons' (Pirquet in Huber 2006b, 721, original emphasis), he writes:

The problem with this and other statements by Pirquet, regarding the essence of the allergy concept, lies in their ambiguity as to *who or what causes the alteration of reactivity*. They are in danger of causing misunderstandings... ultimately, it must be stated – and with a view to the fundamental insights of modern immunology – that the organism is actually itself actively responsible for the reactivity. (2006b, 721, emphasis added)

Huber's comments here reveal that his primary concern with Pirquet's hypothesis is that it *does not name a definitive cause* of changed reactivity. Guided by an etiological impulse to settle the dilemma that reactivity raises, Huber reads Pirquet's theory as incoherent and unresolved because it doesn't locate cause in a given entity. In his attempt to clarify the origin of allergy in Pirquet's account, Huber defaults to the 'insights of modern immunology' – that is, to a mainstream interpretation of allergy as pathology and its implication of an organism that mistakenly injures itself.³³ Crucially, Huber views the tension in Pirquet's account as evidence of its author's inability to clearly express or properly define his concept: it is an ambiguity – a *mistake* – that Huber assumes *cannot* mean anything in itself.

The sections in Pirquet's work that Huber identifies as ambiguous are significant. It is at these points that Pirquet grapples with the ecological problematic of reactivity, trying to articulate, through the restricted conceptual vocabulary of early immunology, the irreducible nature of the immune response. In these moments, Pirquet puts forward descriptions of immune events that sound *confused* precisely because he cannot confine the complexity of these events to the action of a single entity or final cause. As such, these instances can be seen as the points where Pirquet makes an argument for a different understanding of immune responsiveness, one that

³³ The difference between orthodox accounts of allergy as pathology and Pirquet's notion of altered reactivity as a general theory of immune responsiveness is discussed at length in Chapter One.

problematizes the conventional grammar of causality – its spacing and timing. Ironically, the indeterminacy that Huber finds most frustrating in Pirquet's analysis is itself evidence of something unsettling and fascinating in Pirquet's argument. The Pirquet that appears obtuse and incoherent to Huber is the Pirquet that is most focussed and provocative to a different reader: the poststructuralist reader.³⁴

In the remainder of this chapter, I focus on Pirquet's account of what causes changed reactivity. Working closely with Pirquet's monograph and Huber's interpretation of the allergy hypothesis, I unpack how the issue of causality plays out in Pirquet's work. This analysis uses Huber's reading to highlight points of implication in Pirquet's text. Where Huber reduces the cause of changed reactivity to the organism, I argue Pirquet's work can be read as offering an ecological account of reactivity, which problematizes the very givenness, the borders or limits, of the organism's identity.

Sensitisation

Pirquet's studies of reactivity not only laid bare the conventions of immunological work (namely, the assumption of a given organism guided by a principle of self-protection), they caused him to reject this departure point for interpreting immune events on the basis that it presupposed a reductive and abstracted account of what he regarded as a more complex phenomenon of involvement. Pirquet's findings made it impossible for him to concede that changed reactions are simply caused by the interaction of a host organism and a separate, external entity, primarily because this particular explanation offers no account of how such an interaction is even possible. Immunology has long dealt with the *effects* of organism-antigen encounters – the symptoms or phenomena that define different reactions. However, this approach, which focuses on isolating the causes of specific reactions, ultimately precludes the more fundamental issue of the conditions that establish the

³⁴ Here, it is possible to argue that the specific concerns which motivate Huber's reading of altered reactivity generate evidence of a different reading of Pirquet's texts. In the way Huber uses it, frames it, Pirquet's text seems to take on, and indeed evidence, Huber's interests. Huber's reading illustrates that Pirquet's theory is open to a number of readings – its meaning is not finally determined by an original authorial intent; rather, this meaning or intent is centrally at issue.

biological complementarity of organism-antigen pairings. In Pirquet's work, the cause of allergy is not traceable to a single entity (organism *or* antigen), but remarkably, to the ecological interrelation of these apparently distinct elements.

When Pirquet hypothesised that the immune response is defined by change rather than stasis, his attention shifted from an interest in identifying the causal entities responsible for individual reactions, to understanding what causes reactivity or immune responsiveness more generally. In focusing on the extended scene of multiple exposures and in particular, the difference in time between exposures that produces changed responses, Pirquet's work demonstrates a primary concern with *how immune responsiveness is triggered*. His clinical studies grapple with the much larger, and more philosophical puzzle, of what elicits or triggers the immune response *in the first instance*. In other words, he asks: how is it that we come to be responsive? What, precisely, animates response?

Pirquet's fascination with the mutability of the immune response points to the phenomenon of sensitisation – the physiological process by which organisms *become* sensitive to foreign micro-organisms and substances. Sensitisation refers to the first exposure of an organism to an antigen, after which a second or subsequent exposure leads to a greater, or more heightened, response (Cruse & Lewis 2004, 347). It describes the initial encounter between a body and a substance that triggers the body's responsive capacity *in the direction of that substance*. Literally meaning 'to become sensitive to (something)', sensitisation can be understood as the animation of the organism's sensitivity toward specific antigens: it is the ignition or activation of a certain physiological awareness and identity in relation to others.

In its contemporary immunological usage, sensitisation refers to the process by which a healthy body (that experiences normal or tolerant immune responses) is transformed into a hypersensitive organism. It is a phenomenon conventionally associated with the emergence of immunopathology, and specifically, allergy. For instance, Golub and Green explain:

There are many manifestations of hypersensitivity...all having in common the fact that they are initiated by an immune reaction to an antigen and occur in or

on a host who has become SENSITIZED (i.e., has previously made an immune response to that antigen). Thus hypersensitivity...is the result of *restimulation* with the offending antigen. The distinction is made between *sensitizing* and *immunizing*, because not all secondary responses are hypersensitivity reactions. In common parlance, the latter are called ALLERGIC REACTIONS. (1991, 598, original emphasis)

This textbook definition emphasises that sensitisation is a process akin to immunisation in the sense that each describes a process that causes a shift in the organism's response to a specific antigen. However, it differentiates between these processes on the basis of their physiological effects – that is, whether the changed response is protective or pathological.³⁵

Intriguingly, sensitisation is an issue that occupied early immunologists, and remains an unsolved problem for the discipline: contemporary immunology continues to define sensitisation as a key feature of the onset of hypersensitivity and allergic disease (an established scientific fact), but cannot explain why it occurs.³⁶ Given that Pirquet's concept of allergy explicitly problematises the distinction between healthy and pathological immune function (implicit in the observed difference between sensitising and immunising antigen encounters), in his work, sensitisation refers to *any series of organism-antigen exposures that results in changed reactivity*. Pirquet's study attends to all processes of changed reactivity as instances of sensitisation.

Pirquet's monograph deals almost entirely with examples of sensitisation: in each case of allergy he investigates, be it immunity, anaphylaxis, serum sickness, buckwheat allergy or hay fever (1911, 259-260; 261; 262; 281-282), Pirquet documents and analyses a specific process of sensitisation. As mentioned earlier, these processes are depicted visually in a series of graphs that illustrate Pirquet's view of the different elements and interactions involved in producing allergy. Referring to these diagrams, he writes:

³⁵ This view of sensitisation is echoed in a more recent textbook, *Immunobiology: the immune system in health and disease* (2005). Janeway, Travers, Walport and Schlomchik offer the following definition: 'Allergic reactions require prior immunization, called **sensitization**, by the allergen that elicits the acute response. Allergic reactions occur only in **sensitized** individuals' (2005, 773, original emphasis).

³⁶ For an example of this, see Janeway et al. (2005).

...it is my intention to give an explanation of the phenomena in a more subjective manner, calling to my aid many suppositions not as yet quite proven scientifically... The sketches I use for illustration are not made with the intention of creating the opinion that everything therein contained is mathematically proved. They should be accepted only for what they are intended, that is as a scheme to make myself clearly understood. (1911, 405)

Pirquet explains that these graphs function as a conceptual tool to help him convey his understanding of the events of sensitisation or changed reactivity, at a time when the microbiological research relating to antibody formation did not yet exist. Thus, they serve as an important heuristic device that enables Pirquet to make sense of his observations.

The graphs themselves demonstrate that Pirquet viewed sensitisation as a process encompassing four primary elements: organism, antigen, antibody and toxic body (see Figure 2). In his text, the antibody emerges as a material referent of the first encounter that is produced by the organism; the toxic body is a substance or compound produced by the second encounter – it derives from the interaction of the antigen and antibody. As we shall see, within the context of sensitisation, the issue of who or what causes changed reactivity becomes increasingly difficult for Pirquet to locate. In particular, the role of the interval between exposures in determining the outcome of the second response (and thus, in affirming the identity of the previous encounter as ‘sensitising’) complicates the idea that cause is strictly locatable in *any* given entity. Put more precisely, sensitisation points to the very givenness of these entities as a question.

The following discussion works patiently through Pirquet’s explanation of the different elements involved in allergy. It deals separately with three major components of sensitisation which, at various points in his text, are described by Pirquet as *causing* allergy, namely, the antigen, antibody and toxic body. Although sensitisation describes an ecological scenario that cannot be disentangled into separate parts, it is necessary, for the purposes of this analysis, to examine these elements in isolation. While this may seem confusing, it is impossible to talk about immune

phenomena without naming, and thus decontextualising, specific objects. Here, the phenomenon under discussion (sensitisation) is at odds with the *form* that this discussion must inevitably take, namely, a linear narrative. As we shall see, this dilemma of how to articulate sensitisation without reducing its ecological complexity – how to conceptualise or think immune phenomena – is reflected in Pirquet's difficulty in presenting a coherent etiological account of changed reactivity.

The foreign body

Pirquet's account of sensitisation begins with the observation that in order for an immune response to manifest, the organism's responsive capacity must first be animated by contact with an external factor.³⁷ In his original article 'Allergie', he states that allergy 'expresses the change in condition, which an animal experiences after contact with any organic poison, be it animate or inanimate' (Pirquet in Kay 2006, 559). According to Pirquet, changed reactivity results from exposure to a foreign substance, which he describes as a 'poison' due to its effect on the organism. This seems to suggest that the organism responds to the nature of a given substance, and that the shape of its response is a biological signature of that substance. Pirquet's description implies that the organism's response matches the intrinsically harmful, foreign, or in his terms 'alien' (1911, 262) nature of the antigen, and that the cause of changed reactivity can be traced to this material referent.

However, Pirquet points out that the organism's response, and particularly its alteration of response, is generated not simply by contact with the external factor, but by *repeated exposure to it*. He stresses that the response, irrespective of its physiological outcome, arises from a sequence of organism-antigen encounters and the length of time between them. For instance, in recounting Arthus' studies of the effects of horse-serum in animals, Pirquet highlights the importance of multiple exposures in producing allergy: 'a first injection of an apparently harmless substance changed the organism in such a manner that a repeated injection now acted on it as a violent poison' (1911, 261). Pirquet's addition of the temporal context of infections

³⁷ This view is consistent with contemporary characterisations of allergy.

as a variable in determining response seriously complicates any simple, singular attribution of cause, and thus also, the identity of the trigger as foreign, poisonous and causative. Within the temporal frame of sensitisation, the toxic effect of the substance derives as much from the organisation of exposures as it does from any inherent quality of the antigen. In fact, the nature of the antigenic substance – its *toxicity* – is generated by the complex of variables that contribute to its ultimate effect. As such, the cause of changed reactivity eludes a specific location and instead, Pirquet's work refers us back to the organism-antigen relation, and thus the broader scene of sensitisation, as the only factor that can be regarded as causing allergy.

The problem of what triggers or calls forth a changed response remains ambiguous in Pirquet's descriptions of sensitisation because he does not clearly name one entity as its source. This is a point of frustration for Huber, who interprets allergy as meaning that the organism itself is responsible for changed reactions: 'Pirquet was absolutely clear about the fact that the organism actively participates in its changed reactivity' (2006b, 721). Yet interestingly, the explanation Huber offers to further clarify Pirquet's theory presents complications that undermine Huber's intentions. He writes, 'to Pirquet the change of reactivity was dependent upon contact with an external factor...the external factors (foreign bodies) trigger the organism through one or several incorporations [penetrations] to change reactivity' (2006b, 721). Here, Huber states that the organism is induced to react differently by an external provocation. But this provocation, the foreign body, is only activated *as* a trigger after going through 'several incorporations'. Thus, in order to become physiologically provocative for that organism, the antigen must commune with the body of the host – there must be interpenetration. According to this description, the condition of the trigger's *externality* is its being somehow already incorporated by the host (in some initial encounter): its specific nature *as* foreign, other and antigenic derives from an intimacy with the host and results from the host's 'directive' or 'intention' as much as anything. Similarly, the host body, as the agent of its own mutable reactivity, requires that it be *already* triggered into action by something external and presumably very different (though already biologically known) to it.

Here, Huber's description conveys a sense of immune responsiveness as an entanglement of elements and processes that cannot be easily differentiated. The

agentic, reactive immunological body cannot be logically separated from the foreign stimulus whose nature it is (or has become) to provoke and penetrate that body. The responsive capability of the body suggests a familiarity with, and internalisation of, the other, just as the ability of the antigen to elicit a response, which we presume is innate to that substance, implies some prior knowledge of that body. The conditions of response are such that no one component can precede another: the body is always already infected, and the antigen always already incorporated. As such, the characterisation of this situation in terms of the coupling of action and reaction, or stimulus and response, appears somewhat simplistic, as we do not straightforwardly have one discrete thing that affects or penetrates another discrete thing: response is born simultaneously.

The word ‘response’ comes from the Latin, *responsum*, meaning ‘an answer or reply’ (Barnhart & Steinmetz 1988, 918). Historically, it refers to ‘a part of the liturgy said or sung by the congregation in reply to the priest’ (1988, 918). Thus, response implies a responding to something, an answer or reply to a call. A response cannot exist on its own – it always speaks *to* something. Importantly, this does not mean that there are two separate parts that speak to one another (as in the case of a liturgy composed of different roles). Rather, a response is always already spoken in/by the call: each part, in its specificity and partiality, is an expression of its other. In other words, call and response emerge semiologically. If we think about the complex circumstances that give rise to the immune response – namely, the encounter between an organism and an antigen that produces a substance as stimulating and a body as responsive – we might say that the intertwining of these terms expresses familiarity. It is as though each both calls to the other, and responds *in its specific form*. And yet, in this situation, the form (identity) of each anticipates or precedes its being-called.

In grappling with Pirquet’s account of sensitisation, Huber reiterates in his own words, how allergy is triggered according to Pirquet. The uncertainty in his statement seems to go to the heart of the problematic Pirquet is trying to articulate. Huber writes, ‘the contact with the foreign body represents the occasion (‘trigger’) for the change in reactivity: that is, in the framework of dealing with [*Auseinandersetzung*] it, the organism changes its reactivity’ (2006b, 261). In this

statement, the issue of what constitutes the trigger is confusing, as Huber seems to suggest that the encounter – the meeting or relationship of organism and foreign body – is itself *catalytic*. The nature of this encounter is captured in the German term, *Auseinandersetzung*, which, in this context, implies a number of different meanings. *Auseinandersetzung* refers to a discussion, debate or dispute between individuals – it connotes conflict mediation or human interaction, or a more general sense of dealing with a situation or coping with certain circumstances. The confusion over the meaning of this term is apt, as it is precisely the difficulty in *specifying or locating what happens between an organism and an antigen* that is crucial in explaining sensitisation.

Huber's comments foreground the relation of organism and antigen as central in understanding the events of sensitisation. In describing this relation as a debate, dispute or instance of one entity being incorporated by another, he raises the question of how to conceptualise the encounter between these (already) intertwined entities. Of what does this encounter consist? Can we determine where and/or when this debate or negotiation begins and ends? How are we to imagine the meeting of two things that are not clearly separable, but in fact, radically implicated?

In the section of his monograph devoted to tuberculosis, Pirquet gives a wonderfully vivid description of what occurs in an organism during the incubation time of a small amount of tubercule bacilli. Pirquet focuses on the period of incubation – the interval between first and second injections. Remarking on the difference of symptom presentation between this instance and previous test cases involving the administration of larger doses, he explains:

...after an infection with small amounts of tubercule bacilli, weeks or even months elapse before clinical symptoms are noticed. In view of such prolonged periods of incubation, the question arises whether it is possible that the tubercule bacilli remain in the organism in a state of absolute rest, without multiplying and *without stimulating the organism to react*. I have observed similar occurrences in cow pox vaccination and attributed them to '*sleeping germs*'. Here, the germs can be *awakened* later on by mechanical or biological

stimuli, for instance by the antibody formation following subsequent infection. (1911, 393, emphasis added)

The meeting previously interpreted as an interpenetration of organism and antigen is here pictured as a form of *co-* or *in-habitation*. In Pirquet's description, the assumption that there are two encounters separated by a clean break is called into question, as he conceptualises the meeting of these entities as a state of rest in which the boundaries demarcating self and other are unclear. During sensitisation, the relationship of organism and antigen becomes very difficult to picture as clearly beginning or ending, and the notion that this relation is *initiated*, in any conventional sense, emerges as highly problematic. The idea that the antigen 'sleeps' within the body in a non-actualised or potential form waiting to be woken confounds the possibility that these entities are intrinsically opposed, and instead suggests that the distinction between native and foreign (the given material properties of organism and antigen) is an outcome of sensitisation. Moreover, it demonstrates that the natures of substance and organism await some kind of adjudication together: they have yet to properly arrive in an absolute or final form. This is expressed in Pirquet's description of incubation time as a liminal space in which the distinctions between inside/outside, native/foreign, active/passive are strangely suspended.

The antibody

Pirquet identifies the latent period between the first and second organism-antigen encounters as the point at which a *co-mingling* of these entities takes place. In order to account for this latency, that is, for how a period of time could enable this kind of material transformation, Pirquet gives a loose description of the entities and physiological processes involved. Importantly, he argues that the change in response that occurs with the second encounter can be attributed to the presence of antibodies, which are produced by the organism as a result of the first encounter. He writes, 'the disease-producing organism [antigen or foreign body] calls forth symptoms only when it has been changed by antibodies; the time if (sic) incubation is the time necessary for the formation of these antibodies' (1911, 262). Here, Pirquet states that the antigen does not immediately affect the organism, rather, its ability to trigger an

altered response is contingent on its first *being changed* by the organism's antibodies. The antigen does not alone embody the property of 'triggering': its capacity to trigger allergy is contingent on the organism recognising it (where recognition equates to the production of antibodies). Thus, for the antigen to provoke a shift in response, it must first be known to that organism, and presumably have *already* provoked a response (thus establishing the conditions for further recognition).

Interestingly, this discussion suggests that recognition (of the antigen by the organism) is a consequence of a linear sequence of separate organism-antigen encounters. Yet this understanding of recognition is at odds with the logic outlined in our previous discussion, which emphasises the *simultaneity* of call and response. From this perspective, recognition is not an effect of two entities meeting (numerous times) – it does not come after the fact of an initial encounter: recognition is what conditions the meeting of these entities in the first place. Stemming from the Latin *recognocere* meaning 'know again' or 'acknowledge', to recognise is 'to perceive (something or someone) as already known' (Barnhart & Steinmetz 1988, 896). Recognition implies *prior* knowledge of something or someone – it suggests that the encounter which establishes the conditions for recognition has always already taken place. Thus, the notion that a response has already been provoked (in a previous encounter) is itself the condition of *any* encounter.³⁸

³⁸ The notion of recognition goes to the heart of the problem of immunologic specificity – how the organism produces specific antibodies in response to foreign substances, or more basically, how the organism recognises foreignness. This puzzle was a central concern of early immunologist, Karl Landsteiner. Between 1917 and 1918, Landsteiner, who studied the immune response to artificial haptens (partial antigens that bind to carrier proteins), showed that the immune system could produce antibodies in response to a range of artificial or chemically altered antigens (Silverstein 1989, 107-109). He found that in addition to an enormous number of naturally occurring antigens, the immune system could mount specific responses to an even larger range of artificially created antigens: he 'demonstrated that the immune system could react with almost any antigen one could imagine, some of which would never be expected to exist anywhere in nature' (Ulvestad 2007, 61). In establishing that the immune system is capable of recognising substances it could *not* have previously encountered – that it evidences *prior knowledge* of an antigen in a situation where such knowledge is impossible – Landsteiner's work foregrounds the essentially paradoxical nature of recognition. Immune responsiveness is guaranteed by the fact that a first encounter has, impossibly, already taken place. For more on Landsteiner's studies of immunologic specificity, see Mazumdar (1995) and Silverstein (1989).

Importantly, the question of *how* recognition occurs is one that has a strong tradition within continental philosophy. Thinkers such as Georg Wilhelm Friedrich Hegel, Louis Althusser and Jacques Lacan have each explored the scenario of how there could be a 'first' encounter between subjects that enables recognition. These first encounter stories – Hegel's description of the emergence of self-consciousness in the master/slave dialectic, Althusser's notion of interpellation and the hailing of the individual, and Lacan's account of the mirror stage in which an infant first recognises him/herself – offer different meditations on the problem of subject formation (the founding moment of the social and

Pirquet's account of the antibody's agency in transforming the organism-antigen relation is supported by Huber, who explains:

According to Pirquet's theory about the development of disease phenomena, the trigger (Pirquet's concept of allergen) did not immediately affect the organism but first *had to be changed to be effective*... Pirquet left open how this alteration should be imagined and mainly stressed that the clinical disease phenomena are manifest at *the point where antigen and antibody meet*. (2006b, 721, emphasis added)

Huber's description reiterates Pirquet's claim that the alteration in the antigen's status from benign to toxic occurs when 'antigen and antibody meet'. For Pirquet, the antigen becomes allergenic when it comes into contact with the products of the first encounter. Put slightly differently, if the antibody constitutes material evidence of the first encounter, then the change in reaction occurs when the first and second encounters are brought into conversation with one another. Here, the role of the antibody in animating the allergenic trigger suggests that the *antibody* instigates the change of state in the substance, and thus the shift in reactivity.

In Pirquet's monograph, the antibody is introduced as an element that explains the transformative interrelation of organism and substance by acting as a causative link between them. It is an additional element whose very existence accounts for the difference in response between first and second encounters. In the conclusion of his monograph, Pirquet writes:

We have seen that in most of the diseases that we have considered, the clinical reaction was not an immediate consequence of the infection, but it was a phenomenon of a more complicated nature, a phenomenon which could not be explained by the action of a micro-organism [or] some other foreign substance

subjectivity). At issue in each of these texts is the very givenness of the social subject or individual. How is there a subject? What enables us to recognise ourselves? How does an individual recognise an other without first having known him/her? Each of these stories, which highlight the paradox of recognition, attempt to explain how something foreign could be recognised at all. See Hegel ([1807] 1977), Althusser ([1971] 1977) and Lacan ([1949] 1977).

on the tissues, but involving the existence of a third factor. This third factor appears only some time after the first infection. (1911, 403)

Pirquet explicitly states that alterations in reactivity result from the presence and action of a ‘third factor’, the antibody. Counter-intuitively, it is this third factor – a substance produced *after* contact with, or through a physiological response to, an antigen – that actually explains the change in reaction. In Pirquet’s account, the presence of the antibody, the physical manifestation of the initial meeting of an organism and an antigen, determines the outcome of response and is thus responsible for allergy. In short, it affirms a linear causal account of changed reactivity.

At this point, one could argue that the antibody is synonymous with the organism, and therefore the organism participates actively in the outcome of reaction and is the principal agent of this change. Certainly, this is the position Huber adopts. However, it seems far too reiterative of the notion of a defended immunological self to assume that the antibody is straightforwardly a delegate of the organism. If stimulus and response (antigen and organism) are not separate, isolated entities – if the properties of the stimulating substance arise only within the entangled spatio-temporal conditions of sensitisation – then, the antibody emerges as an entity whose manifestation is as ecologically complex as any other in this system. Paradoxically, the antibody is a cause that arises *after* its effect: it only triggers a change in reactivity if a process of sensitisation has *already* been initiated. Put slightly differently, the condition of the antibody being a cause of allergy is that the change it foreshadows has already been anticipated, and manifest, in the conditions that give rise to antibody production. The antibody is thus both a product *and* a determinant of the organism-antigen relation – it is a biological entity that encapsulates and materially evidences the problematic of locating the origin of the organism’s reactivity.

Within Pirquet’s analysis, the identity of the antibody is complicated by the fact that what he intended by this term was quite unclear and is inconsistent with its contemporary scientific usage.³⁹ As discussed earlier, Pirquet’s preference for

³⁹ This point is supported by Huber, who explains: ‘It is crucial that the term ‘antibody’, Pirquet used frequently, is not equated unambiguously with its current, more precisely defined meaning (immunoglobulin). Also, what he understood by antigen-antibody reaction is not the same as the

clinical study over laboratory research meant that his findings relating to antibodies were based almost purely on observations of patient reactions. Referring to his study of serum sickness carried out with Schick, he writes:

...antibodies, when brought in contact with the allergens of the horse serum in the organism, produce a toxic substance as the result of some unknown biochemical reaction. Von Pirquet and Schick designated these bodies *antikörperartige Reaktionsproducte* or antibodies of vital reaction. Later on I proposed the name *ergins* for the same substances. By this I understood bodies which are concerned in the production of the altered reactivity of the organism. The term has a purely clinical meaning, and I do not connect it with any definite chemical or biological character. (1911, 274, original emphasis)

Although Pirquet defines antibodies as immunological entities central in the production of allergy, he is tentative about characterising them scientifically, and insists that his usage of the term is strictly clinical.

Pirquet's hesitation in making specific claims about the mechanisms or microbiology of allergy indicates that the antibody serves a more conceptual function in his investigations. This is evident in the language he employs to define the antibody and its role in the process of sensitisation. For instance, in a more substantial article, 'Allergie' published in 1908, Pirquet describes *ergin* as:

... 'the substance [that] acts as the *carrier* of allergy in the organism.' 'By 'Ergin' I [Pirquet] understand the *hypothetic substance which mediates* the clinical effect of the allergen on the organism'. And: 'without attaching a definite chemical or biological character to the term, I understand antibodies as entities *intervening* with the clinical reactivity of the organism'. (Pirquet in Huber 2006b, 722, emphasis added)⁴⁰

respective modern idea. Pirquet himself repeatedly pointed to the fact that the real nature of 'antibodies' had not yet been clarified, and therefore [in its stead] regularly used different, less defined terms (e.g. 'reaction products of the organism'). He sometimes called them 'ergine' (2006b, 721-722).

⁴⁰ Here, I cite Pirquet through Huber's text, rather than citing Pirquet's text directly, as this article is only available in the original German.

Each of these statements suggests that the antibody functions as an *intermediary* between organism and antigen, a kind of intervening agency that produces changed reactivity. The terms ‘mediates’ and ‘intervening’ imply a relationship between two entities – each codes for the connection, relation or nexus between organism and antigen. Interpreted literally, the antibody is a material manifestation of this relation or nexus. If the antibody intervenes in the clinical reactivity of the organism, then one could say that the antibody evidences the fact that the first and second organism-antigen encounters infect one another. Just as the antibody complicates the givenness of organism and antigen, it similarly complicates the separation and linear, temporal organisation of exposures.

The antibody only works as a causal explanation of sensitisation if we begin from the assumption of a fundamental antagonism between discrete entities – an assumption I have argued is centrally at issue in the ambiguity of reactivity. This is why the introduction of a third term into Pirquet’s framework re-presents the original problem, namely, of how any entity emerges as an individuated unit within an ecological system. Pirquet’s conceptualisation of the organism-antigen interrelation as an additional, third term reinstates the questions of autonomy and mediation that the introduction of the antibody is intended to resolve.

Consequently, the antibody is a substance that attests to, or captures, the ontological complexity of infection. Rather than a *conjunction* of infector and infected, the antibody is a body whose (coming into) being speaks of the wider ecological system of which organism and antigen are but different instantiations. In this sense, the antibody manifests Pirquet’s dilemma of trying to pin down where and how the ecological interrelationship of an organism and its environment begins. The confounded temporal relation of the antibody to both organism and antigen exemplifies the constitutive entanglement of the primary elements that make up this system. Having established that immune responsiveness is anchored neither in a naturally defended body, nor an inherently infective, pathological agent, Pirquet’s introduction of a third element (antibody) – a conceptualisation of this relation – acts to steady the contingency of these designations.

What, then, are the implications of the allergy hypothesis for thinking about the materiality of stimulus and response? How does the antibody, as the embodiment of this systemic *responsibility*, challenge a conventional understanding of substance? Indeed, what notion of substance or matter does the interrelationality of organism, antigen and antibody suggest?

The toxic body

At stake in Pirquet's investigation is the location of the agency that produces changes in reactivity. If cause is not located in an entity, but in the relations among entities in time and space – their ecological interrelations – then cause cannot be identified in the conventional sense. Importantly, Pirquet is critical of this notion of cause, which at the time of his writing was deeply informed by the bacteriological concept of a disease agent that authors pathology. He describes his study as 'abandoning' the widely held view that 'the symptoms...of infectious disease are...entirely due to the action of the micro-organisms' (1911, 426). More broadly, his interest in the relationship of the organism's reactivity to the time difference between organism-antigen encounters offers a perspective on immune responsiveness that explicitly interrogates the idea that its cause could be located in any circumscribed entity/location.⁴¹

Yet despite these intentions, Pirquet inadvertently reverts to an orthodox notion of cause in grappling with sensitisation. This is most starkly illustrated at points where Pirquet names a 'toxic substance' (e.g. 1911, 271) responsible for the pathological symptoms associated with certain forms of changed reactivity. Many of his graphs depict cases of allergy that result in some kind, or degree, of pathology, namely serum disease, cow pox vaccination, and infection with tubercle bacilli (1911,

⁴¹ A similar argument is made by Astrid Schrader (2009) in her discussion of the scientific controversy surrounding the single-celled microorganism *Pfiesteria piscicida*, responsible for killing huge numbers of fish in estuaries in North Carolina. Schrader argues that its toxicity – its capacity to transform into a poisonous, fish-killing algae – is a mutation consistent only with specific environmental factors. In other words, its status as a toxic causative agent is an ecological phenomenon, which calls into question the very idea that there could be a discrete causal agent responsible for fish deaths. See Schrader (2009).

410-417). In each of these diagrams, the shift in response corresponds with the emergence of *toxicity* from organism-antigen encounters.

In addition to the organism, antigen and antibody, Pirquet proposes the existence of a ‘toxic substance’, which at other points he describes as a ‘toxic compound’, ‘toxic product’ and ‘toxic body’ (1911, 271; 407; 408; 411). This fourth term appears as an unknown quantity whose existence, determined by Pirquet only from the clinical effects of changed reactivity, testifies to the presence of the antibody (1911, 411). Despite its illustration in fifteen separate graphs⁴² Pirquet does not define the toxic substance in any scientific detail. Much like the antibody, the toxic substance refers to a hypothetical entity that serves an explanatory function in his study; specifically, it designates the particular property of the antigenic substance that causes an altered, pathological response (1911, 271). In his diagrams, Pirquet represents the toxic body purely as a *quantity of substance* that arises and subsides with respect to levels of antigen and antibody (see Figures 2 and 3).

Throughout the monograph, Pirquet characterises the toxic substance as an effect or by-product of the antigen-antibody interaction. For instance, in discussing a study of the tuberculin reaction carried out by himself and Schick in 1903, Pirquet writes:

...antibody-like substances produced by the organism and diffused through all the tissues enter into combination with the tuberculin [antigen], giving rise to a toxic substance in the general circulation, as well as at the point of the inoculation of the tuberculin. (1911, 389)

Pirquet explains that the ‘combination’ of tuberculin and antibodies generates a toxic substance responsible for the resulting pathology. The physiological effect of the antigen-antibody interaction is conceptualised as a concrete substance that embodies toxic properties. Here, however, it is unclear if the toxic substance is the cause of pathology, or the pathology itself.

⁴² See Pirquet (1911), pp. 409-423.

This point is reiterated in Pirquet's discussion of a graph illustrating the effects of horse serum in man (see Figure 3). Explicitly addressing 'the connection between the antigen and its antibody' (1911, 411), Pirquet offers an account of how the toxic body is produced:

...we have injected the horse-serum not into a rabbit but into man, and are able to observe *the effects of the toxic body formed when antigen and antibody meet*, that is, the serum disease. We see that at the time when the antibody arises, and therefore the antigen disappears, symptoms of general disease occur. The supposed connection is that these symptoms are due to the toxic bodies formed by this digestion of the allergen through the antibody. (1911, 411, emphasis added)

In this statement, Pirquet argues that the emergence of the toxic body corresponds with the 'meeting' or interaction of antigen and antibody. However, he offers the further explanation that the toxic body arises as a result of the antibody 'digesting' the allergen (antigen).

For Pirquet, the toxic substance is *a measurable effect* of antigen-antibody encounters that takes a material form. It is a conceptualisation of the relation between antigen and antibody *as a substance*. In keeping with certain conventions surrounding the characterisation of scientific evidence, Pirquet's description of toxicity as a substance serves the function of grounding the cause of allergy in a fixed entity. Somewhat paradoxically, it is as if the clarity of Pirquet's investigation rests on his ability to anchor the fluid and fluxing nature of immunological relations in something indisputably solid, unchanging and indeed, strangely immune to the contagion that he implies is definitive of this system. For the purposes of giving a coherent account of changed reactivity, Pirquet recourse to a concept of substance (as fixed, given, immutable) that appears contradictory to the central principle his hypothesis elaborates.

In his monograph, Pirquet frequently uses the metaphor of *digestion* to describe the process that gives rise to the toxic substance.⁴³ For example, recounting his study with Schick of the changed reactions observed in cases of serum disease, Pirquet offers the following hypothesis: ‘substances of the character of an antibody digest the foreign substances, and...the products of digestion act as poisons’ (1911, 262). In the text’s conclusion, Pirquet takes up this metaphor in detail and uses it to illustrate the elements and processes involved in cases of allergy that result in some form of pathology. He writes:

A man takes milk containing a small number of bacteria which cannot be attacked by any of the intestinal juices, but which find a good medium in the walls of the intestinal canal. The bacteria will form colonies wherever they settle, and each of these colonies will grow slowly. Now we suppose...that the bacteria stimulate the secretion of a specific ferment in the beginning of the second week. With the appearance of the ferment the digestion of bacteria, the absorption of toxic products, and therewith the disease begins. (1911, 408)

Here, the ingestion of bacteria in milk is compared to infection with an antigen, and the ferment secreted by the body in response to the growth of bacteria in the gut is analogous to the antibody-production that accompanies infection with a micro-organism. Continuing his illustration, Pirquet states that there are two possible outcomes:

⁴³ Intriguingly, digestion is itself a significant immunological event that similarly involves the immune system forming a response to foreign antigens, in this case, food. As Janeway et al. explain, the phenomenon of oral tolerance – ‘a state of specific and active unresponsiveness’ (2005, 439) – prevents the body from rejecting food. Although it is not within the scope of this chapter to investigate the microbiology of digestion, it is a significant metaphor because it describes a physiological process through which the organism negotiates the distinction between self and other, native and foreign, benign and toxic. For instance, on the topic of digestion, a recent study of the gut microbiota in Japanese individuals revealed that the Japanese possess gut bacteria capable of breaking down complex carbohydrate molecules found in marine algae, which Americans do not (Hehemann, Correc, Barbeyron, Helbert, Czejek & Michel 2010). The study showed that Japanese gut microbiota gained this ability by gene swapping with environmental microbes present in raw nori (a commonly eaten seaweed in Japan). That is, they borrowed specific seaweed-digesting genes from microbes found in coastal oceans. If what we eat changes our DNA (the DNA of our gut microbiota) then food is not straightforwardly extraneous or foreign to self. What we can and cannot digest, tolerate or not tolerate, is an open and constantly negotiated process. For details of this study see Hehemann et al. (2010).

...the ferment may be able to dissolve the bacteria and the colonies will be killed *in toto*... Or the ferment acts only on the products of the bacteria or on their dead bodies. The first example corresponds to the acute infectious diseases, especially to cow pox, and the second to chronic infections and especially to tuberculosis. (1911, 408, original emphasis)

Remarkably, even in presenting this relatively resolved account of the processes involved in changed reactivity, Pirquet's work proposes the identity of cause – or more accurately, the location and constitution of the pathological agent (or of foreignness) – as a question. Referring to the outcomes cited above, he offers the following comment: 'In both cases the question remains whether the contents of the bacteria or their products are *toxic in themselves*, or whether the combination of these with the ferment [that is, antibody] constitute *the agent harmful for the organism*' (1911, 408, emphasis added). This statement goes to the etymological heart of allergy. Literally meaning 'other energy', 'other activity' or 'to be infected with the energy of the other', the puzzle that allergy presents is the origin of the energy or agency that produces the change in reaction. In the above statement, Pirquet cannot confidently say whether toxicity inheres in the antigenic substance as a naturally occurring property, or whether this property is a phenomenon emergent from – or enacted by – the antigen-antibody encounter.

To a large extent, the toxic substance rehearses the problem of the antibody, as its materiality is called upon to account for the ecological interrelation of two things: antigen and antibody. The toxic substance evidences the second encounter between organism and antigen in the same way that the antibody evidences the first. Yet, similarly, the identity of this substance is not fixed or straightforward because it too is an effect of a relation that it simultaneously explains. Both the toxic body and the antibody are substances whose essential physical properties are the artefacts of a complex set of interrelations. Rather than resolving Pirquet's account of how and why allergy occurs, the ambiguous identity of the toxic substance stresses the degree to which organism, antigen and antibody are ontologically inter-implicated. In other words, the manifestation of the toxic body circles back to insist on the emergent, entangled and mercurial nature of substance.

This issue concerning the substance of substance is not lost on Pirquet. His need to isolate pathology in a fixed substance is contradicted at numerous points in the text where he suggests that the (causative) properties of substance are not ontologically confined. Although Pirquet habitually views reactions as the effects of specific substances or properties of substance – he sometimes refers to a ‘toxic body’ and a ‘fever-producing body’ (1911, 389) – there are sections of his analysis that openly puzzle over how a single substance could give rise to myriad responses. For instance, in reviewing the scientific literature on the phenomenon of anergy or antianaphylaxis (the absence of a clinical reaction upon second infection), Pirquet discusses the property of substance that gives rise to this response. He writes:

Besredka called this action of horse-serum *propriété vaccinante*, and tried to prove that it was due to a body different from the sensitizing and the toxic. We shall see later on that it is now absolutely proved that all these actions are produced by the same body. (1911, 271, original emphasis)

Rather than presuming the existence of separate bodies that are either ‘sensitizing’ or ‘toxic’, Pirquet asserts that sensitisation and disease result from *different actions of the same substance*. In other words, he suggests that these diverse physiological effects are not the products of isolated infective substances – rather, they evidence *the pluri-potentiality of one substance*, or indeed, of substance itself.

Pirquet’s examination of anergy leads him to directly pose the dilemma that substance, in an immunological context, presents. He writes:

This leads us to the question as to what substances in the serum are the causes of allergic phenomena. Here we must distinguish (*a*) the sensitizing substance, for which I propose the term “allergens;”...(*b*) a substance which acts as a poison after the reinjection (toxic substance); and (*c*) the substance which acts protectively and causes the phenomenon of antianaphylaxis or anergy. It is *a priori* probable that *a*, *b*, and *c* are identical. (1911, 271, original emphasis)

Pirquet lists three substances that correlate with different reactions of the organism; in each case, the individual substance is defined purely by the organism's response as sensitising, toxic or protective. Here, Pirquet takes the organism's response as the most accurate point of reference for empirically determining the identity of the substance. Yet, as he astutely points out, these substances may be, in fact, identical. Pirquet's observation that one substance can take three fundamentally different incarnations not only problematises a conventional understanding of substance, it suggests that the substance of an antigen manifests both provisionally and continuously with respect to particular responses. In the context of sensitisation, the substance of substance is only given in lived relation with the organism. Moreover, the organism's identity, determined through its responses, is the biological signature of a substance that manifests in the event of response.

In this chapter, I have argued that Pirquet's theory of allergy presents an account of immune responsiveness that significantly complicates the presumed givenness, autonomy and self-presence of the organism, and thus with it, a concomitant notion of the antigen as an immutable foreign substance. By beginning with the alterability of reactivity, Pirquet suggests that there is no fixed, stable organism that anchors immune responsivity. In examining immune responsiveness as a phenomenon that cannot be disentangled from the wider scene of sensitisation, Pirquet demonstrates that there is no discrete separation or opposition between fixed entities that precedes the mutual *responsibility* of organism and antigen. His study highlights that the substance of substance (the material identities of organism or antigen) derives from a communal or systemic responsibility inherent in the ecological relations that allergy makes explicit. For Pirquet, the immune responsiveness that mainstream immunology tends to take for granted as a series of brute 'reactions' is actually (trans)formative of the elements traditionally understood to be foreign, other and antigenic.

Pirquet's concept of allergy has profound implications for our understanding of the ontology of ecologies – that is, for how we conceptualise our identity (as organism, body or subject) and our relationships with others. In foregrounding the

complex involvement of our immune responses with the substance of the elements we understand as fundamentally foreign or non-self, Pirquet's work suggests that these responses are a sign of an always/already ecological entanglement with and in the world. It is no longer possible to maintain a strict demarcation between the organism and its environment: Pirquet's work challenges our ability to speak of an organism that is not already its environment. These issues – the spatio-temporal entanglement of sensitisation and its implications for our understanding of an organism (or response) that can be located – will be explored at length in Chapter Five.

Chapter Three

Reiterations of the defended self: Donna Haraway's critique of immune system discourse

Ongoing speculation and debate about the existence of an immunological self has sparked philosophical, political and sociological discussions that extend well beyond the scope of immunology as a science. Outside the life sciences, immunology's enthusiasm for questions concerning the biological identity of the organism has given rise to a broader scholarly interest in immunological concepts and theories, and specifically, the theory of self-nonself discrimination. Immunology's conceptualisation of the body as a self defined in terms of its difference from, and hostility towards, others – that is, its representation of the organism as fundamentally embattled – has attracted the attention of scholars in the humanities and social sciences similarly engaged with questions of identity. Since the mid-1980s, its explanation of immune phenomena in terms of an antagonistic self-other relation has been critically engaged in the areas of anthropology, sociology, philosophy, the history and philosophy of science, ethnography, feminism, postmodernism and science and technology studies. Thinkers such as Donna Haraway (1989), Emily Martin (1994), A. David Napier (2003), Ed Cohen (2008, 2009) and Catherine Waldby (1996) to name just a few, have each contributed to a significant critical literature that addresses the social, cultural and political implications of immunology's basic concepts.⁴⁴

Central to these engagements is the argument that immunology's description of immune function depends on a politically invested concept of self. Directing their analyses to the military metaphors commonly used to illustrate the process of self-nonself discrimination, these thinkers argue that immunology's conceptualisation of the body and physiological function in terms of immunity, detachment and autonomy relies on, and naturalises, a social subject grounded in these principles (e.g. Haraway

⁴⁴ For further examples of cultural criticism that deal with immunological discourse, see Weasel (2001), Treichler (1987), Patton (1986, 1990), Mackenzie (1996) and Bashford (2001).

1989, Cohen 2009). These thinkers suggest that immunology's vision of a naturally hostile world evokes, and inadvertently affirms, a comparable vision of social and political life (e.g. Martin 1994, Napier 2002). Viewed from this perspective, self-nonsell theory proposes a fundamentally defensive view of identity that emphasises the separation and independence of individuals from one another over their connectivity. As such, these commentators criticise immunology for reifying the immune organism or atomic individual *at the expense of the collectivity* as the foundation of biological *and* social life.

This concern with the mutually affirming relationship between biological and social and/or political concepts of identity has become characteristic of critical approaches to immunology in the humanities and social sciences.⁴⁵ Such a dominant interest in the *discourses* of self/other and identity/difference associated with immune system theory, has, in turn, played a major part in defining immunology for non-scientific audiences as a self-centric science. Widespread engagement with immunology purely in terms of self-nonsell discourse has arguably reduced the complexity of this field to the conceptual and philosophical connotations of its most recognised and digestible theory. As such, this confined interest in the political implications of the immunological self has given rise to a body of social and political critique closely wedded to, if not intellectually invested in, a somewhat limited view of immunology as a science.

This chapter argues that selective engagement with this *version* of immunology (a discourse of self-nonsell or self-other) has significantly influenced the types of arguments employed in critiquing this science (discursive, political and epistemological), and consequently, has placed limits on what can be said about it. It observes that *a political and analytical symmetry exists between these accounts*: a similar argument concerning the ethics and politics of self-nonsell discrimination as both a model of immune function and a concept of identity tends to be reiterated to the exclusion of alternative approaches to this material. There exists an unexamined

⁴⁵ In her essay 'Toward an Anthropology of Immunology: The Body as Nation State', Emily Martin makes precisely this point. She argues that mainstream immunological discourse affirms notions of identity and self that are socially, culturally and politically pervasive: 'In the new science of immunology, social differences – between men and women, managers and workers, or citizens and foreigners – are written metaphorically into the character of various immune system cells' (1990, 410). For a detailed account of this argument, see Martin (1990).

kinship between the definition of immunology as self-nonsell discourse and the ethical or moral arguments routinely employed to criticise it. This point raises some salient questions about how scientific work should be used or dealt with in the context of the humanities. What are the implications of engaging with the sciences *only* through discourse (scientific knowledge), and with these discourses *only* in an ethical-political frame? To what extent does the *purpose* of critique effect the style of argument employed? And in what ways might this govern or direct the ways we, as cultural critics, relate to, examine and utilise scientific work?

In order to determine why studies of immunology in the humanities and social sciences are mostly confined to political, discursive analyses of self-nonsell theory, this chapter examines one of the most well known and often cited examples, Donna Haraway's 'The Biopolitics of Postmodern Bodies: Determinations of Self in Immune System Discourse' (1989). Taking her work as an exemplar of the main ideas in this literature, it outlines and interrogates her primary arguments.⁴⁶ How, and on what basis, does Haraway critique representations within immunology? What political frameworks and goals motivate and structure her engagement? What ideas, presumptions and/or intellectual investments are secured by the position she adopts?

Through a close reading of Haraway's text, this chapter explores the ways and extent to which the concept of a defended self, and its accompanying notions of immunity, autonomy and opposition, inform the arguments typical of this literature. It suggests that an interpretation of the self/other relation as a defensive opposition is in fact unwittingly recuperated, and even promoted, in the agonistic form of the critiques themselves. This chapter shows that in arguing *against* self-nonsell discrimination as a model of organismic life, these analyses paradoxically perform the defensive identity politics they simultaneously reject. Critiques such as Haraway's depend on the logic of immunity to secure the (defended) identity of their own distinctly political and moral positions.

⁴⁶ In this chapter, I focus on one important contribution in detail, rather than broadly surveying the literature in the field as a whole, as Haraway's essay is one of the earliest and most influential political critiques of immune system discourse.

First published in 1989, Donna Haraway's 'The Biopolitics of Postmodern Bodies' is one of the earliest and most recognised critical, political commentaries on immunology. Now an historical piece, this strong, ascerbic and timely critique can be interpreted as a culturally situated response to the proliferation of biomedical and social discourses during the HIV/AIDS crisis. At the time, Haraway's explicit concern with the political and ethical implications of immune system discourse for embodied experiences of health and illness attracted considerable attention within the humanities. The persuasiveness and popularity of her argument has played a significant role in situating discussions of immunology (as well as biomedical discourses more generally) firmly within the scope of social and political inquiry. As such, her work has come to be regarded as a canonical text of the period, amongst the contributions of other notable scholars such as Paula Treichler (1988) and Cindy Patton (1986, 1990).

Immunology and the discourse of self-nonsel discrimination became targets of critical attention in the humanities and social sciences during the late 1980s and early 1990s. Prior to this period, studies of immunology had been primarily focused on epistemological issues or historiographies of the discipline, both of which were largely confined to the history and philosophy of science.⁴⁷ However from the 1980s onwards, a range of analyses emerged that treated this science in wholly different terms: as a culturally specific and politically loaded biomedical discourse. This shared view of immunology surfaced in a context defined historically by the HIV/AIDS crisis, and intellectually, by an interest in discourse and its relationship to life.⁴⁸

⁴⁷ See Chapter One for examples of this literature.

⁴⁸ The AIDS crisis occurred during an intellectual moment defined broadly by postmodernism, and a concern with signification, language or representation and how it directs and/or constitutes our experiences of life. In the humanities, the work of French philosopher Michel Foucault and specifically, his concept of discourse, has been particularly influential. Discourse is a term Foucault uses to describe the variety of practices (social, political, scientific, economic, etc.) that structure human life. It refers to 'regimes of truth' that emerged with the human sciences in the eighteenth and nineteenth centuries, that is, bodies of knowledge that have come to organise different aspects of life (such as medicine). There are a few key reasons why Foucault's work has been so important for scholars interested in medicine, illness and the body. In studying specific discourses (e.g. sexuality), his work raises questions about the relationship of the individual to knowledge structures. To what extent can individuals exercise agency if they themselves – their unique identities and perspectives –

AIDS, a disease caused by a virus that attacks the immune system, emerged as an epidemic in the 1980s and had catastrophic consequences for human life, particularly in those early years for groups such as gay men and injecting drug users. Almost as devastating and urgent as its biological outcomes were its pronounced social and political effects – namely, the intense stigmatisation of individuals suffering infection. In the context of the epidemic social responses mirrored scientific ones: potent discourses of discrimination relating to race, sexuality and lifestyle emerged alongside efforts to explain the disease immunologically, which, drawing on the language of self-nonself discrimination, invigorated it with renewed significance.⁴⁹

Perhaps more pertinently than other health crises, the AIDS epidemic foregrounded the extent to which biomedical discourses are intimately intertwined with individual experiences of health, illness and mortality. This point is reflected in cultural criticism from the period, which displays an acute awareness of the power of medical knowledges and representations in dictating not only experiences of body and self, but also the political shape of the crisis itself. Here, critical responses to the emergence of a dominant AIDS discourse, which collapses the boundaries between the social, political and biomedical, were being framed in terms of the constitutive relation between language and life. Increased attention was devoted to exploring the ways in which different manifestations of this discourse – for example, public health campaigns, popular media representations of immune function and disease, and everyday understandings of the virus – were producing concrete effects in the lives of individuals.

are governed by existing discursive frameworks? Secondly, Foucault's notion of discourse demonstrates that truth, or the knowledges we live by, are historically and culturally situated. Importantly, this notion of truth as historically specific opens up a space for contesting the validity of authoritative knowledges, such as medical discourses. For Foucault's account of the concept of discourse, see *The Order of Things: An Archaeology of the Human Sciences* ([1966] 1970) and *The Archaeology of Knowledge* ([1969] 1972). For examples of Foucault's use of the concept of discourse, see *The History of Sexuality: The Will to Knowledge* ([1976] 1998) and *The Birth of the Clinic* ([1963] 1976).

⁴⁹ See Patton (1986, 1990), Treichler (1988), Sontag (1989), Martin (1994), Waldby (1996) and Crimp (1988). See also Tomes (2000) for a discussion of AIDS in relation to discourses of contagion.

The immune system as a biomedical discourse

The intellectual commitments outlined above are reflected in Haraway's use of the concept of discourse in analysing immunology. For Haraway, discourse functions as an explanation of how language structures our lived reality or produces material effects. It is a theoretical device that allows her to argue that immunological language does not simply describe, or attach itself, to a physical reality – but rather, is materially implicated in the actualisation of bodies and subjects in health and illness. Haraway argues that immune system discourse operates at two separate but entangled registers: the biomedical (as a body of scientific rhetoric) and the socio-cultural (as a mode of conceptualising the self in relation to others). In order to get a better sense of the architecture of her argument, I will explore each of these manifestations of self-nonsell discourse in some detail.

At a basic level, Haraway views immune system discourse as a medico-scientific discourse that operates on individual bodies within a biomedical context. She interprets self-nonsell theory as an historically specific framework for conceptualising the organism and inter-organismic relations that is grounded in a dichotomous self-other logic or an opposition between fixed, enclosed entities. Haraway's concern with immunological discourse relates to its reliance on 'the semantics of defense and invasion' (1989, 30) in explaining the physiology of immune function. Alarmed by the defensive metaphors of modern immunology, she is critical of the fact that this basic understanding of the body is deeply informed by concepts of war. As such, her analysis points to this overtly politicised vision of biology and attends critically to the rhetoric, metaphors and imagery that contribute to everyday understandings of the immune system. Sourcing evidence from lay magazine articles and immunology textbooks, Haraway examines the extent to which a combative logic (a natural, pre-existent hostility) informs our basic knowledge of body/world relations.⁵⁰

⁵⁰ Haraway's analysis is peppered with specific examples of representations of immune phenomena. For instance, she writes, 'images of the immune system as battlefield abound in science sections of daily newspapers and in popular magazines, such as *Time* magazine's 1984 graphic for the AIDS virus "invasion" of the cell-as-factory. The virus is imagined as a tank, and the viruses ready for export from the expropriated cells are lined up as tanks ready to continue their advance on the body as a productive force' (1989, 30-31).

Haraway's anxiety about the scientific appropriation of politically loaded metaphors speaks to a fear that immunology affirms the idea that war is a natural and unavoidable characteristic or fact of life. Although a relationship between notions of war and life is by no means new, she stresses that this analogy is greatly strengthened by its adoption within immune system theory. Haraway openly contests immunology's war-like view of life on the basis that it promotes a defensive and politically specific conception of the basic vital relations that define human and organismic existence.

The reification of defence as a given physiological principle implies a model of organism, body and self that Haraway argues corresponds with the social and political context of 'postmodern scientific culture in the United States in the 1980s' (1989, 4). Describing it as an icon of American late capitalism, she argues that immune system theory can be read as a vision of biology consistent with this historical moment.⁵¹ She writes:

The immune system is a historically specific terrain, where global and local politics; Nobel Prize-winning research; heteroglossic cultural productions... clinical medical practice; venture capital investment strategies, world-changing developments in business and technology; and the deepest personal and collective experiences of embodiment, vulnerability, power and morality intersect. (1989, 204-205)

Here, Haraway details the over-determined socio-cultural context that gives rise to the immune system (according to self-nonself theory) as a concept. Locating it at the convergence point of multiple vectors of human life, her description points to the culturally entrenched nature of medical knowledge – that is, to the fact that medical knowledge is always a product of social, political and economic negotiations. For her, the emergence of the immune system from this unique arrangement of

⁵¹ Haraway uses the phrase 'late capitalism' at a number of points throughout her critique. Despite the fact that it plays an important role in situating the discourse she analyses, at no point does she explicitly detail what it means. One can only assume that Haraway's use of this trope is itself situated: it belongs to a particular moment in postmodernism when the period of 'late capitalism' was being referenced extensively. For a commentary that defined 'late capitalism' in the time of Haraway's writing, see Jameson (1984).

circumstances as a modern fact illustrates the contextually embedded nature of scientific work, and the extent to which the facticity of science is itself a situational phenomenon.

Haraway's appeal to the historical and cultural specificity of self-nonsel theory is politically significant. In asserting that the immune system is a contingent and situated characterisation of biology, she suggests that biological knowledge changes. That is, scientific truths, which are products of their contexts, are inherently open to transformation because these contexts themselves (the social, cultural, political and economic conditions of life) are constantly evolving. Put simply, the situatedness of knowledge means that scientific objects are *open to being signified differently*. For Haraway, it is precisely the contingent character of scientific discourses and the precarious conditions of knowledge production that secure the possibility of contesting biological truths.⁵²

The immune system as a socio-political discourse

According to Haraway, the presence of immune system discourse in scientific and biomedical domains indicates that it is also operative within a much larger cultural frame. The success of self-nonsel theory in the context of immunology (its popularity and efficacy as a model of immune function) means that this logic has currency in areas *outside* health, medicine and the biological sciences. Discourse, then, does not remain confined to one area or aspect of life: the emergence of self-

⁵² A number of other feminist scholars draw attention to the contingency and situatedness of metaphors and discourses employed in the biological and biomedical sciences. For example, Evelyn Fox Keller's *Refiguring Life: Metaphors of Twentieth-Century Biology* (1995) maps the development of the discourse of gene action, and its incorporation of metaphors relating to information. Pointing to the historical contingencies that have lent force to this discourse, Keller highlights the extent to which 'the conception of genes as autonomous actors' (1995, 45) has directed the course of biological research over the last century. In other words, she shows that the representations used in biology and biomedicine have significant real world implications. Similarly, the work of feminist anthropologist, Emily Martin, draws attention to the social, cultural and political specificity of the metaphors used in contemporary immunology and biology (e.g. 1990, 1991). In a much cited essay that examines biological representations of the egg and sperm, Martin illustrates that 'gender stereotypes [are] hidden within the scientific language of biology' (1991, 486), and that these assumptions endure, despite the revision of this imagery over time. Importantly, the works of Keller and Martin emphasise that biological knowledges are not neutral descriptions of life – they are politically and philosophically invested representations of life that are culturally and historically situated. See Keller (1995) and Martin (1990, 1991).

nonself logic within the sciences suggests that it simultaneously has purchase in a variety of other contexts. Haraway argues that the concept of organism central to self-nonself discrimination resonates with notions of self and identity that are socially, culturally and politically pervasive, and consequently, she interprets immunology's bounded, immune individual as one instance or manifestation of a wider discourse that works across the assumed division between science and culture.

Haraway asserts that our basic understanding of the individual as a social entity mirrors the notion of organism outlined as biological fact in immune system theory. In her view, the privileging of a defensive reading of self-other relations in biology lends support to a similarly antagonistic description and experience of ourselves as subjects, namely, as autonomous individuals co-existent within a shared social frame. Haraway suggests that immunology's characterisation of biological identity in terms of immunity, and organismic relations in terms of conflict and hostility, affirms an understanding of social and political subjectivity that embodies these basic qualities. Here, Haraway draws a more or less direct connection between contemporary concepts of the individual and community, and immunology's investment in the notion that the enclosed, defended organism forms the foundation of ecological relations; she suggests that immunological discourse describes a model of self and a mode of relating to others that reflects the underlying principle of our social and political organisation. In this sense, she understands self-nonself discourse as a cognitive framework that prescribes possible ways of thinking and living social and political community, *and* a logic for articulating the nature of our biological being.

Haraway argues that self-nonself theory is a pervasive socio-political (as well as biological) discourse that operates through the perception and adjudication of identity and difference within society. She states:

My thesis is that the immune system is an elaborate icon for principal systems of symbolic and material 'difference' in late capitalism. Pre-eminently a twentieth century object, the immune system is a map drawn to guide recognition and misrecognition of self and other in the dialectics of Western politics. That is, the immune system is a plan for meaningful action to

construct and maintain the boundaries for what may count as self and other in the crucial realms of the normal and the pathological. (1989, 4)

In this statement, Haraway describes the immune system in very broad terms as an *icon* of systems of difference, a *map* of self/other relations, and a *plan* for differentiating between the normal and the pathological. She interprets it as a logic that explains significant forms of difference that structure social life. Haraway argues that the immune system is a trope or representation that actualises in different areas of life *as* an oppositional structuring of relations (where opposition is conceptualised as a meeting of bounded entities): it is a template of difference or a concept of relationality that she suggests governs the division and organisation of life into meaningful categories and relations (social, political and biological). In essence, Haraway reads immune system discourse as a mode of conceptualising identity that *gives rise to* specific differences or forms of subjectivity.

This notion of the immune system as a conceptual tool for making meaningful distinctions is reiterated throughout Haraway's critique. She writes:

...the immune system is in some sense a diagram of relationships and a guide for action in the face of questions about the boundaries of the self and about mortality. Immune system discourse is about constraint and possibility for engaging in a world full of 'difference', replete with non-self. (1989, 18)

Haraway describes the immune system as a means of negotiating relations with others in the world. Or more accurately, she understands it as a diagram or guide that, in presuming the world is composed of hostile and similarly bounded others, *prescribes* a particular relation with otherness. These kinds of statements by Haraway suggest that self-nonselves discourse is a broad conceptual framework whose limits shape the decisions we make about how to interpret and relate to others at a social and political level. From her perspective, it can be read as a model for generating and recognising difference – or a schema that orders life – constitutive of the unique structure of the social frame. Haraway argues that immune system discourse actively divides the world into entities and categories, or organises the world into knowledge, around the

locus of an autonomous, defended subject; it is a lens or tool that brings the world into intelligibility through an oppositional identity politics.

Central to Haraway's analysis then, is the issue of identity, and specifically, the sorts of subjects and selves produced in and through biomedical discourses. She argues that concepts of identity have clear political implications: any discourses actively engaged in decision-making about what constitutes the identity of an individual or any individuated entity (e.g. cell, atom, body, organism, etc.) are inescapably political because they directly inform the way we understand and inhabit the world. For instance, models of identity and difference, such as those found in biology, bring the world into existence in correspondence with specific philosophical and political investments. Haraway reasons that scientific and biomedical discourses contribute significantly to official and authoritative accounts of identity and difference, most notably in their responsibility for determining the boundaries of the normal and pathological (which is itself a moral and political decision concerning what we can and cannot accept as belonging to the body proper). Identity, then, is a politics. As Haraway herself puts it, 'what counts as a "unit", a one, is highly problematic, not a permanent given, individuality is a strategic defense problem' (1989, 15). Her critique, then, aims to show how self-nonsell theory constitutes a wider discourse of identity and difference.

Haraway is primarily interested in the concepts of subjectivity and collectivity implied by self-nonsell discrimination. From the outset, she is openly opposed to a model of the subject grounded in the immunity – isolation, difference and exteriority – of individuals from one another. For Haraway, the naturalisation of an immune subject suggests an individual only capable of interfacing with others in a predictably defensive or antagonistic way. Furthermore, it implies a correlative notion of social life as an aggregate of individuals. The immune subject evokes a vision of community as a collective of fixed and independent units defined by their separation rather than inherent connectedness. Consequently, Haraway regards self-nonsell discourse as ultimately negative or politically problematic because the interpretation of identity on which it rests implies a model of community or collective life grounded in the detachment of individuals from one another. Quite simply, she takes self-nonsell discrimination, as a discourse of social and political life, to mean fixed

identities engaged in an enduring, adversarial dynamic. Here, opposition and separatism are one and the same. Haraway's critique is thus rooted in a problem with *opposition*. From her perspective, immune system discourse offers a concept of organismic life as opposition – however, not opposition imagined in terms of dialectical movement that produces change, but opposition as an insurmountable or irresolvable difference between two entities that excludes the possibility of change.

To briefly sum up, Haraway's discussion of the operation of immune system discourse centres on the relationship of bodies/subjects to authoritative discourses. Haraway argues that we are discursive effects: the way we perceive and experience ourselves and the world is shaped and determined by immune system discourse. That is, she conceptualises discourse as a framework that we inhabit – an *interiority* whose limits determine our basic existence. However, simultaneously, Haraway's assertion of the political, non-neutral and historically contingent nature of discourse indicates the possibility of a position *outside* this frame. She suggests that despite our discursive encapsulation as subjects, we are nevertheless able to adopt an external position on the very frameworks that determine us. Interestingly, the implication of this paradox is that being critical of discourses is itself a possibility – or indeed, a manifestation – of our discursive enclosure.

The ethics of biomedical discourse

Haraway's analysis is fundamentally concerned with the *ethics* of immunology's representation of the organism. Her critique points to the negative discursive effects of self-nonselves discrimination in order to highlight that it has immediate ethical consequences. Haraway is unequivocal in her position on this discourse: she openly rejects its politically-invested description of biological and human life and hopes for different epistemological frameworks for thinking the immunological body. In other words, she suggests that not only is it *possible* to conceptualise the immune system differently, it is our political and ethical responsibility to do so. Haraway's thesis, which makes visible the contingent, specific and constructed nature of this discourse, *initiates* a practice of contesting the

authority of biomedical discourses. As such, she views her own work as part of a larger process of questioning and managing the politics of biomedical representations.

Haraway urges us to take seriously the nature and degree of responsibility that accompanies any attempt to define the body scientifically. For her, responsibility is a *condition* of the production of scientific truths, or an issue that arises inevitably at the intersection of life (objects of science) and its authoritative description (knowledge). Put simply, Haraway understands the relations of subjects to objects as relations of responsibility. Responsibility for scientific knowledge, in the senses of who assumes responsibility and who can be held accountable (for specific claims, models or representations), is integral to her critique of science. Importantly, the issue of responsibility is tied to the possibility that there may exist many different forms or figurations of scientific knowledge – that is, to the insight that truth is multiple and perspectival, rather than singular and absolute. Responsibility, then, raises some salient questions about existing and alternative interpretations of the immunological body. Why has the immunological body been defined in the restricted terms of immunity? Why does the coherent, properly bordered immune body determine the parameters of immunology's imaginative and investigative capacities? And in what sense might we aspire to different political figurations of the immunological self?

In Haraway's essay, the issue of responsibility is taken up with respect to the *effects* of immunological discourse. Her concern with self-nonself theory as an overtly politicised representation of the body and pathology is articulated in terms of the power relations that are realised through the widespread adoption of this biomedical framework. From the author's perspective, immune system discourse poses an ethical dilemma precisely because it pertains to configurations of power (unequal social and political relations) that Haraway connects with immunology's description of self-other relations. To a large extent, her analysis suggests that self-nonself discourse institutes problematic and undesirable power inequalities through its role in structuring and shaping experiences of body and self. Consequently, Haraway demonstrates her concern with the dominating effects of power.⁵³

⁵³ Haraway's concern with the power of biomedical discourse, and specifically its capacity to produce effects in the individual, is explicitly demonstrated in the opening discussion of her paper. For instance, she refers to 'the power of biomedical language...for shaping the unequal experience of

Haraway's argument regarding the ethical consequences of biomedical representation rests on her demonstration of *how* relations of power are produced, that is, how power operates, or is exercised, through immune system discourse. As such, her understanding of discourse and its function forms a major aspect of this critique. How does Haraway explain the operation of discourse? What frameworks, models and/or intellectual traditions inform the concepts of discourse and power she adopts? How, in this account, does discourse produce material effects?

As outlined earlier, Haraway understands self-nonsell discourse as a logic immanent within the social sphere that exerts force or influence over subjects; it is a discourse that dominates individuals through the prescription of an intellectual framework for making sense of the world. Haraway views self-nonsell theory as a biomedical discourse that holds a constitutive authority over the bodies and/or subjects it describes. She flags the immersive quality of discourse as having distinct political effects: because discourses function by drawing boundaries that guide our understanding and experience of the world, they can be read as imposed structures that render the world intelligible by closing off other avenues of interpretation. For Haraway, discourses direct our perception of organismic and human life through specific knowledge frameworks that are, by their very nature, deeply perspectival or non-neutral.

This notion of discourse as the determining context in which life is lived is evident in the vocabulary Haraway employs to describe power's operation, and in particular, her use of the concept of 'construction'. For instance, she describes her analysis as exploring 'the contending popular and technical languages constructing biomedical, biotechnical bodies and selves in postmodern scientific culture' (1989, 4).

sickness and death', and calls attention to 'the cultural and material authority of biomedicine's production of bodies and selves' (1989, 3-4). These introductory remarks, which contextualise Haraway's critique of immune system discourse, emphasise (and indeed, warn us of) the power relation implicit in scientific knowledge production.

Here, Haraway conveys the idea that language is a productive force that actively shapes bodies in significant ways. At another point, she states:

...one is not born an organism. Organisms are made; they are constructs of a world-changing kind. The constructions of an organism's boundaries, the job of the discourses of immunology, are particularly potent mediators of the experiences of sickness and death for industrial and post-industrial people. (1989, 10)

In this quotation, Haraway affirms the previous point by stating that immune system discourse *mediates* human experiences of organismic life. In suggesting that life and our bodies are only accessible to us through language – that what constitutes an organism is always determined or informed by a specific body of knowledge and mode of thought – Haraway infers the existence of a pre-discursive body. Her adoption of construction as a mediating trope that explains the operation of discourse sometimes evokes a linear causal narrative whereby language is separate from, or somehow, more agentially productive than, the body it describes. However, Haraway's assertion that self-nonsell discourse is *constitutive* of bodies and subjects suggests that we all emerge, in the first instance, *as* organisms: we do not become organisms, rather we are always already organisms. Here, there is some confusion about exactly how Haraway views the delimiting function of discourse (culture) – is it constructive or constitutive? Is there a difference between construction and constitution? Is the implication of 'construction' epistemological or ontological? The idea that discourse is a force that shapes the body from without suggests a reading of discourse as epistemological influence (how knowledge affects our perception of bodies). However, this is quite different from an understanding of the transformative or agentic capacity of discourse as inherent to the body – that is, from the view that discourse (the knowledges, practices and techniques that define a specific milieu) is itself an ontological implication of life.

What are the ontological implications of Haraway's notion of construction? Underlying Haraway's discussion of discursive construction is a suggestion that the agency that constructs specific bodies and subjects is cultural (in origin). While she argues that discourse is materially implicated in the actualisation of bodies/subjects,

one gets the sense that this implication only operates in one direction. Haraway's claim raises the question of whether this problem can be reversed. If, as she asserts, discourses are constitutive of life, does this also mean that the force that constructs specific discourses (such as medical knowledges or military apparatuses) could be construed as biological in origin? If the (cultural) discourses that we live by are utterly implicated in the very nature of our being, then shouldn't it also follow that discourse – the innovative capacity to imagine and realise ourselves differently – be in some sense intrinsic to our being? If the relationship of discourse to life is an ontological entanglement, then surely discourse itself would need to be thought as an expression of this entanglement.

The concept of mediation, which is central to a linear causal reading of construction, is apparent in the metaphors Haraway employs to explain how immune system discourse and life are co-implicated. Previously, I pointed out that Haraway compares the immune system to an 'icon', a 'map', and a 'plan' (1989, 4) for guiding the interpretation of differences. With these metaphors, she refers us to three representations or objects that, in their traditional contexts, serve as functional devices for directing or mediating specific human actions. By drawing an analogous relation between these objects and immune system discourse, she suggests that the latter serves a similar purpose of facilitating a meaningful relation with the world. She argues that the immune system *translates* the unfamiliar (or pre-discursive) into something comprehensible and therefore significant.

Importantly, the examples Haraway calls on (icon, map, plan) convey a sense of instrumentality, and with it, a conventionally causal model of agency. That is, each of these objects correlates with a *designed effect*. In using these tropes, Haraway suggests that immune system discourse has an origin and that it operates purposefully and with a specific orientation. By conflating the immune system with a series of metaphors that imply its active involvement in generating differences (biological, social and political), she infers that this discourse is authored and that these effects are not without *intention*. Significantly, it is with respect to the realisation of these effects that Haraway argues that immune system discourse demonstrates a capacity for agency or power, and more specifically, power conceptualised as unilateral in its

exercise. Here, then, we have a model of power as centralised and stable – immune system discourse shapes its object through its authoritative description.

This conception of power as coherent in its intentions and actions is, however, problematised by Haraway at points where she attempts to explain *how* the immune system emerges as a truth. Her analysis complicates the idea that power is simply exercised through biomedical discourses by raising the question of how discourses produce their effects – how they have scientific or cultural purchase at all. Moreover, it challenges the naive assumption that biomedicine is a unified authoritative discourse that straightforwardly reflects relations of power. In Haraway's work, the question of *how* and *where* this discourse originates is one that destabilises the presumably discrete identity of both the immune system (as an objectively discovered scientific fact belonging to immunology) and power (as a coherent force issuing from one point and acting on another). Is the immune system a biological discourse that originates in scientific research and is *then* adopted at a cultural level? Or is it principally a social logic whose presence within the public imaginary forms the condition of its efficacy and acceptance as a biological principle? Does it make sense to isolate this discourse in one realm of life and then describe its migration into other areas? The currency of immune system discourse across multiple spheres of life suggests that these domains cannot be simply disaggregated.

Crucially, Haraway avoids drawing a causal connection between the two interpretations of immune system discourse her work maps out (biological and socio-cultural) by refusing to describe one as the origin of the other (neither is conceptualised as the other's effect). Instead, her essay sketches a complex, decentralised and entangled picture of power's operation through these discourses. For instance, the idea that self-nonsel discrimination is a framework discovered in a biomedical context is complicated by Haraway's insistence that this theory is an historically situated concept of organismic life correlative with a specific cultural milieu. Here, construction appears to operate in two directions: the scientific discourse arises within a cultural moment that is itself defined by similar configurations of difference. It is as though the two discourses arise simultaneously, affirming and lending support to one another. The immune system is as much a socio-political concept as it is a scientific one and is as applicable to biology as it is to

social and cultural organisation. Consequently, self-nonsel self theory cannot be said to belong more authentically to either science or culture, as the demarcation of these domains is fundamentally at issue in Haraway's attempt to complicate the authorial integrity of scientific knowledge.

In sum, Haraway contests the idea that self-nonsel self discourse is authored by a single body or entity by complicating the identity of its discursive effects within this frame. By extending the parameters of biomedicine to the cultural field as a whole, she does away with the category distinction that secures the perception of science and culture as different, ideologically opposed domains between which there is limited conversation. Emphasising the diversity and heterogeneity of discursive effects, she suggests that immune system discourse is a manifestation of a larger system from which nothing can be logically excluded. Rather than a by-product of various, conflicting cause-and-effect relations, self-nonsel self theory is conceptualised by Haraway as a phenomenon that expresses the extent to which science, culture, knowledge and power form an entangled system.

Although Haraway does not refer specifically or frequently to the work of Michel Foucault, her understanding of discourse and its role in generating relations of power certainly resonates with a Foucaultian model of discourse, power and knowledge.⁵⁴ Haraway's commitment to a more inclusive and extensive vision of power can be seen in her efforts to maintain a view of immune system discourse as both a series of localised effects and events, and a diffuse, immanent social logic. In *The History of Sexuality: The Will to Knowledge* ([1976] 1998), Foucault contests a conventional reading of power as a centralised, prohibitive force, and instead gives an account from the perspective of the whole field of its operation. He suggests that power needs to be properly understood as an all-encompassing, systemic and dispersed phenomenon that can only be grasped in terms of the wider context that produces its conspicuous effects.

⁵⁴ Although Haraway does not cite Foucault directly in the essay, 'The Biopolitics of Postmodern Bodies', she does make reference to his concept of discourse in a footnote: 'Foucault in *Archaeology of Knowledge* defined discourses as "practices that systematically form the objects of which they speak"' (Foucault in Haraway 1989, 40). In the same footnote, she also refers in passing to *The Order of Things* ([1966] 1970). It is also noteworthy that the title of Haraway's essay references 'biopolitics'. However there is no discussion of a Foucaultian notion of biopolitics in the essay itself.

In *The History of Sexuality*, Foucault makes an important conceptual distinction between power as a dynamic system of relations and the effects that these configurations produce. He differentiates between 'the terminal forms power takes' ([1976] 1998, 92) – its outward consequences, and the social context or the day-to-day conditions that facilitate and constitute its exercise. Power as a series of identifiable outcomes and power as a mode of social organisation are two very different things. Foucault writes:

Power's condition of possibility...must not be sought in the primary existence of a central point, in a unique source of sovereignty from which secondary and descendent forms would emanate; it is the moving substrate of force relations which, by virtue of their inequality, constantly engender states of power, but the latter are always local and unstable. ([1976] 1998, 93)

Foucault argues that power is not a centralised phenomenon, located or concentrated in any particular form or structure, such as a subject, body or institution. The perception of power as a hierarchy, and authority as a quality that is rooted in a source, are *instances of power's operation*. According to Foucault, power needs to be understood as a shifting field of relations whose continuous mutation bodies forth new forms of agonism. It refers to the circumstances or arrangements that generate opportunities for different configurations of relations. This, however, does not mean that Foucault regards the outward manifestations of power as false representations of its nature. One gets the sense that there is no essential or prescribed nature to which power adheres.

In order to explain the extent to which power is decentralised and non-locatable, Foucault introduces the concept of a force field. He writes, 'power must be understood in the first instance as a multiplicity of force relations immanent in the sphere in which they operate and which constitute their own organization' ([1976] 1998, 92); quite simply, 'it is the name that one attributes to a complex strategic situation in a particular society' ([1976] 1998, 93). Here, Foucault extends his characterisation of power to the field or sphere of (what one can only assume is)

life.⁵⁵ In contrast to the idea of power as a single, unified force, fixed in its direction and intensity, he imagines it as the dynamic and evolving situation that is constituted by the complex interrelationality of many force relations. Power, then, is not an isolatable vector, but a web of force relations that produce these individuated effects. It is the ordering or organising of the social body into configurations that are generative of further relations of power. As such, Foucault interprets power as the context of human life, or the antagonisms that define and constitute the social field.

Foucault's notion of power as a phenomenon of the field problematises a conventional reading of agency and intention. His perception of agency as diffuse and non-subjective challenges the basic assumption that it *belongs* to a subject or entity whose intentions it makes evident. For Foucault, agency is something that arises in relation and as such is a condition of collectivity. Crucially, it is not a force that originates with a self-present, isolated subject whose motivations and proclivities are somehow transparently or uniformly given. Life is collective, and it is precisely the entanglement of subjects within this scene of relationality that secures the impossibility of a singularly authored action or intention. As Foucault explains, 'there is no power that is exercised without a series of aims and objectives. But this does not mean that it results from the choice or decision of an individual subject' ([1976] 1998, 95). Agency must be understood as belonging to the context of relations generative of these unique expressions, which includes the appearance (and fact) that subjects own and author their actions.

Importantly, Foucault's work offers a theory of power's operation that contests the orthodox reading of power as domination, and thus with it, the idea of a self-determining subject who owns, administers and is responsible for this authority. Within this frame, agency, intentionality and subjectivity are specific individuations of a system that, at a fundamental level, resists being disaggregated into discrete units (coherent authors) and causal processes (origins). This conceptual structure is useful for Haraway because it allows her, firstly, to argue that biomedicine and biomedical

⁵⁵ This notion of power as immanent within the social sphere – as the field or form of social organisation – is elaborated more explicitly by Foucault in the concept of biopower, and the two primary forms it takes: the disciplines and the regulatory controls associated with biopolitics. Foucault argues that power, in the modern period, shapes human life into two distinct forms, the individual and population. The concepts of biopower, biopolitics and disciplinary power are discussed at length in Chapter Four.

language occupy an authoritative position with respect to individuals, and secondly, to insist that this authority is a dispersed effect of intersecting social, cultural, political and economic systems (not a centralised force). She writes:

The power of biomedical language – with its stunning artefacts, images, architectures, social forms and technologies – for shaping the unequal experience of sickness and death for millions is a social fact deriving from ongoing heterogeneous social processes. The power of biomedicine and biotechnology is constantly re-produced, or it would cease. This power is not a thing fixed and permanent...[it] is more vulnerable, more dynamic, more elusive, and more powerful than that. (1989, 3-4)

The adoption of a Foucaultian perspective enables Haraway to present an account of power that recognises its oppressive consequences (validating individual experiences of the effects of immunological discourse) whilst also interpreting these effects as symptoms of a larger cultural economy (an encompassing social system). Consequently, by drawing on this theoretical perspective, Haraway's analysis complicates the conventional divisions between biomedicine, biomedical language and the social field.

Construction: how bodies are made

Haraway's understanding of the immune body as an historical and cultural artefact is based in the view that bodies are *produced* rather than given. She argues principally for a concept of bodies and biology as contextually emergent and particular. Haraway rejects the notion that immunity is a discovered, universal truth of the organism, and instead insists it is an interpretation of biological function consistent with the conceptual frame and politics of self-nonsel self discrimination.

Yet, this interpretation of discourse is at odds with Haraway's description of the immune system as an 'icon', 'map' and 'plan' that mediates understandings of identity and difference (1989, 4). As discussed earlier, there are points in her critique that evoke a conventional causal constructionism to explain how discourse produces

its effects. Thus, there are two very different notions of discourse operative in Haraway's analysis. On the one hand, she reads discourse as epistemological, in the sense that its capacity to shape and influence the body is guaranteed by its exteriority to its object. On the other hand, she suggests that discourse is ontologically implicated in the bodies it materialises. Here, discourse is constitutive of its object and as such, is not distinct from it.

Haraway's concept of bodies as complex expressions of their cultural contexts raises the issue of *how* bodies are discursively produced: it requires her to explain how the discourse of self-nonsel discrimination generates correlative figurations of biology. Unpacking Haraway's account of how immune bodies are constructed draws attention to the difficulties that arise in trying to articulate this process. The very act of describing construction evokes a distinction between bodies and discourse (matter and meaning) that the concept of construction is itself intended to complicate, or render inherently problematic. What, exactly, does Haraway mean by construction? To what processes or phenomena does the term refer?

At the time of Haraway's writing, 'construction' was being taken up vigorously by social and cultural theorists as a means of explaining how different discourses produce their effects.⁵⁶ This term was adopted widely by studies that

⁵⁶ The concept of social or cultural constructionism is one found in a wide range of disciplines in the humanities and social sciences, including sociology, cultural studies, gender studies and science and technology studies. Across these different fields, it has been interpreted in numerous ways and applied to the analysis of a broad range of topics.

In a general sense, social constructionism is a conceptual tool used to question or problematise aspects of our reality that are taken-for-granted, for instance, the norms, values, categories and institutions that govern the sphere of our lived experience. Importantly, social constructionism is usually offered as a counterpoint to essentialist positions, which maintain a view of these phenomena as fixed and determined. It is a viewpoint that actively interrogates the idea that certain phenomena (such as normative concepts of gender and sexuality) are naturally given, or given in nature, by arguing that they are the products of social forces and processes – they are generated by the actions of individuals, over time, within a shared social space. Rather than assuming that the discourses that structure life are naturally determined, social constructionism suggests that the very notion of what is natural or self-evident is itself culturally determined, and thus contextually and historically specific. As Zoë Sofoulis explains, social constructionism demonstrates that 'categories of gender, race and class, and their associated social and economic functions, [are] not essential or natural, but...products of historical and material arrangements of power/knowledge formations' (2009, 81).

In critiquing the ideas and categories that have become naturalised through ingrained social processes and frameworks, social constructionist arguments uncover the ways in which individuals participate in the construction of their own reality. They show that the agency that gives rise to these phenomena is social and cultural in origin. Crucially, the idea that we are the agents responsible for social norms and structures implies that we also have the agency to change them. In this sense, social constructionism is

sought to account for the role of discourses in shaping social life through the production and maintenance of significant forms of difference, such as gender, sexuality and race. These kinds of critiques used construction to explain how these categories of difference were embodied, circulated and implicitly reaffirmed through social and cultural processes. The issue of construction's operation, however, is amplified in discursive analyses of medical knowledge, where there is an imperative to demonstrate that the structuring or constitutive effects of discourse extend to the individual's body and physiology. In fields such as the sociology of health and illness and the medical humanities, construction is used as a conceptual tool to describe the ways in which bodies are affected, infected or inhabited by socio-cultural factors and environments.⁵⁷ Although these accounts insist on the presence of discourse in the body's interior, they often do so by evoking a causal relation that sees discourse as agential, operating *on* bodies. Despite this recourse to a simple model of causation, construction is a concept that nevertheless refers to the problematic of how language, rhetoric and culture relate to, or are generative of, material reality, and consequently, it has been employed as a way of managing and/or overcoming, ontological divisions between the biological and the social, material and linguistic.

The broad appeal of construction as an analytical strategy arguably lies with the fact that it bridges the inexplicable gap between nature (matter) and culture (meaning). It functions effectively as an explanation of the implicated relation of bodies and knowledges encapsulated in the concept of discourse. In other words, it

valued for its political potential in overturning assumptions that perpetuate certain relations or structures within society.

For a general discussion of social construction, see Hacking (1999) and Weinberg (2009). For a sociological account of the social construction of reality, see Berger & Luckmann (1981). For a critical discussion of the social construction of scientific facts see Latour & Woolgar (1986). For literature on the social construction of medicine, see Wright & Treacher (1982) and Bury (1986). For specific examples of the social construction of illness, see Orr (2006) and Davis (2008). For a range of examples of the contexts in which social construction is employed, see Gerger & Gerger (2003).

⁵⁷ The literature on the social construction of medicine, and specifically, how bodies and illnesses are constituted through medical discourses (medical technologies, apparatuses, practices and institutions) is vast. Concerns within this area include a general interest in the social, cultural, political and historical processes that contribute to the emergence of medical or scientific knowledge (e.g. Fleck [1935] 1979, Kuhn [1962] 1996); the relations of power implicit in the operation of medical knowledge and the medical gaze (e.g. Foucault [1963] 1976, Armstrong 1983, Lupton 2003, Brown & Webster 2004); how patients experience and embody illness and negotiate medical knowledge and diagnoses (e.g. Parsons 1951, Armstrong 1989, Frank 1995, Epstein 1995, Novas & Rose 2000, Lupton 2003, Cohen 2004 and 2008); and critical analyses of specific examples of illnesses and medical technologies that render the distinctions between medicine and culture, the biological and the social, deeply problematic (e.g. Keane & Rosengarten 2002, Keane 1999, Waldby 2000, Waldby & Mitchell 2006, Wilson 2004b and 2008, Metzl 2003 and 2010).

connects spheres normally regarded as ontologically discrete, or more accurately, it indicates the impossibility of disentangling these domains. For this reason, construction is often used to refer to the interrelationality of matter and meaning, and has become a shorthand way of citing the infection that characterises body/world or body/culture relations from a Foucaultian perspective. Yet, somewhat problematically, this device has been overused as a self-evident representation of the matter/meaning puzzle, such that the term itself has, in many instances, come to signify a somewhat superficial engagement with this entanglement. In some cases, its usage is a way of evading a detailed examination of *how* discourse functions to produce the phenomena being studied.⁵⁸

Haraway is conscious of the theoretical problems that attend the use of construction in explaining how immune bodies arise. Specifically, she is wary of evoking a conventionally causal constructionist narrative and with it, a fundamental division between nature and culture. Amongst social constructionist perspectives on the body it is common for construction to be imagined in terms of a cause and effect relation between language and the body, where the former operates upon the latter through systemically entrenched processes of encasement, description and articulation.

Haraway finds this interpretation of construction problematic because it privileges one sphere as active and transformative (culture) over another, perceived as passive and receptive (nature). Underpinning this model is an assumption that matter does not participate in processes of signification: it is conceptualised as illiterate, inanimate and illegible.⁵⁹ By neglecting to address *how* matter might be involved in,

⁵⁸ The pervasive deployment of 'construction' as an analytic device that explains how bodies and subjects are constituted through social and cultural processes has been critiqued by a number of material feminists whose work interrogates the entanglement of matter and meaning. Barad (2007), Kirby (2008) and Wilson (1999, 2004, 2008) have each critically engaged the question of *how* discourses produce their effects, that is, how languages, representations and ideas that are contextually specific and contingent are constitutive of material life. For instance, Kirby asks: 'how do constructionist arguments that concentrate their critical energies on cultural representation explain science's efficacy?...if all we are ever dealing with are the signs of reality and not reality itself, then why do signs and second-order models of reality have any pragmatic purchase whatsoever?' (2008, 7). As these theorists explain, the central issue that conventionally linear, cultural constructionist arguments overlook is the precise nature of the relation between matter and meaning – the division itself – such that one could manifest as an effect in the other.

⁵⁹ The issue of matter's absence from feminist, cultural constructionists accounts of the body has been examined by Elizabeth Wilson. Wilson is critical of the refusal of biological detail evident in many

complicit with or receptive to its own cultural production, and indeed, how cultural production might be intrinsic to matter's nature (what is the frame of reference here?), these arguments effectively strip the body or biology of agency and reduce it to a site of cultural inscription.⁶⁰ This presents an obvious problem for Haraway, who argues that any model failing to acknowledge the active presence or input of materiality – to complicate the frame of reference or scene of the body – essentially negates half the equation. Here, the replacement of biological reductionism with a form of cultural or discursive reductionism simply rehearses the original dilemma of how to account for the truth of the body without recourse to a fixed referent, be it nature *or* culture. Thus, the central problem is a tendency to privilege one of these spheres as the most appropriate or truthful frame of reference.

Haraway's aversion to causal constructionist arguments is outlined in 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective' (1988), an essay which discusses the status of objects (their conceptualisation and utilisation) in the production of objective knowledge. In this paper, Haraway argues that in the same way a certain branch of social construction interprets matter as subordinate to the determining forces of culture, objective knowledge relies on the appropriation of objects that are denied 'any status as agent' (1988, 592). Objectivity, which detaches object from subject (nature from culture, body from mind) and organises them hierarchically, treats the object as a resource – a relation which 'guarantees and refreshes the power of the knower' (1988, 592). Haraway emphasises that the characterisation of matter as passive and immutable that underpins cultural reductionism similarly underpins biological reductionism: 'It – the world – must...be objectified as a thing, not as an agent; it must be matter for the self-formation of the only social being in the productions of knowledge, the human knower' (1988, 592). In this sense, objectivity describes a power inequality between objects and subjects, and this political disparity forms the foundation of scientific knowledge. Elaborating this point, Haraway writes, 'accounts of [scientific] objects

feminist analyses of corporeality and embodiment, and argues that this omission reduces biology to a passive material substrate that does not participate in the production of bodies and bodily phenomena that are culturally and historically constituted. For a detailed account of this argument see Wilson (1999, 2004a). For a fascinating account of matter as literate, see Kirby (1997). For an overview of corporeal feminism and debates about the ontological status of biology and the matter/meaning distinction in recent feminist thought, see Keane & Rosengarten (2002).

⁶⁰ For a discussion of these issues, see Kirby (2008).

can seem to be either appropriations of a fixed and determined world reduced to a resource for instrumentalist projects of destructive Western societies, or they can be seen as masks for interests, usually dominating interests' (1988, 591). Here, she asserts that the use of objects in creating objective knowledge comes with dominating, colonial intentions. For Haraway, conventional social constructionist arguments are fraught with the same issues as a model of science that engages a passive world in a relation of mastery.

The model of construction Haraway adopts is intimately tied to the political critique of objectivity presented in 'Situated Knowledges'. Her understanding of how immune bodies are generated is informed by a larger debate concerning the ethics of scientific knowledge production, in which she proposes an alternative model for engaging with the world that overcomes or circumvents the need for mastery (of Nature) as the foundation for knowledge claims. In an attempt to retrieve matter from a position of passivity in processes of knowledge production, Haraway suggests the concept of 'objects as actors' (1988, 591). She reconceives the masterful relation of objectivity, that requires the mute compliance of the object, as a 'noninnocent conversation' (1988, 594) in which a variety of different actors demonstrate agency. This political re-figuration of the subject-object dichotomy is fundamental to her concept of construction, which attempts to do away with the idea that the body is simply authored by culture and that matter is static but open to being signified differently. In both 'Situated Knowledges' and 'The Biopolitics of Postmodern Bodies', Haraway insists that we need an account of how materiality *participates* in processes of signification – how it is always already involved in the production of its own legibility.

The apparatus of bodily production

For Haraway, the plausibility of construction as a tool for making sense of the division between matter and meaning rests on an acknowledgement of the agency of

both matter and meaning in the production of bodies.⁶¹ As such, she employs a model of construction that allows her to define the body as an agent within the context of its discursive production. She states:

In this overdetermined context, I will ironically – and inescapably – invoke a constructionist concept as an analytic device to pursue an understanding of what kinds of units, selves, and individuals inhabit the universe structured by immune system discourse: I call the conceptual tool “the apparatus of bodily production”. (1989, 10)

The apparatus of bodily production is a constructivist concept directly appropriated from the work of Katie King (one of Haraway’s students) that explains how meaning in literature is generated. Haraway writes:

King suggests the term ‘the apparatus of literary production’ to highlight the emergence of what is embodied as literature at the intersection of art, business, and technology. She applies this analytic frame to the relation of women and writing technologies. I would like to adapt her work to the articulation of bodies and other objects of value in scientific productions of knowledge. (1989, 10-11)

King’s conceptual framework appeals to Haraway because it takes a deeply contextual view of its object – literature. According to King, literature is a phenomenon that emerges at the intersection of a larger set of circumstances; like any other object, it stems from, and is entrenched within, a specific environment. For King, *meaning* in literature is generated by a field of intersecting factors: it is not a quality contained within language, nor can it be understood as something intended by an author and transmitted through a piece of writing. King asserts that meaning in literature derives from its *situatedness* within a matrix of social, cultural, political, economic and historical forces. Furthermore, literary meaning is complicated by the fact that literature is realised through language, which always signifies in excess of an

⁶¹ Haraway’s interest in the nature/culture question – particularly with reference to narratives of colonialism – also fits into feminist debates concerning the equation of the feminine with the body and nature. Although Haraway does not discuss this connection explicitly, her active engagement with this distinction speaks of her familiarity with these issues.

author's intention. King argues that the actualisation of literature through the pluri-potentiality of language demonstrates that language is a factor that *exceeds the writer's control*. Consequently, language is not simply a resource for the author who shapes it into a meaningful form – it is 'an actor independent of intentions and authors' (Haraway 1988, 595) that is always *active in the production of meaning*.

King's theory provides two major ideas that Haraway uses in conceptualising the actualisation of particular biological bodies. The first of these is King's view of meaning as a contextually embedded phenomenon. As detailed earlier, Haraway insists on an understanding of the body as historically and culturally specific. Throughout her analysis, she is adamant that the body discovered by science is a political and cultural object indicative of a wider social ecology. In making these claims, Haraway's concept of bodies parallels King's interpretation of poems as objects. The second of King's insights is the notion of 'objects as actors' evident in her discussion of language as an actor whose involvement in the production of meaning disrupts any simple reading of authorial integrity. The agency of objects is a particularly important aspect of Haraway's analysis and arguably forms the theoretical foundation of her interpretation of discursive construction. Indeed, it is this concept that allows her to argue for a view of scientific objects (e.g. bodies) as *participants* in knowledge production. Recognition of the agency of objects is fundamental to Haraway's insistence on the inseparability of matter and meaning in processes of signifying and articulating bodies.

Curiously, in elaborating her own intellectual debt to King, Haraway does not draw on King's insights about the diffuse, contextual nature of authorship. Although she cites the aforementioned ideas as King's, they also resonate clearly with some of the central insights of actor network theory (ANT), and specifically, the early work of Bruno Latour, with which Haraway is undoubtedly familiar. Despite the fact that references to ANT and Latour are sparse in Haraway's two essays,⁶² when specifically questioned about her use of the concept of 'objects as agents' in an

⁶² One reference to Latour and actor network theory can be found in a footnote in 'Situated Knowledges', where Haraway includes Latour amongst recent constructionist arguments about science (1988, 596).

interview with Constance Penley and Andrew Ross (1990), Haraway responds frankly about her relation to this work:

...I'm most influenced by Bruno Latour's actor-network theory which argues that in a sociological account of science all sorts of things are actors, only some of which are human language-bearing actors, and that you have to include, as sociological actors, all kinds of heterogeneous entities. (1990, 9)

Haraway's reading of immune system discourse depends heavily on some of the central tenets of actor network theory, in particular, the idea that objects have agency. Moreover, it draws specifically on the notions of object, subject, agency and the social, developed in detail by the major proponents of ANT. In order to get a better sense of how Haraway's work is informed by the conceptual framework of ANT, I will briefly outline its major theoretical contributions.

Established in France in the 1980s, actor network theory refers to a branch of sociology that emerged originally from social studies of science and technology. Developed primarily by Bruno Latour, Michel Callon and John Law, ANT offers a method of sociological analysis and a schematic definition of the social that, at the time, marked a significant departure from conventional sociological perspectives. Perhaps the most important theoretical contribution of ANT is its conceptualisation of non-human entities as social agents. Observing that objects play as much a part in bringing about social phenomena as their human counterparts, actor network theorists argue that agency is demonstrated as much by objects as the subjects for whom this characteristic is typically reserved. In contesting a conventional human-centred interpretation of agency, these thinkers insist that agency is a quality or force diffused within, or which arises from, a social field composed of human *and* non-human actors. Agency is perceived as *distributed* amongst different kinds of social entities, known as actants.

In an article from 1992 that consolidates early accounts of ANT, John Law outlines some of the foundational concepts of this field. He explains:

...[ANT] does not celebrate the idea that there is a difference in kind between people on the one hand, and objects on the other. It denies that people are *necessarily* special. Indeed, it raises a basic question about what we *mean* when we talk of people. (1992, 383, original emphasis)

ANT challenges the assumption that the human is the locus of the social. By asserting that all objects and subjects within the social field are in fact social participants, ANT reconceives the basis and structure of the social. Rather than attributing the emergence or existence of social phenomena to the actions of individuals or groups, actor-network theorists trace how the collective agency of objects and subjects, arising from their heterogeneous organisation, causes these specific manifestations. In this sense, ANT approaches social phenomena systemically, or from the point of view of the field. There are thus some striking similarities between ANT's account of the emergence of social phenomena and Foucault's understanding of power as an animate field that manifests in evolving forms. In the same way that ANT understands social phenomena as the peculiar expressions ('punctualisations') of complex networks of actors, Foucault conceptualises these as power's effects – individuations of a larger entangled system.

ANT is quite specific in its choice of metaphors for visualising the organisation of the social. Broadly speaking, actor network theorists conceptualise society in terms of a system constituted by a concatenation of linked, but independent, actors. ANT imagines society as ordered networks of heterogeneous entities or actors: it argues that social phenomena are produced when objects or 'actants' join together to form meaning-generating configurations called 'networks'.⁶³ Law explains that the actants that make up networks are diverse: 'networks are composed not only of people, but also of machines, animals, texts, money, architectures – any material that you care to mention' (1992, 381). As such, networks can refer to situations, events or circumstances in which unique arrangements of elements cause different phenomena to occur (such as new technologies, industries and institutions).

⁶³ A good example of this can be found in *Science in Action* (1987), where Latour examines the phenomenon of scientific knowledge as a product of collective, social processes. Adopting an extreme social constructionist position, he analyses every stage of scientific knowledge production as a deeply contextualised event. Focusing on 'science in the making' (1987, 15), Latour's work complicates the purity of scientific discoveries by demonstrating the social, cultural, political and economic networks that contribute to the production of scientific authority.

Within the framework of ANT, social phenomena are interpreted as network effects. As Law writes, ‘the metaphor of the heterogeneous network...is a way of suggesting that society, organizations, agents, and machines are all *effects* generated in patterned networks of diverse (not simply human) materials’ (1992, 380, original emphasis). The notion that social phenomena are products of networks speaks to the underlying purpose of ANT. As a critical position, its central aim is to elucidate the ‘mechanisms of power and organization’ (1992, 380) that structure society in particular ways. ANT accounts for how certain social formations, such as governments and institutional structures, come into being by revealing patterns of organisation. It is a tool used to trace the webbed associations that cause phenomena (which are contingent on a network of actants) to emerge as coherent, solid and stable.

ANT’s account of the ontology of the social culminates in the concept of the ‘actor-network’. A fundamental principle of ANT is the idea that all actors are also networks, meaning that every actor can be unpacked to expose a heterogeneous network of components, factors, subjects, etc. (1992, 384). For instance, an institution can be defined as an actor operating within networks of other actors, and producing a variety of effects. However, it is also itself an effect of different networks, and its identity as an institution hinges on the maintenance of these relations. In this sense, every actor evidences the principle of the actor-network: externally, it is joined to other actors in the formation of various networks, and internally, it mirrors these associations as it itself is an assemblage of micro-aggregates.

The concept of the actor-network has important implications for the way agency is conceptualised, as it takes account of the social both as a system (network) *and* its basic unit (the actor). From this viewpoint, the social is not something that is straightforwardly composed of individuated elements that themselves ‘possess’ agency. Rather, the agency that any actor demonstrates is the effect of a whole network. As such, the identity of any one actor is the agency that it expresses as a network. If we take this concept to its logical conclusion, then there is nothing in the system of the social that is without agency, or more accurately, the system itself is

nothing but a field of agency. Here, agency and network are synonymous concepts. Agency is not something that belongs to or is transmitted by a single actor because the actor-network inherently contests the idea of a discrete actor.⁶⁴

The material-semiotic actor

As argued so far, the concept of objects as actors, which Haraway borrows from Katie King, and inadvertently, from actor network theory, allows her to put forward a model of construction that insists on the active participation of matter, as well as culture, in the production of immune bodies. It is an idea central to her critique of scientific objectivity and her attempt to develop a feminist objectivity that insists on ethics in scientific knowledge production. The notion that objects are social actors, which significantly problematises the origin of immune system discourse (it does not properly belong to either nature or culture), is suggested in Haraway's definition of the object – the body – as a 'material-semiotic actor'. She explains:

“Material-semiotic actor” is intended to highlight the object of knowledge as an active part of the apparatus of bodily production, without *ever* implying the immediate presence of such objects or, what is the same thing, their final or unique determination of what can count as objective knowledge of a biological body at a particular historical juncture. (1989, 11, original emphasis)

Haraway describes the material-semiotic actor as a mode of conceptualising the object of knowledge that does not imply its immediate presence. It offers a theorisation of the object as never finally determined, but always actively engaged in a process of

⁶⁴ Here, there are obvious resonances between ANT and Foucault's work. As an approach to the analysis of power, ANT is certainly indebted to a Foucaultian perspective. For instance, in his essay 'The powers of association', Latour draws heavily on a Foucaultian notion of power: 'when an actor simply *has* power nothing happens and s/he is powerless; when, on the other hand, an actor *exerts* power it is others who perform the action... Power is not something you may possess and hoard' (1986, 264-265, original emphasis). Latour describes his work as 'an expansion of Foucault's notion [of a diffusion of micro-powers] to the many techniques employed in machines and the hard sciences' (1986, 279). However, other actor network theorists also make a conscious effort to differentiate their work from that of Foucault. Law comments, 'actor-network theory is all about power – power as a (concealed or misrepresented) *effect*, rather than power as a set of causes. Here it is close to Foucault (1979), but it is not simply Foucaultian for, eschewing the synchronic, it tells empirical stories about processes of translation' (1992, 387, original emphasis).

being determined. In this sense, she uses the material-semiotic actor to argue for a view of the object as already enmeshed in processes of meaning production, or to account for matter in terms of its actualisation through culture. Curiously, Haraway does not detail the nature of this determination or actualisation. Rather, the characterisation of this actor as material-semiotic allows her to maintain a sense of the object's ambiguity as neither solely material nor semiotic.

Interestingly, the term material-semiotic is a hybridised one that implies a *conjunction* of matter and meaning. Taken literally, it evokes a causal relation between discrete domains or aspects of the object's being. However, the context in which it is presented suggests that Haraway uses this concept to convey a sense of the object as already thoroughly semiotic, or never pre-discursive. For instance, she writes:

Like King's objects called "poems", sites of literary production where language is also an actor, bodies as objects of knowledge are material-semiotic generative nodes. Their boundaries materialize in social interaction; "objects" like bodies do not pre-exist as such. (1989, 12)

In citing King, Haraway states that language is *also* an actor – that is, an actor *in addition* to the author, that contributes to the production of a poem's meaning. Here, one gets the sense that there are two separate agents, the author and language, whose conversation or interaction gives rise to the meaning of the poem. In drawing an analogy between poems and bodies, Haraway states that the body or object's boundaries emerge *in* social interaction. Rather than suggesting that a number of actors (material *and* semiotic) come together to produce the body as meaningful, she argues that the object is a *processual* phenomenon – in no way does it pre-exist the process of its discursive articulation or manifestation.⁶⁵

⁶⁵ The concept of the material-semiotic actor appears in a number of Haraway's early essays including 'The Biopolitics of Postmodern Bodies' (1989), 'Situated Knowledges' (1988) and 'The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others' (1992). In these papers, the concept is discussed very briefly and in each instance, the same explanation offered (namely, that outlined above). The phrase 'material-semiotic' appears a number of times in Haraway's later work, *Modest_Witness@Second_Millennium.FemaleMan@_Meets_OncoMouse™* (1997) as an adjective to describe apparatuses, bodies, practices, fields, worlds; however, further explanation of the concept is not offered. Interestingly, the notion of the 'material-semiotic' actor and material-semiotics, as a style

Consequently, the material-semiotic actor is an analytic device that Haraway uses to unsettle the presumption of a stable, causal or mechanistic account of the relation of objects to processes of signification. It is a concept of the object as always already semiotic that exemplifies her systemic account of immune system discourse. Moreover, it is a tool that draws on key ideas from ANT to think self-nonsell discourse in systemic or Foucaultian terms – as an historically specific figuration of life emergent from the field. According to this account, immune system discourse is a diffuse social phenomenon whose conception cannot be definitively or finally traced to individual points or actors because it is authored by the field.

Situated Knowledges: Haraway's feminist critique of objectivity

Haraway's argument concerning the materiality of self-nonsell discourse (its instantiation at the level of body and biology) rests on the persuasiveness with which the material-semiotic actor acts as an explanation (or mechanism) of the construction of immune bodies. Her assertion that biology is always already materially engaged in a process of meaningful becoming hinges on her appeal to the agency of objects. Yet nowhere in 'The Biopolitics of Postmodern Bodies' does Haraway explicitly state *how* objects have agency and participate in knowledge production. Rather, the material-semiotic actor appears first in her essay 'Situated Knowledges' where it functions as a major component of a larger argument concerning ethics and politics in scientific knowledge production. In this paper, the material-semiotic actor is a concept of 'objecthood' that Haraway uses to equalise the status of objects and subjects in events of knowledge production. That is, the act of recognising the agency of objects allows her to refigure the subject/object dichotomy as a fundamentally *non-hierarchical* relation. For Haraway, this reading of objects is a strategy that disrupts and subverts the conventional structural logic of universal truth claims, and consequently, is an essential aspect of her proposal for a feminist objectivity.

of work, is also taken up in actor network theory. For a discussion of the relationship between ANT and material semiotics, see Law (2009).

Given the history of this concept within Haraway's work, her account of the material life of immune system discourse needs to be situated both politically and theoretically in terms of her critique of objectivity and its call for responsibility for knowledge. Crucially, 'Situated Knowledges' establishes the ethical-political framework for interrogating scientific discourses that informs, and indeed *motivates*, her analysis of immunology's conceptual vocabulary. The idea of objects as actors relates not only to the *content* of the latter critique (a systemic account of immune system discourse), but also to the *form* that this argument takes. Reading these essays side by side provides the intellectual background to her investigation of self-nonself theory, and explains why it assumes the form of a contestation.

'Situated Knowledges' presents a feminist reading of science that exposes the gendered politics implicit in the classical conception of scientific knowledge as objective universal truth. Contesting the orthodox view of science as a masterful relation between a knowing subject (Culture) and a passive object (Nature), Haraway argues that this model rests on a series of assumptions about the autonomy of the observer from its object. Haraway takes issue with the perception of objective knowledge as impartial, disembodied, ahistorical and apolitical. For her, scientific discourses cannot exist separately from social, cultural and political discourses. The notion that scientific work can be detached from its contexts – or that it remains essentially untouched or uncontaminated by the identities of its investigators – presumes that scientific claims are immune to the specific circumstances from which they emerge. Haraway argues that this model of knowledge is one that infers the existence of an observer who is free of any (compromising) connection to the world he investigates.⁶⁶

Focusing on vision as a metaphor of knowing, Haraway argues that objectivity masquerades as 'infinite vision' (1988, 582), or what she terms 'the god trick of seeing everything from nowhere' (1988, 581). It is a form of vision imbued with relations of power: 'vision is *always* a question of the power to see – and perhaps of the violence implicit in all visualising practices' (1988, 585, original emphasis). In opposition to the presumed omnipresence of this view, Haraway's analysis refers us

⁶⁶ In 'Situated Knowledges', the subject is always referred to as male. See Haraway (1988, 581).

to 'the embodied nature of all vision' (1988, 581). She asserts that historically, this sensory system 'has been used to signify a leap out of the marked body and into a conquering gaze from nowhere' (1988, 581) – a gaze which, representing others while escaping representation itself, 'signifies the unmarked positions of Man and White' (1988, 581). In other words, far from overcoming the contingencies and limits of specific subject positions, objectivity speaks of an historically-locatable identity. Here, Haraway's critique reveals the paradox of objectivity – its foundation in a 'particular and specific embodiment' (1988, 582). Emphasising the *situatedness* of objective vision, she demonstrates that the primary characteristics of objectivity, namely its claims to transcendence and universality, rest on a disavowal of the situated, located and partial subjects in which knowledge is anchored.⁶⁷

According to Haraway, the assumed universality of objective knowledge – the idea that it is fundamentally identical from all viewpoints – forms the foundation of an *irresponsible* engagement with the world. She asserts that if truths are divorced from the situated observers involved in their production, then no one can be held answerable or accountable for the knowledge that organises life. That is, if we maintain an understanding of scientific knowledge as universal, in the sense of being unauthored or given in Nature, then we effectively relinquish our capacity to question and challenge the ways in which these truths 'make claims on us' (1988, 593). As Haraway explains, 'Situated Knowledges' argues 'against various forms of unlocatable, and so irresponsible, knowledge claims', where 'irresponsible means unable to be called to account' (1988, 583). Put precisely, her work draws attention to how a general investment in an invisible and unlocatable observer quarantines responsibility and accountability from the work of science.

'Situated Knowledges' grapples with the contradiction that the ideas of objective truth (Truth) and responsibility for knowledge (contestability of truths) present. She writes, 'I think my problem and 'our' problem is how to have

⁶⁷ The notion that scientific knowledge is situated is not unique to Haraway's analysis. In the paper's acknowledgements, Haraway explains that 'Situated Knowledges' 'originated as a commentary on Sandra Harding's *The Science Question in Feminism*' (1988, 596). Moreover, in a footnote, she positions her feminist critique of objective knowledge amongst the contributions of scholars in social and feminist studies of science and technology, including Harding's *The Science Question in Feminism* (1986), Keller's *Reflections on Gender and Science* (1984), Nancy Hartsock's 'The Feminist Standpoint: Developing the Ground for a Specifically Feminist Historical Materialism' (1983).

simultaneously an account of the radical historical contingency for all knowledge claims and knowing subjects...*and* a no-nonsense commitment to faithful accounts of a ‘real’ world’ (1988, 579, original emphasis). In this quotation, Haraway demonstrates her commitment to two apparently irreconcilable aims: objectivity and ethics. She argues that it is just as important to have objective and authoritative accounts of the world, as it is to retain an understanding that these discourses are fundamentally contestable and thus that knowledge is always a political project (1988, 591-592). As such, her discussion raises a series of questions about the nature of scientific knowledge and our relationship to it. Is it possible to have an ethically-oriented objectivity? Are we in a position to manage, in a political sense, the discourses that describe (and prescribe) us? Or rather, in what ways might the contestability of truth alter our relationship to it, and its purchase on us? In short, how do ‘we’ figure in knowledge projects?⁶⁸

‘Situated Knowledges’ responds directly to these issues by proposing a feminist model of objectivity that embraces situatedness and partiality as the necessary conditions of scientific knowledge production. Rather than imagining these characteristics as compromising the validity and facticity of objective truths, Haraway insists that they are contingencies basic to all knowledge projects. She suggests an ‘embodied objectivity’ (1988, 581) built on the principles renounced by orthodox accounts – that is, an objectivity that underscores the inherently perspectival nature of knowledge production (knowing as en-visioning). According to Haraway, situated knowledges ‘initiates, rather than closes off, the problem of responsibility for the generativity of all vision practices’ (1988, 582-583) as it recognises the contextually entrenched, and therefore multiple, nature of truth. Emphasising the principles of ‘partial connection’, ‘limited location’ and ‘ways of seeing’ (1988, 586; 583; 585) over the traditional values of distance, neutrality and universality, the idea of situated knowledges is offered as a more ethical version of objectivity because it emphasises the extent to which subjects are implicated with/in the knowledge they produce. As Haraway sees it, scientific facts are not something that privileged human investigators

⁶⁸ These questions concerning the ontological status of knowledge, inquiry and the human investigator are explored in detail by Karen Barad, whose work grapples with the ontology of specific concepts and experiments in quantum physics. In *Meeting the Universe Halfway* (2007), Barad critically interrogates the distinctions between epistemology and ontology, observer and observed, subject and object, matter and meaning, through empirical examples. Importantly, Barad’s attempt to give an account of the ontology of knowing inevitably raises the issue of ethics or responsibility.

naively discover – they are claims that *specifically located subjects (must) take responsibility for in discovering*.

Responsibility for knowledge: refiguring the subject/object dichotomy

As stated earlier, ‘Situated Knowledges’ reconceptualises the subject/object relation in terms of ‘conversation’ and ‘fidelity’ (1988, 594). Moving away from ‘domination’ and the active/passive split it implies, Haraway offers a model of knowledge that imagines this dichotomy in more egalitarian terms. ‘Situated Knowledges’ insists that both subjects *and* objects are active components of knowledge production and as such, knowledge is not simply a human-centred event. She writes:

A corollary of the insistence that ethics and politics covertly or overtly provide the bases for objectivity in the sciences as a heterogeneous whole...is granting the status of agent/actor to the “objects” of the world... Accounts of a “real” world do not, then, depend on a logic of “discovery” but on a power-charged social relation of “conversation”. (1988, 593)

Haraway argues that in order to have forms of objective knowledge that are *not* organised around the privileged activity of human subjects, it is essential that we recognise the agency of objects and their role as social participants. Developing situated knowledges – that is, responsible accounts of the world – involves rethinking the status of the human with respect to the agency of objects. As such, the possibility of responsibility in objectivity rests on the ability of humans to relinquish a sense of control over objects, to acknowledge the equal participation of objects in knowledge projects, and thus discover ways of relating to them that do not depend on domination.

Throughout ‘Situated Knowledges’ Haraway refers to the agency of objects in grand and abstracted terms as ‘the world’s active agency’ (1988, 593). She writes, ‘in some critical sense that is crudely hinted at by the clumsy category of the social or of agency, the world encountered in knowledge projects is an active entity’ (1988, 593).

Haraway's reference to the world as an agent refigures the scene of knowledge such that what was once an authoritative opposition between a subject and an object now emerges on an enlarged scale as a relation between human subjects and the world. Knowledge, then, arises from *a heterogeneous field of agencies*. For Haraway, it is not the result of a subject's pursuit of a passive and given object, but rather, the effect of a network of agents (subjects and objects) whose 'conversation' is itself a phenomenon of the field. Here, the influence of actor network theory is palpable. By foregrounding the role of non-human entities, Haraway is able to reconceptualise knowledge in terms of the complex arrangements of actors within the world.

Haraway's references to the world's active agency take on a distinctly feminist tenor in the figures she uses to describe this agency. She writes:

Acknowledging the agency of the world makes room for some unsettling possibilities, including a sense of the world's independent sense of humor. Such a sense of humor is not comfortable for humanists and others committed to the world as resource. There are, however, richly evocative figures to promote feminist visualizations of the world as witty agent. The Coyote or Trickster, as embodied in Southwest native American accounts, suggests the situation we are in when we give up mastery but keep searching for fidelity. (1988, 593-594)

Haraway draws on the coyote and trickster as figures that personify the world as a participant in knowledge projects. Importantly, she invites us to imagine the world through characters that are known for the mutability of their form and the unpredictability of their behaviour. In constructing a model of objectivity that resists being reduced to a dichotomous power relation, Haraway appeals to the caprice of the trickster, and thus to the shape-shifting nature of objects and the world. The author's conceptualisation of the object as a shape-shifter suggests that the world encountered in knowledge projects can never be known or anticipated in an absolute sense. Haraway emphasises that knowledge is a conversation or interaction between entities that are themselves mercurial, in transformation or always capable of further change. In a feminist context, the changeability of the world – the fundamental instability of objects – is a factor that *disrupts* the efficacy of conventional narratives of objectivity,

and consequently, is a characteristic Haraway embraces for its subversive political potential.

This figurative account of the agency of the world infers a position outside or beyond the domain of human subjects. By suggesting that the world *exceeds* the capacity of humans to know it entirely (or finally) – that it escapes absolute or universal description – Haraway problematises the authority of scientific objectivity. She writes, ‘feminist objectivity makes room for surprises and ironies at the heart of all knowledge production; we are not in charge of the world. We just live here and try to strike up non-innocent conversations’ (1988, 594). Haraway’s recourse to an outside, or to the disruptive function of the world’s agency, is relevant to her work in a political sense: the existence of an external position secures the possibility of *contesting* scientific truths. Her model of objectivity, which advocates ‘contestation, deconstruction, passionate construction, webbed connections’ (1988, 585), rests on the belief in a world that naturally eludes our efforts to map it comprehensively. Interestingly, the model of scientific knowledge production that Haraway evokes here, which rests on an absolute separation between human investigators and the elusive world of objects, is quite distinct from that offered by actor network theory, which, by contrast, insists on the impossibility of such a stark separation; if the object is a manifestation of networks, it cannot exist *outside* these networks.

A political community of subjects and objects

In reinterpreting the masterful relation of subjects to objects as a ‘non-innocent conversation’ between situated, embodied subjects and an agentic, unpredictable world, ‘Situated Knowledges’ transforms the subject/object dichotomy primarily in a *moral* sense. Wanting to preserve some version of objectivity (given the value of authoritative knowledge), Haraway’s critique retains the structural logic of objective truth – a subject plus an object – but redefines the nature or character of this relation. ‘Situated Knowledges’ reconceives subject/object interactions *in terms of the concept of responsibility*. As she puts it, there are ‘better’ and more responsible ways of conceptualising our relationship to the world. Here, Haraway’s aspiration for

‘better’ ways of relating to objects is caught up with conventional notions of futurity and progress, that is, with the assumption that things will improve in the future.

In ‘Situated Knowledges’, the difference between responsible and irresponsible forms of knowledge relates to the way we envision our-selves with respect to the world in the act of producing knowledge. Responsibility is about how we engage with and interpret objects. Haraway argues that irresponsible claims are those guaranteed by their *detachment* from the world, that is, *truths claimed on the basis of their independence of the subjects and contexts through which they emerge*. By contrast, responsible knowledge claims (situated knowledges) are those based in the *connectedness* of human investigators to the world they inhabit, or their enmeshment within complex social, cultural and political circumstances. Here, the notion of situatedness is pertinent. Haraway’s view of the subject as situated, located and embodied suggests a being deeply embedded in the world and bound to others (subjects *and* objects) in relations of obligation. The very concept of situatedness evokes the image of a point or node within a web of relations: it implies a single perspective whose identity is given in and by an expanded frame of connectivity or indebtedness.

Haraway’s moral refiguration of the subject/object dichotomy involves reconceptualising the separation, distance and detachment that defines the observer’s relationship to the object (the way these entities are joined) in terms of connection, communication and obligation. Contesting the perceived *immunity* of universal truth claims from their contexts, she argues for a concept of knowledge grounded instead in the principle of *community*. It is worth noting that responsibility is an idea Haraway associates closely with a particular understanding of community or collectivity. For her, responsibility is the condition of subjects and objects being tied together in complex configurations: being responsible means being bound to others and not refusing this connectivity. Central to this interpretation of responsibility is a notion of the entity (be it subject or object) as fundamentally *connected*. As such, Haraway differentiates, in a moral sense, between two ways of thinking about the identity of the unit and thus the subject/object relation: detachment (immunity) and connection (community).

Crucially, this distinction resonates with the position Haraway takes on immune system discourse. The same dichotomy emerges. Haraway's aversion to self-nonself theory is rooted in immunology's conceptualisation of the body in terms of immunity: that is, defence, war, antagonism, boundedness and autonomy, in other words, a rejection of connectedness with others. She is directly opposed to immunology's interpretation of the entity as a defended isolate whose boundaries express its inability to interface with others in non-hostile ways. As an alternative, she proposes thinking about the individual or immune body as an entity that naturally co-exists with others. Haraway states, 'immunity can also be conceived in terms of shared specificities; of the semi-permeable self able to engage with others (human and non-human, inner and outer)' (1989, 32) – that is, a self capable of connection with other selves. Here, she suggests that immunology's concept of identity – the immunological self – can be conceived according to the logic of *either* defence or connection (immunity or community, living separately or living together), and that the decision between these is a political one.

At stake in 'Situated Knowledges', then, is a concept of responsibility that is at once a model of political community and subjectivity: an account of the unit (subject or object) as joined to, rather than disconnected from, others. The concept of situated knowledges presumes a collectivity of subjects and objects grounded in the principle of *connection*. At the heart of this vision is a situated, politically transparent subject who can be 'held to account' for the truths s/he produces. In other words, responsibility is anchored in a discrete, embodied subject who, despite being partial and 'never finished' (1988, 586), is nevertheless *given* in the specificity of their location with respect to other actors. According to this account, the subject who assumes responsibility for the truths they produce is one who simultaneously *authors* these findings. Authorship and accountability go hand in hand: accountability is guaranteed by the connection (conversation) or correspondence (fidelity) of situated subjects to the objects about which they make claims.

Contradictory concepts of knowledge

Haraway's commitment to a structural logic of connection and communication (between senders and receivers) in conceptualising subject/object relations is significant. For her, the demarcation of subjects from objects secures a concept of the human agent that underpins the possibility of accountability. The essential difference that underwrites the division of subjects from the world, closely observed in 'Situated Knowledges', guarantees a distinctly human form of agency, and with it, the authority of human subjects as arbiters of knowledge that can be held accountable for knowledge claims.

This difference is cemented by the fact that Haraway does *not* conceive of the human in terms of – or as an expression or instance of – 'the world's active agency' (1988, 593). Rather than envisioning the white, male scientist who seeks mastery of objects (a figure or caricature she invokes repeatedly in 'Situated Knowledges') as itself a manifestation of 'the world's independent sense of humor' (1988, 593) – a perverse means by which the world comes to know itself – Haraway differentiates between human agents and the agency of objects. This is demonstrated by the fact that Haraway characterises the world's agency in terms of its 'independence' from the agency of subjects. Moreover, in putting forward her proposal for a feminist objectivity, she writes, 'the world encountered in knowledge projects is an active entity'; and she refers to scientific realism as 'a rather poor way of engaging with the world's active agency' (1988, 593). Each of these statements conveys a sense of a subject/object separation: for Haraway, objectivity is about how we *encounter* or *engage with* the world, or our inability to control its 'independent sense of humor' (1988, 593) – the fact that it always exceeds our capacities to know it. Here, the object is viewed as a distinct entity over which we have limited control. Haraway's emphasis on finding new 'ways of relating' and 'ways of engaging' with the world, affirms the subject's externality to its object; in her work, the 'world' is a concept that sets the human inquirer apart from the context it investigates and inhabits. Consequently, Haraway's interpretation of objects in terms of the world displays her investment in the human subject: a being whose bounded existence over and against

the world ensures its ability to discover, construct, interrogate and contest, and very often, in erroneous ways.⁶⁹

However, this model of knowledge is at odds with that put forward in Haraway's analysis of immunological discourse. Haraway argues that self-nonsel discourse is produced by complex networks of actors that constitute the wider social field. Central to this reading is an understanding that the emergence of self-nonsel discourse in immunology *coincides* with its emergence in social, cultural and political contexts. Immune system discourse does not *originate* in either science or culture – it is a description of organismic life or a concept of identity that demonstrates the extent to which these spheres are inter-implicated. Far from being tied to a situated author, or anchored concretely in the areas of science and biomedicine, self-nonsel theory is an idea or perceptual frame that arises in many areas of life *simultaneously*, or in the field of life as a whole.

In critiquing self-nonsel discourse, Haraway maintains a view of knowledge as systemically produced or bodied forth by the wider context of human life. Drawing on the insights of Foucault and Latour, she contests the idea that this discourse is the work of a single actor and as such, rejects a conventional reading of authorship as stable, coherent and centred. Here, the phenomenon of knowledge demonstrates the extent to which individual subjects and their decisions emerge *semiologically*. As a result, this non-causal, systemic account of knowledge stresses the radical impossibility of a concretely located, bordered, autonomous subject who could take responsibility for his/her claims.

Haraway's analysis of immune system discourse is thus defined by a tension between two concepts of knowledge: knowledge as a phenomenon of networks or contexts, and knowledge as something created by situated human subjects who can be held to account for the truths or errors they produce. This contradiction is significant as Haraway's critique of self-nonsel theory is delivered in the context of the arguments made in 'Situated Knowledges' concerning how we might take

⁶⁹ Haraway's investment in a subject/world separation – that is, to the form of a specifically human species being – recuperates a conventional notion of identity or individuality. In contrast to the systemic reading of identity articulated at other points in her work, Haraway reverts to an understanding of the autonomy and boundedness of the human subject.

responsibility for scientific knowledge. That is, her sophisticated, systemic account of how immune bodies are produced (and the non-causal model of construction on which it rests) is presented within the framework of a moral argument (good or bad metaphors), whose primary purpose is to judge the political appropriateness of immunology's rhetoric and to suggest an alternative set of metaphors. Consequently, there is a major disparity between the political motivations that drive Haraway's critique of immunological discourse, and the generous theorisation of this discourse her analysis actually offers. On the one hand, she is committed to a feminist position (the political situatedness of her own account) and asserts that 'feminists have to insist on a better account of the world' (1988, 579), and specifically, on 'knowledge potent for constructing worlds less organized by axes of domination' (1988, 585). However, on the other hand, she concedes that knowledge is not straightforwardly devised and disseminated by individuals, but rather, always the product of complex collective processes that can only be said to originate in the conditions of social life. This ambiguity raises the ontological status of Haraway's own intervention (her political opposition to self-nonselves discourse) as a question.

In short, the moral position Haraway adopts in evaluating immune system discourse seems to compromise the systemic reading her analysis puts forward. Her insistence on accountability and contestation – on the agency of human subjects to both determine and challenge the shape of knowledges within specific contexts – makes it difficult to conceive of self-nonselves theory in terms of the analysis she offers – namely, as arising within a field of agencies from which no agent can be simply extricated. As a result, her text speaks of two irreconcilable commitments, or two very different concepts of identity, which complicate the task of determining her position.

The structure of moral arguments: Haraway's dependence on the logic of immunity

It is centrally important that Haraway establishes her argument through strategies that focus on othering the concept of immunity. Crucially, her position is an *opposition* in the sense that she *rejects* and *contests* self-nonselves discrimination, distancing herself politically from immunology's conceptualisation of identity. Thus,

the strength and integrity of her claims rest on the extent to which they are dissociated from the notion of a defended self. However, the structure and style of Haraway's argument bear a close resemblance to the object it critiques. Haraway's critique of self-nonsel self discrimination emerges as an oppositional politics; in marking itself as embodying different political values to modern immunology it literally takes the form of a defended self. In this sense, Haraway's opposition to the concept of immunity expresses and manifests the antagonistic self-other logic she identifies as problematic and which she argues against. As such, a symmetry exists between the structural logic of her critique (rejection, contestation, moral differentiation) and its object (self-nonsel self discrimination): paradoxically, Haraway's critical engagement with immunology relies on and reproduces the defensive identity politics centrally at issue in her work.

For instance, the oppositional logic implicit in moral arguments is embodied in the strategy of contestation, which Haraway favours in critiquing scientific discourses. The term 'contestation' implies a struggle or fight. In the most basic sense, to contest is to dispute, argue against, contend or compete with – it suggests agonism, in the sense of a meeting of defended positions. Etymologically, contest comes from the Latin *contestari*, which means 'be a witness, bear witness, testify', or to 'introduce (a lawsuit) by calling witnesses' (Barnhart & Steinmetz 1988, 213). Importantly, as a mode of engagement it is not typically associated with conversation, dialogue or openness to others. Imagined in these terms, Haraway's contestation of immunity is an action designed to differentiate her work politically and intellectually from the practices and aims of the sciences. To a large extent, the identity of her position as a cultural critic of science derives from its refusal of, and political difference from, this scientific discourse. Consequently, in contesting immunity, Haraway defines her work against that of science in a process akin to self-nonsel self discrimination. In maintaining this (op)position, her critique mimics or performs the defended self to which she otherwise takes exception. Somewhat problematically, this strategy inadvertently evokes a dichotomy between scientific inquiry and cultural criticism – a rift which Haraway's systemic reading of self-nonsel self discourse concedes is impossible.

The science/culture opposition that arises through Haraway's use of contestation reinstates a series of other problematic dichotomies. For instance, her insistence on the provisional, contestable nature of scientific discourses leads her, at some points, to infer that a causal relation exists between language and matter. Contra her theorisation of the material-semiotic actor (matter/meaning entanglement), Haraway suggests that language and matter are ontologically discrete domains. In an interview, she explains:

...biology is not the body itself, but a discourse. When you say that my biology is such-and-such – or, I am a biological female and so therefore I have the following physiological structure – it sounds like you're talking about the thing itself. But if we are committed to remembering that biology is a *logos*, is literally a gathering into knowledge, we are not fooled into giving up the contestation for the discourse. (1990, 11)

In this statement, Haraway differentiates between language (or discourse) and the material substrate to which it refers. She locates contestation unequivocally at the level of discourse (language, rhetoric, representation), which is perceived as contingent, malleable and open to intervention. Here, the possibility of contestation rests on the belief in a language/matter split and thus also the existence of a human agent who mediates, or accounts for, this relation. Contestation involves disputing the *meanings* applied to pre-existent things, and matter is presumably affected or shaped by these shifting representations. By extension, arguments concerning matter (such as the political dispute surrounding immunology's concept of the body) occur above or outside matter's actual domain. Consequently, Haraway demonstrates a commitment to the causal model of social construction that she criticises in 'Situated Knowledges' and attempts to circumvent in 'The Biopolitics of Postmodern Bodies'.

Underlying Haraway's investment in an oppositional engagement with scientific knowledge is the belief that biological phenomena can be interpreted in many different ways, and that we, as human investigators, are positioned to make ethical decisions about the representations we adopt as our truths. Here, knowledge *about* biology and biology itself are separate phenomena. Our inquiries into biological life are seen as *affecting* biology (or our embodied experiences of biology),

but these investigations are not regarded as entangled with biology, or perhaps more accurately for this thesis argument, the involvements of biology with itself. Instead, questions concerning life are relegated *outside* the scene of biology.

This view of the relationship between knowledge of biology and biology itself passes over the issue of *how* politically invested biomedical representations have empirical efficacy or pragmatic purchase. If we maintain that biology and its representation are distinct phenomena, then the question of how these images and metaphors work is bracketed out. How can scientific knowledges account factually for the substance and operation of the biological body if they are socially, culturally, politically and historically contingent, and thus constantly changing? The fact that the life sciences continually produce truthful, and yet different, accounts of biology seems to suggest that biology is, in some sense, involved or materially implicated in processes of knowledge production, or more provocatively, that knowledge production is itself an innovation of biology.

Haraway's commitment to a view of contestation as a linguistic, cultural and human practice indicates that the question of what it might mean *ontologically* to call for 'better' or 'more ethical' biological metaphors does not figure in her analysis. The political framework of her critique, which, as I have shown, refuses the entanglement of matter and meaning, effectively forecloses an engagement with the biological research that underpins, and presumably secures, the generalised discourse she analyses. Consequently, biology itself appears absent from Haraway's account of the production of immune bodies.⁷⁰

Rethinking inquiry

⁷⁰ This observation is supported by Alfred Tauber, an authority on the philosophy of immunology. In a review of an edited collection containing Haraway's critique of immune system discourse, Tauber argues that in calling for 'a more humane model' of self, Haraway makes no effort 'to incorporate the scientific data themselves' (1994, 1546). He writes, 'Haraway takes no account of immunology's scientific criteria, nor does she present an alternative scientific interpretation...her critique offers no insight into why adversarial metaphors are scientifically either appropriate or inappropriate and no indication of which observations might be marshaled to construct an alternative theory' (1994, 1546). For a full account of this criticism, see Tauber (1994).

What, then are the implications of the contradiction that Haraway's argument contains? Firstly, her commitment to a concept of responsibility or ethics in knowledge production is one that rests on a fundamentally *exclusive* notion of community. For Haraway, responsibility means acknowledging our connectedness to the world and finding ways of relating to objects that do not depend on domination, defendedness and separation. Thus, the concept of community to which Haraway aspires is one grounded in a problem with separation: in her view, community is synonymous with connection, moral alignment and togetherness or oneness. Importantly, it is *not* a concept that can accommodate hostility or division.⁷¹

Secondly, Haraway's commitment to a notion of community grounded in the connectedness of humans to the world relies on a human/world distinction. Rather than seeing the human as entangled with/in the world, she quarantines the human subject from its worldly context and asserts that this ontological separation is the condition of knowledge and ethics. Crucially, this position forecloses the possibility that responsibility, ethics and knowledge are themselves instances of life's entanglement. The fact that Haraway does not conceive of the human as always already an expression of the world (its active agency) means that knowledge and ethics can only occur by means of the subject's externality to the world. At stake in Haraway's analysis, then, is the status of the human.

In asserting the need for modes of knowledge production that are ethical and responsible – and thus also, for critical engagement with existing knowledges – Haraway's work foregrounds the ontological status of the investigator or critic as a question. Her concern with how to have ethical knowledge practices draws attention to the position of the investigator/critic as a problem of subject/world relations. Conventionally, intervention and investigation describe modes of engagement with an object or issue, where that object or issue *pre-exists* the action of investigating or intervening (for example, the scientific discovery of a given, natural object, or the political contestation of an existing social norm). The contradiction in Haraway's work poses questions about the entangled conditions through which these modes of engagement are realised. How can an intervention into scientific knowledge (a

⁷¹ The concept of community and its relationship to immunity will be discussed at length in Chapter Four.

political contestation of self-nonself discourse) come from *outside* the context that generates and gives credence to specific knowledge claims? Is it possible to occupy an external position? Or, if it *is* internal, as my argument suggests, and Haraway often admits, how does this impact a notion of morality that simply divides right from wrong, as if the agency of worlding isn't ontologically mired in such webs of ambiguity?

The following chapters continue this investigation into the ontology of inquiry, or the relationship between subjects and objects, knowledge and life. If there is no position outside the object, then the conventional notions of knowledge, criticism and intervention need to be rethought. If subject and object constitute an entanglement, then an intervention or inquiry can only be internal to the system it interrogates. As we shall see, thinking inquiry systemically (that is, holistically, in terms of the wider system to which it belongs) forces us to question the status of any intervention and thus to reassess what it means to do critical work. Put simply, it confronts us with the ontological implications of taking a position on anything.

Chapter Four

Defending community: the politics of Ed Cohen's genealogy of immunity

Ed Cohen's *A Body Worth Defending: Immunity, Biopolitics, and the Apotheosis of the Modern Body* (2009), forms the most recent contribution to critical engagements with immunological discourse in the humanities and social sciences. Continuing in the tradition of canonical texts such as Donna Haraway's 'The Biopolitics of Postmodern Bodies: Determinations of Self in Immune System Discourse' (1989) and Emily Martin's *Flexible Bodies: Tracking Immunity in American Culture From the Days of Polio to the Age of AIDS* (1994), Cohen's work shares a similar concern with immunology's reliance on the metaphors of war, defence and invasion in conceptualising the organism and self. Like Haraway and Martin, Cohen argues that immunity relies on, and affirms, a politically-invested concept of self, namely, a bounded individual who exists within, but is distinct from, his or her social and political milieu (Cohen 2009, 26). Specifically, he asserts that immunology's dependence on the explanatory value of 'defence' betrays a deep-seated commitment to a political subjectivity grounded in the principles of individualism, autonomy and self-possession.

A Body Worth Defending seeks to make historical sense of the fact that we have come to imagine ourselves, both as bodies and subjects, as defended entities contained within hostile environments. Cohen explains that his project attempts:

...to understand how and why those of us who live within the ambit of modern medicine...so readily accept the notion that to endure as living organisms, we must actively and relentlessly fend off the predations of the very world that sustains us. (2009, 25-26)

In addressing this issue, Cohen situates his work within the ambit of the moral and political questions that have defined critical engagements with this interpretation of immunological identity. However, his analysis brings this generalised concern with

the politics of defence into focus both historically and theoretically by anchoring immunity's taken-for-granted political associations (e.g. war, invasion) in a lineage of concrete events.

To this end, Cohen's text conducts an extensive investigation of the specific political subject that finds empirical purchase in biological immunity. Central to his critique is the claim that 'biological immunity makes the body *modern*' (2009, 10, original emphasis). Cohen argues that the emergence of immunity in the areas of biomedicine and bioscience as a basic description of organismic life indicates the *biologisation* – or material actualisation – of a distinctly modern form of political subjectivity. He asserts that 'with the advent of biological immunity', the 'monadic modern body' is realised as a biological entity (2009, 8). As Cohen explains, 'until the end of the nineteenth century the modern body does not exist, strictly speaking, as a biological body', but rather, as a 'political, economic, philosophical, and...psychological phenomenon' (2009, 7); it only later takes on a tangibly corporeal existence. In making this case, his text offers a detailed genealogy of immunity that demonstrates how its biological incarnation comes to embody the political, philosophical and historical complexities of the modern subject.

At the heart of Cohen's text is an ontological argument concerning how our politics *becomes* biological. His project centres on the claim that immunity's history witnesses a transformation that is *ontological*, rather than simply epistemological: he argues that juridico-political immunity becomes materially implicated in the substance of our biology, as opposed to merely conceptually implicated in bioscientific and biomedical representations of biology.

This chapter presents a close reading of Cohen's text that critically examines his account of *how* this conversion or transformation takes place. It investigates the rationale Cohen offers to justify his investigation, his historical analysis and the theoretical resources he uses to make his ontological claim by way of the Foucaultian concepts of biopower and biopolitics. What concerns motivate Cohen to explore the history of the notion of biological immunity? What conclusions are supported by the specific historical account he offers? And what intellectual investments – about the

nature of biology, scientific representations of biology and the relation between biology or actual flesh and its representation – does this historical narrative betray?

This chapter shows that Cohen's text is based firmly in the assumption that immunity is an inherently political concept that has been *mistakenly* adopted into the fields of biomedicine and bioscience. It argues that this reading of biological immunity as an epistemological error relies on an ontological distinction between politics and biology, or knowledge and life. Cohen's assertion that immunity travels from politics to biology affirms that there is no sense in which politics might be, in a broader sense, itself already biological.

As we shall see, this investment in an ontological division between politics and life has a number of important implications. Firstly, it means that the argument Cohen makes about immunity's transformation is essentially epistemological. In beginning from the assumption of a knowledge/life separation, it cannot overcome the ontological gap it simultaneously installs. Secondly, this logic directly informs Cohen's reading of Foucault. For Cohen, biopower describes an historical event in which the boundary between politics and life *becomes* (con)fused; in other words, he maintains these domains were separate *prior* to this event. Consequently, Cohen's reiteration of an absolute distinction between politics and biology (or life) demonstrates his commitment to an orthodox interpretation of Nature (or biology) as a pure and unadulterated 'entity' that pre-exists the intrusion of foreign, external elements (politics).

A history of immunity

Cohen's text critically examines the emergence of immunity as a biological fact at the end of the nineteenth century. Crucially, it reconstructs a history of immunity that firmly locates its foundations in the domains of politics and law. Arguing for a strong connection between its juridico-political and biomedical formulations, Cohen states that immunity operates as a political and legal concept *long before it enters biomedicine*. He explains, immunity 'existed as a powerful juridical and political concept for two thousand years before medicine applied the

idea to vital contexts' (2009, 274); its biomedical meaning derives from, and is informed by, a 'rich juridical and political inheritance' (2009, 49). Writing from this premise, Cohen presents a chronological narrative that differentiates historically and contextually between immunity's juridico-political and biological figurations, and in doing so, emphasises that these concepts belong to different periods, as well as different areas of life (law and politics; biomedicine and bioscience). As such, his account takes the form of an historical progression from law and politics to biomedicine – a narrative structure that compartmentalises the political from the biomedical (and thus biological), and highlights the imaginary and material work involved in immunity's slow transformation from political concept to biological fact.

In the text's introduction, Cohen provides an extended statement that succinctly captures the scope of his historical inquiry and its general argument:

...as we go for vaccinations, take antibiotics, or avoid the things we are allergic to...most of us remain ignorant of a basic historical fact: biological immunity as we know it does not exist until the late nineteenth century. Nor, for that matter, does the idea that organisms defend themselves at cellular and molecular levels. For nearly two thousand years, immunity, a legal concept first conjured in ancient Rome, has functioned almost exclusively as a political and juridical term... "Self-defense" also originates as a political concept, albeit a much newer one, emerging only 350 years ago in the course of the English Civil War, when Thomas Hobbes defines it as the first "natural right." One hundred and twenty five years ago, biomedicine fuses these two incredibly difficult, powerful, and yet very different (if not incongruous) political ideas into one, creating "immunity-as-defense." It then transplants this new biopolitical hybrid into the living human body. We have not been the same since. (2009, 3, original emphasis)

Cohen argues that immunity and defence are historically specific ways of conceptualising the organism. For him, the notion that organismic life is sustained through an innate defensiveness or an instinctive hostility towards others is peculiar to the imagination of the late nineteenth century. He claims that immunity, as it appears in biomedical contexts, is an amalgam of two concepts (exemption and self-defence)

whose unique juridical and political histories *predate* the science of immunology. Cohen claims that biological immunity arises from the combination of ‘exemption’, which he traces to ancient Roman law, and ‘self-defense’, which he attributes to the political philosophy of Thomas Hobbes and John Locke. Examining the conditions that facilitate this convergence, he argues that immunity (exemption) and self-defence come together to form the hybrid concept ‘immunity-as-defense’. Cohen concludes that this ‘biopolitical hybrid’ – a fusion of two political logics in a biological concept – is adopted into medical knowledge as a scientific fact, and has since become fundamental to our understanding of the biological body.⁷²

The political foundations of Cohen’s narrative

Early in the first chapter of the text, Cohen gives a detailed account of immunity’s etymology that outlines the term’s original usage in ancient Roman law. He explains that immunity was first used to refer to a specific form of exemption from citizenry duties legislated by the Roman state:

Immunity derives from the Latin (*im + munis*), where the root *munis* (from which we also derive our contemporary word “municipal”) gestures toward responsibility for “shared duties, charges, or services” (*OED*). In its original Roman usage, *munus* signifies a range of possible social practices and obligations: service, function, duty, gift, favor, kindness, tax... *Munera* are the specific practices that define Roman citizens’ public burden and are therefore required of them *as citizens*. (2009, 40-41, original emphasis)

Here, immunity suggests an exemption or freedom (implied by *im-*) from the shared duties, charges, and services that define Roman citizenship. Cohen states that immunity was used to designate the exemption of certain citizens or citizen groups from the obligations and duties that were required of Roman citizens (*munera*) and which legally constituted their citizenship. Put precisely, immunity described an

⁷² As we shall see, the logic of hybridity is central to Cohen’s critique. At this point, it is worth noting that his use of the term ‘hybrid’ implies the prior existence of two unlike entities that are mixed together to form one entity.

exceptional sub-category of Roman citizenship based on the lawful suspension of citizenry obligations.

Cohen argues that this etymology is preserved in immunity's biological incarnation. He asserts that the logic of exemption, as in exemption or freedom from a general law or rule, is fundamental to the immunological interpretation of immunity, in the sense that the immune organism is exempt from the experience of certain infections or diseases to which others remain vulnerable. He notes that long before immunity was established empirically it 'appears repeatedly' in discourses about health 'as an unspecified, and indeed, unknown, set of conditions that permits some people to "escape" from the epidemic influence of a "reigning illness"' (2009, 211). Furthermore, Cohen highlights the extent to which the legal logic of exemption informed early understandings of biological immunity:

Prior to Metchnikoff's revision...when immunity appears in medical texts, it explicitly borrows against its juridico-political inheritance – especially in reference to epidemics. According to immunity's metaphoric tenor, nature acts precisely as a political sovereign does, affirming its jurisdiction by defining those whom it exempts from its laws. (2009, 207)

Thus, he argues that the notion of legal exemption survives in our contemporary biomedical understanding of immunity insofar as it implies the organism's protected enclosure within a field of difference, or something alien.

In uncovering immunity's etymology, Cohen establishes that the genealogical foundations of immunity are unequivocally political. Appealing to etymology itself as a stable and enduring historical referent, he argues that immunity is an *essentially* political concept: it derives from, and is proper to, political life. The basic fact that immunity's roots can be traced to the Roman polis is vital to Cohen's account of biological immunity. Indeed, the coherence and plausibility of his narrative rest heavily on the immutability – and immunity – of this departure point. As such, he treats immunity's etymology as a given, historical fact.

Yet despite its significance for Cohen's argument, only a relatively small percentage of the text is devoted to elaborating immunity's political and linguistic origins, and the presentation of this information is very matter of fact. Moreover, the givenness of this political origin is asserted frequently throughout the text. Cohen consistently reminds the reader that for the majority of immunity's history, it has served 'exclusively as a legal and political concept' (2009, 45). However, intriguingly, Cohen does not subject juridico-political immunity to the same historical scrutiny as biological immunity. Instead, the self-evidence of the concept's purportedly original juridico-political identity actually *motivates* him to interrogate its biological figuration.

Cohen's account of immunity's etymology is followed by a much more substantial elaboration of the historical origins of self-defence. Like immunity, he argues that self-defence emerges *initially* as a political, rather than biological, concept: 'Until Metchnikoff conjures "defense" in the early 1880s to name the cellular events he identifies as immunity, self-defense remains an exclusively *political* doctrine. Before his innovative use of the concept, no physiological meaning for organic "defense" exists' (2009, 55, original emphasis). Moving swiftly from ancient Rome to seventeenth century Europe, Cohen identifies the roots of this concept in modern political philosophy. He claims that self-defence, conceived as a property innate to the body or self, is specific to theories of modern personhood. Through a brief exploration of the thought of Hobbes and Locke, Cohen outlines some of the foundational precepts of the modern political subject, which then come to be embodied in biological immunity.

Cohen's account of self-defence attempts to explain the correlation between two aspects of modern personhood: the perception of the subject as a monadic individual, and the notion that the body exists as a naturally bounded entity. He argues that this idea of the body as an atomised organism *given* in nature or reality is a specifically modern innovation that speaks to a corresponding view of subjectivity. In an effort to elucidate this relation, Cohen begins by examining the connection between the concepts of self-defence and property. Self-defence, he states, is a natural corollary of the modern notion that the body constitutes a form of property owned by the self: 'While first conceived during the medieval period, [the] juridico-

theological naturalization of property produces some of modernity's most enduring principles; our relations to the world, to each other, and to ourselves travel through its ambit' (2009, 54). For Cohen, the interpretation of the body as something held in possession is peculiar to modernity. Drawing on the Lockean idea that 'we enter the political domain as owners of our bodies', Cohen claims that modern personhood is grounded in a 'proprietary self-relation' (2009, 70). He asserts that modern notions of legal and economic personhood (broadly captured in the idea of individualism) are based in the understanding that '*to be a person means to have a body*' (2009, 70, original emphasis), and consequently, he identifies the possession of a body as a constitutive condition of modern subjectivity.

Cohen notes that this notion of the body as a possession has significant implications for the way subjectivity is conceived, and for the interpretation of the body that grounds this political being. He argues that 'the body (imagined as a kind of being that can be "had") unconsciously and unwittingly gives shape to modern forms of subjectivity and belonging' (2009, 73). Cohen claims that within this philosophical and historical frame, the body serves as 'a metonym for the kind of person who can be interpellated as a qualified subject' (2009, 73). That is, as an object owned by the self, the body is imagined as a material analogue of the subjectivity it embodies. Accordingly, he holds that modernity gives rise to a unique perception of the body (which he describes as a 'somatic conceit') as the physical location of the subject, or 'the human's "natural" home' (2009, 73). For Cohen, the perception of the correspondence between political subjectivity and biological body as *natural*, rather than political, foreshadows the emergence of biological immunity.

According to Cohen, this metonymic self-relation has a few important implications. Firstly, the notion of self-possession requires that the body be clearly circumscribed: 'for property to exist at all, it must be well defined' (2009, 74). He states that the body owned and inhabited by the modern subject is one whose boundaries are strictly demarcated. Secondly, Cohen points out that a necessary consequence (or condition) of defining property is that its borders be protected: 'For something (or some *thing*) to be someone's (or some *one*'s) property, the boundary drawn around it must be defensible' (2009, 74, original emphasis). Thus, 'underlying the logic which takes (or mistakes) the human body for a kind of property' is 'the

assumption that the body forms a defensible boundary' (2009, 75). This point is significant in terms of the connection Cohen makes between immunity and self-defence. As he explains, a necessary condition of owning property is that ownership itself be protected; put simply, '[t]o retain property as property requires a *defense* against its loss' (2009, 54, original emphasis). Here, Cohen deduces that the very principle of bodily ownership presumes a subject that actively defends him/herself – a defended subjectivity. Consequently, this perception of the body as property presupposes self-defence as an embodied characteristic of the body/subject. If, as Cohen maintains, immunity realises the modern political subject as a biological body, then it also realises self-defence as an innate physiological propensity.

Cohen finds support for this 'defended self' in Hobbes' *Leviathan*, and specifically, his meditations on the laws of nature. Here, he refers the reader to Hobbes' claim that man is guided by the principle of preserving his own life. Quoting from *Leviathan*, Cohen writes, '[i]mpelled by this lawful inertia, there exists the "naturall Right" to "protect his life and members," that is, "to preserve and defend his Body"' (Hobbes in Cohen 2009, 57). In other words, man's adherence to natural law is evident in his own proclivity towards the protection of his life. Furthermore, Cohen argues that this perception of self-defence as a natural, lawful characteristic of human life is cemented by the Hobbsian notion that "'The condition of Man...is of Warre of every one against every one'" (Hobbes in Cohen 2009). For Hobbes, 'war defines the prevailing pattern of interactions among humans' (2009, 58). However, as Cohen notes, this does not mean that life is an incessant battle, 'Hobbes construes war as the climate within which human relations unfold' (2009, 58).

From Cohen's viewpoint, the vision of life that Hobbes presents 'reduces the complex potentialities and vulnerabilities engendered by coexistence among human organisms to incessant battle' (2009, 58). That is, it eliminates alternative accounts of the ways humans interact with each other and the world. Thus, Cohen claims that Hobbes' account "'naturally" renders the living human being singular in its struggle against death' (2009, 57) and as such, suggests an interpretation of the subject as a guarded individual. He argues, '[i]n its original juridico-political context, the doctrine of self-defense literally and *naturally* establishes the individual as the paramount form

of personhood’ (2009, 55, original emphasis). In short, Cohen insists that the principle of self-defence underwrites the modern body’s abstraction *from* the world.

This cursory glance at the conceptual-political foundations of biological immunity suggests a number of things about the genealogy Cohen offers. At a basic level, his discussions of ancient Roman law and English political philosophy affirm politics as the proper (or most appropriate) place to begin writing immunity’s history. More importantly, this departure point anticipates and establishes the groundwork for an historical narrative that aims to explain how the political *becomes* biological (and thus, how our biology becomes political). In prefacing his analysis with a discussion of these juridico-political origins, a certain temporal causality, a unidirectionality, is implicit in his account: Cohen assumes that politics is not already inherently biological.

How politics becomes biology

Cohen’s elaboration of these political foundations demonstrates that his analysis is principally concerned with the *migration* of immunity from the spheres of politics and law to biomedicine. The majority of the text focuses on the emergence of biological immunity, which he redefines as a hybrid of two existing political concepts, ‘immunity-as-defense’. In naming it thus, Cohen highlights the concept’s shift in status as central to his argument. Within his analysis, immunity’s mutation figures not as the appropriation or adoption of a concept belonging to a different field, in the sense that it crosses a boundary between politics and biomedicine. Rather, its migration denotes the ‘transubstantiation’ of juridico-political immunity into ‘biological function’ (2009, 24). Cohen argues that biological immunity gives modern political subjectivity (the defended, body-possessing individual) a material, biological existence: we now literally embody our politics.

At many points throughout the text Cohen states that immunity’s biomedical usage has altered us biologically, such that our political being as modern subjects now informs, shapes and inhabits the very substance of our bodies. He writes, ‘medicine secret(e)s its political import into the tissues, cells, and molecules of our flesh... It

turns us into modern bodies' (2009, 31); it 'buries our political assumptions deep within us – in our cells and molecules and subatomic particles' (2009, 268). It is clear that for Cohen immunity, as a central principle of modern biomedicine, has material implications for our biological being. As he explains:

...modern biomedicine embeds modern political ideology when it represents the singular, epidermally bound organism which defends itself against a relentlessly pathogenic environment as a universal fact...[it] incarnates assumptions of classic political and economic liberalism as biological and even natural phenomena. (2009, 274)

These kinds of statements illustrate that the ontological status of Cohen's argument is centrally at issue. However, it is unclear whether immunity affects biology itself or representations of biology, and as such, there is some confusion about whether Cohen's argument is truly ontological or epistemological.

In claiming that immunity realises politics in our biology (whether this realisation is ideational or material), Cohen draws heavily upon the work of French philosopher, Michel Foucault. He explains that his project is directly informed by, and closely wedded to, Foucault's analysis of political power during the modern era, and specifically, the concepts of biopower and biopolitics. For Cohen, the historic 'convergence' of political life and biological life theorised in the notions of biopower and biopolitics is an insight that *provokes* his investigation of immunity. That is, Foucault's assertion that life itself becomes the principal object of power in the modern period is foundational to the way Cohen interprets immunity's history. Indeed, it might be more accurate to say that Foucault's work provides a template – namely, a theorisation of the relationship between politics and life – that Cohen applies or fits to the case of biological immunity. As such, his genealogy relies greatly on the conceptual, cultural, political and historical geography mapped out in Foucault's discussions of these concepts.⁷³

⁷³ In the introduction to his text, Cohen discusses the close relationship of his work to Foucault's. Cohen's exploration of the same historical period and some of the same political phenomena as Foucault lead him to describe his project as an elaboration or extension of Foucault's project. He states: 'The body of this book limns the terrain of Foucault's writings (especially the less well-known, more recently published lectures he gave at the Collège de France between 1975 and 1978) and asks

Without going into too much detail here, Cohen's interest in Foucault relates explicitly to the concept of biopower as a theorisation of how power, in the context of modern Europe, operates through life itself. Cohen draws on Foucault's work because it accounts critically for the way in which political life and biological life (modern political subjectivity and modern biological being) intertwine, or become confused, during this historical period. The concept of biopower is thus useful for Cohen as it explores the relationship between political and biological life as an historical question. As he sees it, the advent of biopower signals a unique moment in which the division between these domains (politics/nature, the intellectual/the vital) becomes increasingly blurred or compromised. In fact, it marks an historical threshold or break after which it becomes impossible to disaggregate the political from the natural.

Cohen's reading of Foucault is thus pivotal to his interpretation of the history of immunity and the argument it makes. Crucially, it is through the concepts of biopower and biopolitics that Cohen presents a narrative explanation of how juridico-political immunity takes on a biological existence. I will return to Foucault's work and Cohen's use of it later in this chapter.

Confusing political concepts with biological concepts

Cohen's interest in immunity's conceptual transition from politics to biomedicine means that his text is devoted centrally to elucidating the entangled historical circumstances through which this concept *negotiates, transgresses and/or transcends* the presumed division between these spheres. The centrality of this 'border-crossing' to Cohen's text indicates that he interprets politics and biomedicine as discrete domains of life that are (or were), to a large extent, dissociated from one another. The assertion that immunity overcomes the boundary between these spheres raises a number of pertinent questions. How does immunity find purchase *outside* its

how they illuminate our investments in biomedicine and human bodies more generally. As a result, the argument continually circles around and returns to topics often familiar to Foucault's readers; however, in doing so, it expands on and extends the Foucaultian reference by dwelling on and with texts and issues that Foucault himself often passes over quickly while making his points' (2009, 25).

original domain? What causes this political concept to emerge as a logical choice of metaphors for describing complex biological processes? In short, how does immunity function self-evidently and efficaciously in such disparate contexts?

Having established that immunity is *first* a legal and political concept, Cohen interprets its later usage in the discipline of biology as a strained (mis)use of the term. Musing over this issue, he writes:

The longer I work on this project, the less I understand why it seems obvious to us to use a complex legal and political concept to describe how we coexist as organisms. Taken at face value, immunity has little to recommend it as an organismic possibility...it seems hard not to notice that the trope only works as catachresis. (2009, 14)

Cohen suggests that immunity's application in a biological context works only insofar as it distorts or perverts its original meaning. Thus, within the historical and epistemological parameters of his analysis, immunity's biological incarnation inevitably appears as a concept *out of place*.

Curiously, this view of biological immunity as a distortion or misappropriation of an originally political concept is at odds with Cohen's claim that immunity's history witnesses the transformation of politics into biology. Put simply, there is a tension in his account between two readings of biological immunity. On the one hand, Cohen suggests that this political metaphor works within a biological context to the extent that its usage skews its intended meaning. However, on the other hand, he argues that the political transubstantiates or materially transforms, into the reality of the biological (2009, 24). From this perspective, immunity doesn't *move between* different domains; rather, it evidences the mutation of one domain into the other.

Putting this tension to one side, let us consider the first reading (immunity as catachresis). There are several moments at which Cohen underscores immunity's status as a politically mediated description of actual biological processes. At these points, Cohen draws attention to the *non-accordance* between the concept of immunity and the biological reality it purportedly describes. For instance, he writes,

‘immunity...does not transparently reveal the material processes of the living organism as it coexists with other living beings in shared environments,’ but instead ‘construes the individual as a natural unit’ (2009, 274). Here, Cohen stresses the misfitting relation (or separation) between this representation and its corresponding material substrate. This sense of an ontological gap, or difference, is communicated emphatically in the following statement:

The language of friend and enemy in no way derives from the matter of the world; it does not describe the unfolding of biochemical processes according to immutable natural laws; it does not constitute an unmediated representation of an essential physical truth; rather the trope of friend and enemy has circumscribed Western politics since Aristotle. In fact, it has provided the canonical framework for defining “the political” as such ever since there first was a *polis*. (2009, 277, original emphasis)

In this quotation, Cohen asserts that ‘the language of friend and enemy’ (exemplary of the defensive logic of immunity) bears an arbitrary or non-essential relationship to corporeality. Evoking Saussure’s first principle of linguistics, the arbitrary nature of the sign, he clearly differentiates between the rhetoric of immunity, which *necessarily* organises our understanding of ‘the political’, and the material, biological referent whose relationship to this rhetoric is *arbitrary*.⁷⁴

These kinds of statements have a number of important implications. Firstly, Cohen’s continued insistence that immunity does not directly relate to biology *in reality*, suggests that actual biological processes exist separately or independently of their representations. That is, his reading of biological immunity is grounded in a fundamental bifurcation between life (nature) and its (cultural) description. This dichotomy is reflected in the terms Cohen employs above to describe this referent. Referring to nature’s ‘immutability’ and its ‘essential’ characteristics, he demonstrates his understanding of biology as a solid, unchanging and enduring substance that precedes and underlies political and cultural representation. Thus, Cohen summons the biological in opposition to the political as a counterpoint whose

⁷⁴ For an account of Saussure’s notion of the arbitrary nature of the sign, see Saussure (1974). For a critical re-reading of Saussure’s work see Kirby (1997).

stable anchorage in the world of actual matter highlights the contingent, mutable and inevitably erroneous nature of representation.

The distinction Cohen makes between politics (culture) and biology has an unmistakably moral dimension. In highlighting the gap or difference between representations of immunity and an underlying biological reality, Cohen judges immunity's appropriateness as a scientific concept on the basis of its juridico-political heritage. In other words, he foregrounds its lack of accordance with actual biology (whatever this is) as evidence of the fact that it is *inapplicable* to biological phenomena. Put slightly differently, Cohen believes that there is something inherently wrong, unsuitable, or to use his words, 'patently improper' (2009, 14) about using political concepts to describe natural phenomena. As such, his reading of biological immunity emerges as a censoring moral verdict.

This moralism is demonstrated in Cohen's view of biological immunity as an instance of category confusion or error. For him, biological immunity *confuses* the political with the biological (politics with nature, the idea with the thing itself), compromising the integrity and mutual exclusion of these presumably very different modalities of life. Importantly, Cohen presents this confusion as a form of *deceit* or *duplicity*. Expressing alarm at 'how obviously its "political nature" hides in plain sight' (2009, 14), he argues that biological immunity disguises politics *as* nature. He maintains that immunity's entry into the field of biology entails the *concealment* of its juridico-political heritage. Here, the underlying logic of this strategy (to hide something by masking it as something else) affirms his commitment to an absolute division between politics and biology (or nature), and speaks of his aversion to any notion of cross contamination between them, or at least, between biology and a negative or 'bad' politics.⁷⁵

This hygienic discrimination between nature and culture, the natural and the political (and the moral imperative that informs it) surfaces continually in Cohen's account, such that he often instinctively employs a politics/biology (or politics/nature)

⁷⁵ As we shall see, Cohen differentiates between 'good' and 'bad' politics (community and immunity). For him, the problem with biological immunity is that it realises a politics of individualism that he regards as having negative consequences. Oddly, he does *not* identify other more 'positive' – though equally politicised – representations of organismic life as political.

division to frame and elaborate his concerns. For example, in a discussion of the disease-causing relationship between human organisms and microbes, he asks:

...if this struggle [host-microbe relation] represents such a natural condition, why do medicine and biology rely so explicitly on political and juridical concepts to make sense of it? If the ways that organisms coexist evince our political and juridical precepts so immediately, does this mean that medicine after immunity constitutes politics by other means? (2009, 6)

Here, Cohen poses a rhetorical question, which, in appealing to the powers of common sense, suggests that the use of political concepts to represent biological phenomena is plainly nonsensical or illogical, and as such, issues a clear call to reason.

Biological discourse or biology itself?

Cohen's assertion that immunity bears no intrinsic relation to the organism's materiality indicates that his argument operates within a conventional representationalist frame. In viewing 'biology' as divisible into discourse (immunity) and matter (complex cellular processes), Cohen proposes a fundamental disjunction between signs and their referents. This disjunction, epitomised in his reading of biological immunity as catachresis, suggests that the material biology that exists 'in reality' is inaccessible and therefore unrepresentable.

Cohen's commitment to this position is captured in an early section of the text where he argues that immunity constitutes only one of many possible ways of representing organismic life.⁷⁶ Arguing 'that no necessity or inevitability underlies

⁷⁶ The same point is made in the critiques of immunological discourse offered by Haraway and Martin. Both thinkers cite the dominant discourse of self-nonsel self discrimination alongside different scientific figurations of organismic identity in order to highlight the contingency of self-nonsel self theory as a representation of immune function. For instance, in an essay addressing the mainstream immunological metaphors of war and defence, Martin turns to the work of Polish biologist, Ludwick Fleck, as offering an alternative vision of organismic life (1990, 419-421). She writes: 'Fleck had already seen the limitations of the metaphor of warfare in immunology and conceived of another possibility... Instead of the organism as a self-contained independent unit with fixed boundaries, he proposed a "harmonious life unit", which could range from a cell, to the symbiosis between alga and

our commitment to having a body' (2009, 73), or to the *idea* of bodies, he cites a description of multicellular life taken from the work of biological theorist Dorion Sagan. According to Cohen, Sagan 'elaborates the politics implied by the recent bioscientific insight that organisms evolve not just by competition and "survival of the fittest" but also by cooperation and symbiosis' (2009, 72). Sagan argues that these cooperative biological processes suggest an interpretation of body and self that contests the notion of a strictly monadic existence. As he puts it, "[w]e are all multiple beings... The body is not one self but a fiction of a self built from a mass of interacting selves" (Sagan in Cohen 2009, 73). Reflecting on these ideas, Cohen writes:

Sagan refigures the unit of analysis on which we found our self-conceit. Underscoring the biological complexity that multicellular organisms necessarily incorporate, he calls attention to the fiction we invoke when we apprehend the body as a singularity that naturalizes our status as individuals. Our much vaunted oneness, our indivisible individuality, he suggests, lives in our imaginations, not in our cells. (2009, 73)

Here, Cohen cites Sagan's discussion to underline that our common sense understanding of the organism and/or person is a construction that rests on cultural, political and philosophical – as opposed to empirical, biological – foundations.

Cohen states that the value of Sagan's work lies in the fact that it 'challenges our economic, epistemological, psychological and political investments in a monadic organism' (2009, 73). He recognises that Sagan presents a differently politicised account of life, 'a nonmodern perspective...that incorporates a fundamentally different political ontology' (2009, 73). However, simultaneously and somewhat

fungus in a lichen, to an ecological unit such as a forest' (1990, 420). Similarly, Haraway draws on immunologist Niels Jerne's network theory to show that there are ways of conceptualising the relation of self to nonself other than an antagonism between a bounded organism and a foreign, external other (1989, 22-23). In presenting these alternative images, Haraway and Martin suggest that different models of biology are not only possible, but also available. Underlying this assertion is the view that we, as human investigators, are capable of choosing 'good' metaphors (harmonious co-existence) over 'bad' ones (defence, war). In other words, their appeals to the fact that a variety of models exist highlight the role of human agency in determining the specific models we adopt as our truths. However, these arguments neglect the more pertinent issue of why or how the dominant model or metaphor – war and defence – dominates. If defence, invasion and violence are so politically undesirable why have they remained so current (scientifically and culturally) for so long?

paradoxically, Cohen's analysis draws strength from Sagan's intimate engagement with science, that is, from his work's proximity to the empirical reality of the body. Cohen uses the example of multicellular organisms to demonstrate that life, given in its cellular reality (in nature), undoes or overturns the (political) conceit of the singular, bounded organism. Here, one gets the sense that the scientific character of Sagan's example has greater currency for Cohen in revealing the political architecture of immunity's truth, or that Sagan's discourse enjoys the privilege of being truer or closer to reality in its direct reference (and access) to biology.

There is a curious tension in Cohen's use of Sagan's work. On the one hand, Sagan's account of multicellular life is cited as a political alternative to the atomism of immunity, and on the other hand, it is used as a factual description of actual biology. For Cohen, Sagan's work is useful in highlighting the constructed, political nature of immunity precisely because the discourse of multicellular organisms is *equally* as constructed. Sagan's work illustrates that there are other ways of conceptualising the same phenomenon. Yet Cohen clearly also appeals to the empirical, scientific basis of Sagan's insights. Paradoxically, then, Sagan's work is cited for its value as a cultural construction *and* an empirical truth. This contradiction draws attention to the fact that regardless of its heritage, immunity is as grounded in scientific knowledge and practice as the phenomena Sagan describes. From a scientific viewpoint, immunity is as empirically verifiable as the processes of cooperation and symbiosis typical of multicellular organisms. However, Cohen does not make this point explicit. In fact, his analysis almost entirely neglects any consideration of the biological detail that underpins and secures the generalised discourse of immunity, which he takes as his primary target.

The critical deployment of Sagan's insights in Cohen's analysis draws attention to a central ambiguity surrounding Cohen's interpretation of biology. There are significant points at which Cohen introduces or refers generally to scientific accounts of the body, offering them as factual descriptions of biology that highlight the politics of the modern body. For example, he writes:

...if we reflect for a moment on what we actually refer to when we say "the body" or "my body"...we might find that, rather than manifesting a thinglike

substantiality, or well-defined appropriability, corporeal being unfolds temporally as a concatenation of biomolecular transformations of matter and energy localized in space... Therefore we might argue that our common understanding of the body as both formally discrete and politically, socially and psychologically fundamental poses something of a paradox: How are evanescent, contingent, and continuous processes construed as separate and distinct “individuals”? (2009, 73-74)

Again, Cohen argues that the body, experienced as a coherent unit, is an intellectual construct that obscures, stands in for, or is used to make sense of, what in *actuality* is ‘a concatenation of biomolecular transformations of matter and energy’. He asserts that ‘the individual’ is a lens through which a dynamic material substrate of ‘evanescent, contingent, and continuous processes’ is organised perceptually. In differentiating between corporeal being (biomolecular transformations) and its interpretations (a naturally discrete body), Cohen treats scientific discourse as though it were as self-evident as the object it claims to discover. Although at other points he affirms biology’s *inaccessibility*, in this instance, Cohen assumes that intimacy with biological detail provides greater or perhaps less-mediated access to the real. In what sense, then, does Cohen intend this biological reference? What is the status of biology in these moments?

This ambiguity surfaces repeatedly in Cohen’s work. He writes:

With immunity as its avatar, modern biomedical dogma holds...that as organisms we vitally depend on a perpetual engagement *against* the world to maintain our integrity or indeed ourselves. However, this antagonistic presumption does not entirely accord with biological thinking about how organisms coexist in shared ecologies, sometimes with great mutual benefit, sometimes pacifically, sometimes indifferently, and sometimes deleteriously. (2009, 8, original emphasis)

In this statement, Cohen refers loosely to ‘biological thinking’ as a counterpoint to ‘modern biomedical dogma’. He cites immunity as exemplary of the politics of biomedical discourse (a biological concept we know to be political), in opposition to

concepts of ecology and coexistence in biological thought, which he regards as more *factual* than political. But what, precisely, does Cohen mean by ‘biological thought’? What ideas, theories or data is he referencing? Does this thought fall outside the politicised domain of biomedicine? In what way can it be differentiated from ‘biomedical dogma’?

How we come to embody our politics

The ambiguity that surrounds Cohen’s reading of biology has significant implications for the coherence and plausibility of his argument. His claim that immunity materialises the modern political subject is called into question by the fact that he frequently deals with immunity as a culturally circumscribed discourse, which he sets apart from biology itself. Much, then, hinges on the explanation and evidence Cohen provides for the means or mechanism by which this transformation occurs. It is thus pertinent that Cohen refrains from elaborating what immunity’s ‘migration’ entails *biologically*. Although he frequently uses terms such as ‘incarnate’, ‘incorporate’, ‘embody’, ‘literalize’, ‘transubstantiate’ and ‘apotheosis’ (2009, 274; 34; 34; 225; 24; 22) to describe this transformation, no specific details of these processes are offered. Instead, the repetition of these terms – which each encapsulates an ontological leap from language to matter that his genealogy proposes – implies an explanation that in fact never eventuates. Or rather, Cohen remains committed to an idea of biology as notional – a concept that isn’t itself material.⁷⁷ As a result, his work circumvents the need to engage closely with the theoretical, conceptual and material issues his argument presumes, such as arguments that don’t regard language as a second order supplement to matter.⁷⁸

⁷⁷ This idea will be dealt with in detail in the following chapter with reference to the biological philosophy of Georges Canguilhem.

⁷⁸ It is worth noting that Cohen does not engage with the arguments of feminist theorists whose works deal closely and rigorously with these issues. For instance, scholars, such as feminist philosopher Judith Butler, have endeavoured to account for the discursive production of gendered and sexed subjects *without* recourse to a model or analytic frame that separates life and language. In *Gender Trouble* (1990), Butler argues that subjects are always already discursively determined, such that one cannot occupy a position outside the juridical structures of language and politics. This text, which critically interrogates the sex/gender distinction, deals centrally with relation between nature (biology) and culture. In theorising this division, her work offers conceptual tools for understanding the prediscursive (natural sex) as itself an effect of culture. Thus, whilst Butler’s work contains its own

Instead, Cohen's use of the above terms often infers a causal relation between discourse and biology, and suggests that the former *infects* the latter. He writes:

Those of us who live within the province of Western medical practice incorporate immunity both in our tissues and in our minds. Most of us who rely on allopathic medicine as our primary means of health care now materially embody immunological doctrine (via vaccinations, inoculations, antibiotics, etc.). That is to say, we have been biochemically altered at the cellular, molecular, and perhaps even subatomic levels by the powerful consequences of this transformative image. Furthermore, we not only recognise ourselves through the frame of biological immunity (e.g., believing that we have an immune system or that our bodies defend themselves against pathogens) but also hold that immunity tells us something fundamentally true about our experiences of health and illness. In doing so, we make immunity matter. (2009, 34)

This passage describes the body as an object materially affected and physically transformed by medical practices *engendered by the discourse of immunity*. Here, Cohen views biology as an inert, passive mass that is subjected to, and modified by, a series of external biomedical instruments and interventions (such as vaccination and antibiotics). Within this frame, political concepts 'enter' biology insofar as they structure and inform biotechnological and clinical practices to which bodies are then subjected. For Cohen, immunity becomes a biological phenomenon only as an effect or consequence of the instrumental and technical applications of this discourse. This causality is further affirmed in Cohen's assertion that 'we make immunity matter'. He argues that immunity's material purchase as a biological principle relates to the fact that we invest it with meaning and significance.⁷⁹

inconsistencies, it is nevertheless an important historical example of the kinds of arguments that have been made in the humanities to address the issues that Cohen's analysis passes over.

⁷⁹ This point is also illustrated in the following quotation: 'Metchnikoff's immune theory imaginatively and materially remakes the living human organism. In its wake, new bioscientific technologies proliferate that transform us through and through: vaccinations, inoculations, antibiotics, antibody tests, genetic medicines, and even the public health campaigns which mobilize them all, seek to diminish our vulnerability as beings who necessarily coexist with microscopic others that may harm us' (Cohen 2009, 267).

Cohen's figuration of matter as a passive recipient or object of discursive practices demonstrates that his argument is primarily *epistemological*. Ultimately, he argues that immunity transforms our biology only to the extent that it transforms medical knowledge and practice (construed as linguistic and cultural). Thus, Cohen's critique provides an account of how the concept moves across different discursive domains. For instance, he explains that 'immunity metaphorically carries over the legal logic that historically animates it into biological texts and contexts' (2009, 49); and the concept of self-defence enters 'the nature of living matter' 'by analogy' (2009, 55). As such, the question of how immunity is biologised falls outside the parameters of Cohen's analysis: his many references to the body's fleshy materiality (e.g. cells, molecules) are references to ways of *knowing* or *construing* this materiality, which we are lead to believe, is not inherent to these processes of knowing or construing (itself). This commitment to biology as a purely cultural discourse is reflected in his reduction of immune therapies to discursive effects. Cohen's text excludes any investigation of how bodies lend their very substance to these cultural ideas and instrumentations. How is biological matter receptive or responsive to these cultural and political determinations? If there wasn't some sort of accordance between biology and discourse, how would vaccinations and antibiotics work? How could immunity operate so effectively as a scientific fact if it (and therefore politics) wasn't somehow already intrinsic or native to biology?

Naturalisation: biopolitics as an immunological narrative

So far I have argued that Cohen's critique is characterised by two competing claims. On the one hand, he makes the ontological argument that politics transforms into biology (the political literally becomes biology). On the other hand, he maintains that immunity's shift in context, from politics to the biological and biomedical sciences, indicates that it is a concept taken out of context (an epistemological argument). The latter claim is one based in the intuition that there is something wrong with, or problematic about, using political concepts to describe the behaviour of biological phenomena. Furthermore, I have illustrated that the ontological argument Cohen proposes remains unsubstantiated in the genealogy itself, and

instead, his work is more clearly defined by the moral argument it makes concerning immunity's misappropriation (the seamless transition from politics to the biological and biomedical sciences).

Significantly, Cohen accounts for immunity's re-contextualisation by arguing that juridico-political immunity is erroneously *naturalised* as a biological concept. He understands naturalisation as a metaphor that describes immunity's appropriative transfer from politics to biomedicine. He writes, '[i]mmunity incarnates ideas about human being from modern politics, economics, law, philosophy, and science, which then belatedly achieve scientific status when immunity *inoculates* them into the living organism and thereby validates them as essentially "natural"' (2009, 8, emphasis added). A few pages earlier, he states, '[i]mmunity strangely *grafts or inoculates* both military and political potentials into human biology as an entangled mode of explanation' (2009, 6, emphasis added). And with reference to the notion of 'immunity-as-defense', Cohen claims that 'biomedicine...*transplants* this new biopolitical hybrid into the living human body' (2009, 3, emphasis added). In each of these instances, Cohen refers to therapeutic practices as literary devices to describe how political and cultural ideas are naturalised as scientific and biological concepts. Grafting, inoculation and transplantation – which each refer to physiological processes of naturalisation – serve as metaphors for the processes or mechanisms through which immunity negotiates the boundary between the fields of politics and biology. In appropriating these immunological concepts, Cohen infers a mechanistic explanation of how these different areas of life become intertwined: he uses them to bring politics into the study of biology, or rather, to show how these spheres become indistinguishable from one another.

Although grafting, transplantation, and inoculation refer to quite different bio-technical procedures, they are nevertheless grounded in a common immunological principle. In each instance, the immunological body is induced to tolerate something foreign to itself (nonself) as native (self) – that is, the body is conditioned to no longer elicit the same harmful response to that foreign agent. In the cases of grafting (allografts) and transplantation, the host's active defense mechanisms are suppressed so that the host body will accept tissues (for example, vital organs) from foreign donors of the same species. Here, foreign tissues are supported, nourished and

incorporated physiologically by the body as though they were part of that body (native to the self), and as such, they *become* part of that body. In the case of inoculation, a small amount of attenuated viral material is injected into the host to induce the generation of specific antibodies that, upon a subsequent or later infection (a second encounter), proliferate within, and protect, the host. Inoculation describes the process by which the host body's immune system alters its response to further infection (by the same agent) from harmful to harmless. This alteration in response corresponds with a transformation in the identity of the antigenic substance – from toxic (non-self) to benign (self) – specific to that body. As such, grafting, transplantation and inoculation each describes an *initial* instance of infection (the penetration of one entity by another) that sets in motion a process of *naturalisation* (the transformation of an entity's status/identity from foreign to native).

When Cohen employs these concepts to describe immunity's migration, he argues that politics *infects* biomedicine. Moreover, he construes this infection as catalysing a process of naturalisation, where politics, viewed as foreign (external) to biological phenomena, is incorporated into biomedicine as though it were native to this domain (as though its newfound status as scientific fact indicates that it was never *not* biological). Here, Cohen imagines politics and biology in the conventional immunological terms of self and non-self (native and foreign, inside and outside), and suggests that politics contaminates or infringes upon a sphere (an entity or body) to which it doesn't normally or naturally belong. As such, he conceptualises the entry of politics into biomedicine as the *intrusion* of a foreign concept: it is identified as an instance of *pathology*, a deviation from, or aberration of, the normal. However, this impropriety is veiled by immunity's incorporation into biomedicine – by the concept's shift in status from foreign to native (cultural to natural). Thus, Cohen offers naturalisation as a theorisation of how political concepts come to be understood as biological concepts, by accounting for the specific nature of this confusion, intrusion and/or infection in conventional immunological terms.

There is a striking resemblance between the underlying logic of these immunological procedures and the principle critical-theoretical framework Cohen employs to make his argument, namely, the Foucaultian concepts of biopower and biopolitics. Crucially, Cohen's interpretation and application of immunological

concepts reflects his reading of Foucault: one that is consistent with an orthodox interpretation of immune events, based in the theory of self-nonsel discrimination, and thus firmly grounded in the principle of immunity.⁸⁰ Cohen's interpretation of biopower draws heavily on the trope of infection, and thus also on the causal model of immunological explanation it implies. In this sense, his interpretation of biopower as an historical phenomenon is consistent with his basic understanding of immune events, and consequently, it begins from the assumption of a familiar series of agonisms including self/other, native/foreign, nature/politics, normal/pathological, good/bad. Importantly, it is this agonistic understanding of relationality that Cohen uncritically installs in one instance, only to dispute and reject in another.

Foucault, biopower, biopolitics

Biopower is a term Foucault uses to name the entry of life into politics that characterises modern forms of power. This concept receives its clearest elaboration in two of Foucault's essays, namely, 'Right of death and power over life' in *The History of Sexuality, Volume One* ([1976] 1998), and in the concluding chapter of *Society Must Be Defended: Lectures at the Collège de France, 1975-76* ([1997] 2004). In these chapters, Foucault argues that a major historical shift has occurred with respect to the operation and function of political power: around the mid seventeenth century, state power in Europe undergoes a dramatic change in both its primary object and modes of exercise. Foucault states that this shift corresponds with a transition from pre-modern to modern times, and specifically, a movement from sovereign power to modern power. He claims that the advent of modernity heralds a new form of power – biopower – that takes *life* rather than death as its primary object.

In explaining this phenomenon, Foucault gives a brief account of sovereignty according to its classical conception. This discussion (contained in the aforementioned essays) focuses on 'the right of life and death', which he names 'one of sovereignty's basic attributes' ([1997] 2004, 240). According to Foucault, 'the right of life and death' refers generally to the sovereign's capacity to 'either have

⁸⁰ Immunological orthodoxy, and specifically, adherence to the belief in a given immunological self, is discussed in detail in Chapter One.

people put to death or let them live' ([1997] 2004, 240) – 'to *take* life or *let* live' ([1976] 1998, 136, original emphasis). He emphasises that this right is exercised only in instances where the life of the sovereign is directly threatened, as the central purpose of the right is the 'defense of the sovereign, and his own survival' ([1976] 1998, 135).

Foucault argues that although the right involves both the granting and taking of life, it is nevertheless characterised by 'a startling dissymmetry' ([1997] 2004, 241):

The right of life and death is always exercised in an unbalanced way: the balance is always tipped in favour of death. Sovereign power's effect on life is exercised only when the sovereign can kill. The very essence of the right of life and death is the right to kill...the right of the sword. ([1997] 2004, 240)

From this perspective, sovereign power is exercised only in the action of putting subjects to death. As Foucault states, it is a power that works primarily by 'means of deduction...a subtraction mechanism' – it is a force that 'seize[s] hold of life in order to suppress it' ([1976] 1998, 136). Within this political frame, then, the 'life' of subjects figures only negatively with respect to death as its potential absence or negation.

Foucault claims that the transition from sovereign to modern power coincides with a major change in the specific life or life-form that political power protects and preserves. He explains that the life regarded as most important shifts from the sovereign to the collective of subjects that constitutes the state:

Wars are no longer waged in the name of a sovereign who must be defended; they are waged on behalf of the existence of everyone...the existence in question is no longer the juridical existence of sovereignty; at stake is the biological existence of a population. ([1976] 1998, 137)

For Foucault, the demise of sovereignty brings with it a radical reconceptualisation of the state in terms of the individual lives that together manifest the social body. He

argues that the state now identifies itself in the social collectivity, and in doing so, takes this body of subjects as its immediate object of concern. In recognising its own wellbeing in the life and vitality of its subjects – in their health, productivity, and prosperity – the modern state finds its ultimate expression in ‘the function of administering life’ ([1976] 1998, 138). Sovereignty comes to be replaced by a form of political power that regards the lives of its subjects as its most valuable asset, and thus the principle object and site of its operation.

Foucault asserts that modern political power is centrally devoted to the administration, management and protection of life. Biopower is ‘a power that exerts a positive influence on life, that endeavors to administer, optimize, and multiply it’ ([1976] 1998, 137). Contrary to sovereign power, which manifests in the spectacle of life’s erasure, biopower values life and ‘establishes its dominion’ ‘over life, throughout its unfolding’ ([1976] 1998, 138). ‘[R]ather than simply wielding death and diminishment as sovereign power does’, Cohen explains, ‘biopower *appreciates* life by recognizing in it an exploitable natural resource’ (2009, 21, original emphasis). Importantly, Foucault argues that this political investment in life is realised in a variety of techniques for studying, fostering and preserving this vitality, that are peculiar to the seventeenth and eighteenth centuries. He divides these techniques into two categories based on the specific form of human life they address, namely, the individual or population. Foucault states, this ‘power over life evolves in two basic forms’ that together form a ‘great bipolar technology’: ‘the disciplines: an anatomo-politics of the human body...and regulatory controls: a bio-politics of the population’ ([1976] 1998, 139, original emphasis). As such, he claims that through the intersection of these different techniques, human life becomes the locus of political power.

According to Foucault, the disciplines refer to a series of techniques used to govern the social body by ‘disciplining’ its basic unit, the individual. Emerging in the late seventeenth and eighteenth centuries, the disciplines operated primarily through the ‘framework of institutions such as schools, hospitals, barracks, work-shops’ ([1997] 2004, 250), which each isolated individuals and subjected them to regimes of training and education. Foucault argues that the implementation of these institutional and knowledge frameworks seized on the individual as a target of disciplinary power.

Stressing the disciplines' atomising effects, he explains, 'discipline tries to rule a multiplicity of men to the extent that their multiplicity can and must be dissolved into individual bodies that can be kept under surveillance, trained, used, and, if need be, punished' ([1997] 2004, 242).

One of the major consequences of disciplinary power is a perception of the subject as an individual body regarded as 'a source of forces that have to be rendered both useful and docile' ([1997] 2004, 249). Foucault argues that disciplinary mechanisms operate from the presumption that the body is a discrete entity that forms the basic unit of human life. As such, these mechanisms actively produce the body as the physical and psychic location of the person, and therefore a site at which the state can intervene in the life or vitality that subjects embody. Foucault underscores the disciplinary view of the body as 'an organism endowed with capacities' ([1997] 2004, 249) – vital capacities that the state can control as an asset. He explains, disciplinary power '[centers] on the body as a machine', on 'the optimisation of its capabilities, the extortion of its forces, the parallel increase of its usefulness and docility, [and] its integration into systems of efficient and economic controls' ([1976] 1998, 139). For Foucault, it is by these means that human life is directly politically engaged *as* an individualised form.

In contrast to the disciplines, biopolitics refers to a series of regulatory technologies that address the life of the social body as an entity in itself. Supplementing the atomising perspective of the disciplines with a view of life from the vantage of the whole, Foucault asserts that biopolitics examines and engages human life as a collective existence. As Cohen explains:

Biopolitics emerges in the eighteenth century as a regulatory ensemble that both constitutes and conditions a new aggregate form of life: population. One of a series of modern abstractions that hypostatize the regularities of collective living and discern quasi-natural laws within them (e.g., the economy, society, human nature), population conceives the individual lives of national subjects as units belonging to a more encompassing vital domain which the state now recognises as a resource for its own ends. (2009, 20)

Foucault claims that biopolitical technologies focus not on the stand-alone body, but on ‘the species body, the body imbued with the mechanics of life and serving as the basis of biological processes’ ([1976] 1998, 139). He notes that the examination of human life through the lens of population produces the aggregate as a unique set of quantifiable characteristics. As a result, human life emerges as a collective organism ‘affected by overall processes of birth, death, production, [and] illness’ ([1997] 2004, 243). Foucault argues that the study of these traits gives rise to the establishment of a ‘series of interventions and regulatory controls’ addressed to the issues of ‘propagation, births and mortality, the level of health, life expectancy and longevity,’ ([1976] 1998, 139). These include demography, the study of endemic illnesses ([1997] 2004, 243), and growing state interest in ‘public health, housing, and migration’ ([1976] 1998, 140).

Foucault explains that the implementation of a biopolitical frame conjures life as a patternment of ‘biological and biosociological processes’ ([1997] 2004, 250): life, taken at the level of population, emerges as a diverse set of characteristics or ‘general biological processes’ ([1997] 2004, 249). According to Foucault, the ‘economic and political effects’ ([1997] 2004, 246) of these processes mean that the state views the population as ‘a problem that is at once scientific...political [and] biological’ ([1997] 2004, 245). Biopolitics, then, involves the establishment of mechanisms designed to intervene in, and affect, these processes ‘at the level of their generality’ ([1997] 2004, 246). Biopolitical mechanisms work to improve, alter, and ultimately regulate biological processes across the entire population, thus providing a second and complementary means by which the state exercises power over/through life ([1997] 2004, 246-7).⁸¹

Reading Foucault with Latour: immunity as a ‘biopolitical hybrid’

⁸¹ This discussion presents a basic overview of Foucault’s notion of biopower and its two primary aspects, namely, the disciplines and biopolitics. For more on Foucault’s notion of disciplinary power, see *Discipline and Punish: The Birth of the Prison* ([1975] 1991). For further elaboration on the concept of biopolitics, see *The Birth of Biopolitics: Lectures at the Collège de France, 1978-79* ([2004] 2008), *Security, Territory, Population: Lectures at the Collège de France, 1977-78* ([2004] 2007), and *Society Must Be Defended: Lectures at the Collège de France, 1975-1976* ([1997] 2004).

The centrality of Foucault's work for Cohen's project lies with its theorisation of 'the natural body' (the discrete, monadic body) as an artefact of modern forms of political power. As Cohen explains, 'Foucault's biopolitical thinking emplots "the body" as a life-form that takes place within the historical transformations that modernize us' (2009, 15-16). For Cohen, the natural body is the politically circumscribed figuration of life that underlies biological immunity, and which immunity realises and materialises as a biological entity: 'biological immunity and the body mirror each other, each reflecting the other as both natural ground and *raison d'être*' (2009, 14). Thus, Cohen views biological immunity and the body as political concepts that each affirms the other as a natural phenomenon.

According to Cohen, the body as theorised in Foucault's account of biopower, is a modern innovation that problematises the distinction between politics and life at this historic juncture. As the principal site of power's operation, the body manifests the politics/life boundary: it literally embodies the problem of where natural life ends and political life begins. Cohen writes:

Formed through a "technique of subjectification" and target for "new mechanisms of power", the "natural body" clearly does not manifest "nature" in an unmediated or ontological sense. Rather, constituted by and for strategic exigencies, the natural body serves as the political locus within which *vital forces endure*. (2009, 19)

Cohen defines the natural body as an entity that complicates any simple notion that life or natural life – as we imagine, interpret and experience it – can be separated from politics, or exists outside the political domain. At stake in Cohen's reading of Foucault, then, is how Cohen interprets the interrelation of politics and life encapsulated in the 'natural body' (and biopower, more generally), that is, how life becomes an object and instrument of political power.

Cohen's reading of biopower and its investment in the natural body is directly informed by the central insights of another critique of modernity, Bruno Latour's *We Have Never Been Modern* (1993). Meditating on the relation between this work and Foucault's, Cohen writes, '[w]e discern in Foucault's natural body one of Latour's

social-natural hybrids that shore up the Modern Constitution, since its nature is thoroughly political' (2009, 19). Cohen argues that the natural body, as it figures in Foucault's discussion of modern power, is a 'social-natural hybrid'. His understanding of the enmeshment of politics and life, exemplified by the notion of a naturally autonomous, bounded body, is mediated by Latour's notion of hybrids. As such, Cohen's account of how politics becomes intrinsic to life hinges on his use of the concept of hybrids in illuminating Foucault's historico-theoretical project.

In *We Have Never Been Modern*, Latour gives a critical account of what it means to be modern. Orienting his discussion around some of the foundational precepts of modernity, most notably the assumed divisions between Nature and Society, human and nonhuman, Latour argues that the modern era is, in *actuality*, defined by phenomena that complicate or contest this division. Specifically, he claims that modernity is characterised by 'the proliferation of hybrids' (1993a, 1): phenomena and situations in which nature and culture are interwoven in complex networks that confound their simple separation. As Cohen explains: 'Hybrids form material networks that bind up "nonhuman nature" and "human culture" while disappearing below, beneath, or beyond modernity's epistemological and ontological threshold' (2009, 12). Latour notes that the existence of hybrids stands in contrast to, and is concealed by, the prevailing perception of nature and culture, science and politics, the nonhuman and human, as discrete ontological categories. He suggests that intellectual investment in these divisions (the bifurcations that underpin a conventional humanism) contradicts the actual or underlying nature of modern phenomena. As such, Latour argues that there is a fundamental discordance between the appearance and reality of modern phenomena, and that the former obscures the latter (1993a, 1-12).

In light of this paradox, which he claims is a dominant feature of modernity, Latour puts forward a hypothesis explaining how this contradiction is sustained. He states that modernism works through two sets of practices that are imagined to operate separately from one another – *translation*, which 'creates mixtures between two entirely new types of beings, hybrids of nature and culture', and *purification*, which 'creates two entirely different ontological zones: that of human beings on the one hand; that of nonhumans on the other' (1993a, 10-11). In Latour's terms, translation

(‘mediation’ or ‘hybridization’) refers to practices that generate hybrid phenomena. He explains that these phenomena typically take the form of ‘networks’ (in the sense of actor-networks). For instance, a hybrid might emerge as ‘a continuous chain’ comprising ‘the chemistry of the upper atmosphere, scientific and industrial strategies, the preoccupations of heads of state, the anxieties of ecologists’ (1993a, 11). Conversely, purification describes ‘the modern critical stance’ (1993a, 11) – it refers to a worldview grounded in a strict division between the natural and social worlds, and a set of practices that adhere to this separation.

For Latour, the interdependent relationship between these practices is crucial to understanding what he describes as the ‘Modern Constitution’ (1993a, 13) – the fundamental principles that determine or govern the modern. He argues that in demarcating nature from culture, purification *denies* the work of translation; the intellectual foundation of the modern perspective contests the very existence of hybrids. However, Latour explains that this denial actually *gives rise* to the proliferation of hybrids: ‘the more we forbid ourselves to conceive of hybrids, the more possible their interbreeding becomes’ (1993a, 12). Or in Cohen’s terms, ‘hybrids “work” precisely insofar as their work remains immune from the radical, or indeed ontological, bifurcation that modernity presumes’ (2009, 12). Consequently, Latour claims that purification makes translation possible – the modern propensity to quarantine nature from culture, nonhuman from human, has the opposite effect of engendering scenarios that render these divisions inherently compromised or unsustainable.⁸²

Crucial for understanding Cohen’s critique is Latour’s notion of hybrids. At a basic level, Latour’s concept of hybridity draws on the term’s most literal meaning – a composite or conjunction of heterogeneous entities, or an entity heterogeneous in origin. Hybrids are composed of entities capable of being attached in complex arrangements or networks, which Latour designates ‘nature-cultures’ (1993a, 7). In this reading, the logic underpinning hybridity is one of *connection*. However, the issue of whether this concept presumes the prior separation of nature and culture, nonhuman and human, is complicated by the fact that Latour defines the work of

⁸² This brief account of Latour’s critique of modernity omits much of its finer detail, which, due to the scope of this chapter, cannot be covered here. See Latour (1993a).

hybridisation *against* that of purification, and thus also the ontological distinction it maintains between these categories. In this sense, hybridity implies the ontological interimplication or involvement of nature and culture. Moreover, Latour refers to hybrids as ‘quasi-objects’, which, at other points, he uses as a synonym for ‘actor-network’ (1993b, 262). Recalling the discussion of actor network theory in the previous chapter, the equation of hybrids with actor-networks confounds any simple sense of hybrids as aggregations. If every actor is simultaneously a network, or if the agency that apparently individuated actors demonstrate is itself a phenomenon of the whole field, then the system to which these expressions belong is one that cannot be based in the structural logic of addition.⁸³

How, then, does Cohen interpret the notion of hybridity? In the text’s introduction, Cohen provides a very brief summation of Latour’s thesis in *We Have Never Been Modern*, and the primary concepts he takes from this work. Cohen explains that hybrids ‘[materialize] concrete instances of nondifferentiation’, and are characterised by their ‘nonappearance and nonintelligibility’ (2009, 13). In other words, they are phenomena in which the social and natural, human and nonhuman are *not* differentiated, and whose existence *as* nondifferentiated is neither perceptible nor intelligible.⁸⁴ However, what Cohen means by ‘nondifferentiated’ is somewhat unclear. For the most part, Cohen’s reading of hybrids is illustrated through his discussions of specific examples of hybrid phenomena, namely, biological immunity and biopolitics.

As a whole, Cohen’s text argues that biological immunity is an exemplary instance of the hybrid, modern phenomenon, biopolitics (in the broad sense of a politics of life). In fact, Cohen defines immunity explicitly as a ‘biopolitical hybrid’

⁸³ This point is summed up nicely in an essay by Vicki Kirby, ‘Natural Convers(at)ions: Or, What If Culture Was Really Nature All Along?’ (2011). In elaborating the provocation that Latour’s notion of the actor-network presents, she writes: ‘in [Latour’s] various clarifications of what he means by “network” and “actor” he explains that nets are inseparable from the act that traces them, and further, that this act of tracing isn’t done by an actor external to the network that reveals them. In other words, all “parts” of this network “device” are a sort of synchronous, assemblage/emergence’ (2011, 85). For a fascinating critique of Latour that addresses the logic of conjunction/aggregation as it appears in his work (namely, as a distinction between human *and* nonhuman), see Kirby (2011).

⁸⁴ The latter point accords with Cohen’s discussion of biological immunity as a biopolitical hybrid whose “political nature” hides in plain sight’ (2009, 14). As noted earlier in this chapter, Cohen’s text emphasises that biological immunity constitutes a form of deception – he argues that the concept’s true political nature is veiled under the false guise of a scientific, biological fact.

(2009, 3). He states that biological immunity constitutes a Latourian hybrid because it *connects* the political and the natural whilst appearing to do the opposite: ‘by borrowing on its explicitly juridico-political legacy and then claiming to describe nature itself, biological immunity succinctly illustrates how hybrids *conjoin* nature and society while occluding the fact that they do so’ (2009, 12-13, emphasis added). Here, biological immunity functions as a hybrid because it draws on political ideas to elaborate corporeal processes, whilst simultaneously presenting itself as a scientific account of a strictly natural phenomenon. According to the logic Cohen evokes with the term ‘conjoins’, biological immunity *fuses* politics and nature under the (false) guise of their separation (a separation affirmed in his exhaustive account of immunity’s migration *from* politics *to* biology). Thus, for Cohen, immunity’s efficacy as a hybrid stems from the fact that it masks a joining it enacts.

This view of immunity derives from Cohen’s interpretation of biopolitics as a ‘hybrid domain’ (2009, 15). He writes:

...biopolitics names a “hybrid domain,” or a domain of hybridisation. It makes visible and intelligible relations of force which, on the one hand, seek to distinguish biology and politics epistemologically and ontologically and, on the other, endeavor to mobilize “life” as a vital resource for, and target of, power. (2009, 15)

Here, Cohen draws on the notion of hybrids to articulate the involved relation of politics to life described in the Foucaultian concept of biopolitics. Cohen argues that biopolitics is a phenomenon that epitomises the paradox of the moderns. In keeping with the modern critical stance (as outlined by Latour), biopolitical technologies differentiate between nature and culture, science and politics. However, the efficacy of biopolitics as a mode of power derives from the fact that biopolitical technologies complicate the distinction between political and natural life – they render the boundary between these domains unlocatable.

Life itself

At issue in Cohen's critique is the way 'life' is figured in a biopolitical context. Reading Foucault with Latour, Cohen puts forward an account of how life becomes politicised that relies on the same philosophical assumptions that underpin a conventional notion of hybridity (conjoined, heterogeneous entities). According to Cohen, human life emerges in specific forms that are, in themselves, inherently political, but which appear unequivocally natural (namely, the individual body and population):

Alluding to a pervasive engagement with, or entanglement in, "life itself", biopolitics bespeaks a palpable sense that power has operated for the last two hundred or so years in part by creating, manipulating, managing, promoting, enhancing, and investing in a "zone of indistinction" (to appropriate Agamben's idiom) between nature and culture which we all too unproblematically call "the body". If both the life of the body and the quantum of life realized within bodily aggregations known as "populations" emerge as political concerns in Europe during the late seventeenth century and the eighteenth, we might say that they do so as hybrids which entrain the nature that humans incorporate within the politics that we enact. In other words, following Foucault, biopolitics seems to gesture toward an unremarked elision between nature and culture both in what we name as "human" and in ensembles of living human beings. Moreover, biopolitics reveals this hybrid formation as a highly potent domain, or as a domain whose potency derives from the biopolitical indistinction it motivates. (2009, 15)⁸⁵

In this statement, Cohen argues that the operation of biopolitics as a mode of power hinges on the *indeterminate* (or 'nondifferentiated') status of the specific life-forms it takes as its primary objects – the individual body and population. That is, the efficacy

⁸⁵ The work of philosopher Giorgio Agamben features prominently in contemporary critical discussions of Foucaultian biopolitics. Agamben's work, which theorises the relation between *zoē* (bare life, 'the simple fact of life in a biological sense') and *bios* (cultural or political life, 'a way of life shared among a particular group'), presents 'a "correction" or at least a "completion" ... of Michel Foucault's account of the emergence of biopolitics as a key moment in the development of modern techniques of state power' (Agamben in Patton 2007, 204). Agamben's work is not explored in this chapter, as it does not feature prominently in Cohen's analysis. For more on Agamben's reading of biopolitics, see Agamben (1998). For a discussion of the concepts of biopower and biopolitics as used by both Foucault and Agamben, see Patton (2007). For an overview of Agamben's philosophy, see Mills (2008).

of biopolitics relates to the fact that these two life-forms are neither strictly natural nor cultural/political. Cohen asserts that these figurations of life occupy ‘a zone of indistinction’ between nature and culture, and as such, blur or nullify the boundary between these domains. He views life, in both its individual and collective forms, as located at the threshold of nature and culture. Cohen identifies the individual body and population as hybrids that ‘entrain the nature that humans incorporate within the politics that we enact’, and as such, argues that these figurations establish our nature as a *consequence* of our politics.

Somewhat problematically, Cohen’s characterisation of biopolitics as ‘a pervasive engagement with, or entanglement in, “life itself”’ (2009, 15) offers two quite different accounts of the politics/life relation. On the one hand, he defines biopolitics as an ‘engagement with’ life itself, where engagement implies the meeting or interaction of two entities (political power and life itself) that exist independently of one another. According to this logic, power’s operation takes the classical form of an *intervention*, an interference. Power is conceptualised as external to, and separate from, life; and life emerges as an object or enclosed space that power penetrates and manipulates. Engagement, then, infers a model of power that, in beginning from the presumption of a series of dichotomies (inside/outside, native/foreign, life/politics), takes the form of an infection. However, on the other hand, Cohen describes biopolitics as an ‘entanglement in’ life itself. Contrary to engagement, entanglement suggests a view of power (and thus politics) as an instance or aspect of the life it takes as its object. If politics and life are entangled, then politics is itself a peculiar manifestation of the life it objectifies, harnesses and invests. Formulated in this way, power cannot be conceptualised as exterior to life. The logic of entanglement confounds our ability to discriminate between politics and life, inside and outside, primary and secondary: the enfolding of these terms means that power acts upon the life that it *is*.⁸⁶

Cohen’s reading of biopolitics is demonstrated in the fourth chapter of the text, which examines the cholera epidemics that recurred across Europe throughout the nineteenth century. Cohen argues that the cholera crisis is a concrete example of a

⁸⁶ Foucault’s account of power as a systemic phenomenon is outlined in detail in Chapter Three.

biopolitical event; for him, its biopolitical significance lies with the fact that epidemics are simultaneously political *and* medical crises.

Cohen introduces the cholera crisis by detailing the ‘contentious medico-political context’ (2009, 218) in which it arises: ‘the most significant medico-political convergence appears during the international deliberations among European nations about the cholera pandemics’ (2009, 217). Cohen presents the epidemics through the lens of the International Sanitary Conferences that took place across Europe in response to disease outbreaks (from 1851 to 1911). The conferences, he explains, provided a forum for nations to discuss, devise and implement collective strategies to combat the spread of cholera. In particular, the meetings broached the issue of standardising quarantine measures that could be adopted in the event of epidemic outbreaks (2009, 223).

Cohen’s analysis of these meetings centres on the political debates that unfold about the efficacy of quarantine as a preventative measure against cholera. He states that nations such as Austria and England opposed the imposition of quarantines on the grounds that cholera could be better prevented and contained if individual nations addressed the more localised issue of sanitation (2009, 219). Cohen highlights that disagreements about the efficacy of quarantine reflect the adherence of different nations to different theories of disease causality. He stresses that in these political forums, competing views on the most useful methods of ameliorating epidemics correspond with different medical interpretations of infection. Additionally, Cohen observes that specific theories of disease exemplify the political and economic interests of individual nations. For instance, he notes that the English preference for ‘waste management and sanitary regulation as the state’s primary means [of circumventing] epidemics’ reveals England’s ‘ideological commitment to economic and political liberalism’ (2009, 219):

The liberalism underpinning English sanitary health policy – and consequently its official theories of disease – proves a main point of contention at the International Sanitary Conferences, where the British assiduously fend off or modify all measures which potentially threaten trade (especially quarantine). (2009, 221)

Cohen stresses that the English opposition to quarantine relates as much to the protection of their economic interests with respect to trade, as it does to medical fact. He argues that the medical explanation that the English prefer is *both* political and medical: in the English example, the political and the medical become impossible to disaggregate.

Examining cholera from the perspective of these diplomatic negotiations, Cohen argues that the crisis is defined by the ways in which medical explanations of disease and political responses to epidemic outbreaks are complexly inter-woven. Through the English example, he demonstrates that political efforts to deal with outbreaks are profoundly implicated in the medical interpretation of cholera as a disease. In fact, the confusion between the political and medical is such that medicine emerges *as* a political discourse: ‘medical explanation emerges at the expanded Constantinople gathering [1866] as a political instrument that shapes how nations diplomatically address one another’s aims...different arguments about disease causality manifestly bolster different national interests’ (Cohen 2009, 225). Here, Cohen emphasises that cholera comes to be understood as a disease entity through these political debates. In describing medical explanation as a political instrument, he illustrates its inseparability from national political and economic concerns, and consequently, shows that the medical and political aspects of the crisis are entangled with/in one another.

In demonstrating that political responses to the crisis relate intrinsically to the way cholera is defined as a disease within specific national contexts, Cohen’s analysis suggests that these aspects (political and medical) are inextricably inter-implicated. For instance, Cohen’s contextualisation of the crisis as a whole implies that cholera’s legibility as a biological phenomenon arises within, and is thus determined by, a distinctly political frame of reference. In this scenario, medical explanations cannot be set apart from the political discussions and economic interests that inform these specific accounts. It could be argued that political responses (quarantine and sanitation) do not precede medical explanations of cholera, and vice versa: neither can be identified as the catalyst or origin of the other. Rather, each implies, anticipates,

and expresses the other; politics and medicine are not foreign to one another, but always already implicated in the form the other takes.⁸⁷

Yet Cohen leans decisively toward a view of cholera as an event composed of different facets that are causally related to one another. Temporality is a linear unfolding in this account. Consequently, Cohen favours an interpretation of biopolitics as an infective relation between politics and medicine (and thus nature, by proxy). This reading is demonstrated in Cohen's discussion of English sanitary reform and specifically, Edwin Chadwick's position on 'filth' as a major contributor to epidemic disease. Reflecting on the 'medical politics' of sanitation, he argues, 'Chadwick introduces "filth" as a simultaneously social and natural issue – as literally and materially a *biopolitical issue*, insofar as it issues from humans who live both politically and biologically' (2009, 220, original emphasis). Crucially, Cohen defines filth as a biopolitical issue because it is *both* social and natural – because it pertains to humans who are political *and* biological. As such, he characterises biopolitics in terms of the coexistence of nature and society, biology and politics. Significantly, this viewpoint differentiates political being from biological being and betrays Cohen's view of human life as an interaction between, or complex composition of, these two fundamental forms of being.

This conjunctive logic is explicit in Cohen's description of cholera epidemics as hybrid phenomena. He writes, '[f]rom its opening moments...the 1866 conference engages cholera's hybrid status as at once a biological, political, economic, and military event' (2009, 226). Here, cholera's identity as a hybrid derives from the fact that it manifests in different but interconnected contexts; or rather, its emergence foregrounds the extent to which life's various domains overlap. For Cohen, cholera epidemics are events that *link* natural and cultural elements: 'through the diplomatic

⁸⁷ This argument – that politics and science/medicine are always already entangled enterprises – is made by Robyn Smith in her study, 'The emergence of vitamins as bio-political objects during World War I' (2009). Smith states that 'prior to their isolation as bio-chemical molecules', vitamins 'emerged as players, active agents, in Britain's wartime bio-political problems of food distribution and population health' (2009, 180). Through a detailed discussion of the relationship between early scientific understandings of the role of vitamins in nutrition and the problems that beriberi and scurvy posed for the British and Allied war effort, she argues that vitamins became stabilised as biopolitical objects. Central to Smith's account is the assertion that scientific knowledge about vitamins and the political utility of vitamins emerged together: 'the vitamins lent their potential as scientific objects to the political situation, the political situation lent the vitamins increasing stability as objects' (2009, 180). For further details of this argument, see Smith (2009).

process, cholera epidemics overtly emerge as biopolitical hybrids (in Latour's sense), conjoining nature and politics as matters of international concern' (2009, 225). With these statements, Cohen deploys hybridity as a conceptual resource and returns us to the view that politics and life are fundamentally separate. He demonstrates that his reading of biopolitics depends on a logic of infection – he understands biopolitics as the result of an instance of contamination (the political infecting the vital). In doing so, he illustrates his commitment to a correlative notion of naturalisation, whereby something foreign comes to be accepted, tolerated or recognised as native (the political is naturalised as biological).

Native and foreign

As we have seen, Cohen's reading of biopolitics as a confusion of the boundary between politics and life (or politics and nature) is grounded in the assumption that these phenomena are initially separate. He accounts for this confusion, which occurs with the transition from sovereign to modern forms of power, by drawing on the conventional immunological concepts of infection and naturalisation. In using these ideas to elaborate the politics/life relation, Cohen interprets biopolitics as a linear, causal narrative: he begins with discrete domains (politics and nature) and argues that the boundary separating them is *then* transgressed (politics contaminates nature). Consequently, he conceptualises power's historical transformation as the naturalisation of politics – or the politicisation of life – such that at/after this point, politics belongs *natively* to the domain of life. Put succinctly, Cohen understands naturalisation and/or politicisation as processes by which life becomes *denaturalised*.⁸⁸

⁸⁸ It is worth noting that this reading of biopower and biopolitics, as an account of how biological life or life itself becomes denaturalised in the modern period, constitutes the most dominant or mainstream interpretation of these concepts. Scholars in critical theory, science and technology studies and the medical humanities who address the notions of biopower and biopolitics typically recount Foucault's explanation of an historical transition from sovereign to modern forms of power, and a corresponding shift in the object of power from death to life (e.g. Cooper 2008, Rose 2007). The assertion that biopower emerges at the end of the 18th and beginning of the 19th centuries – that life *becomes* an object and instrument of political power at this specific historical juncture – suggests that politics and life were not always entangled. The reiteration of this shift in contemporary accounts means that it has become absolutely conventional to view biopower and biopolitics in terms of a conceptual schema that presumes the prior separation of biological life from politics, and then argues that after the turn of the century, these domains become irreversibly confused. For instance, biopolitics is commonly described

This reading of biopolitics mirrors Cohen's account of immunity's biologisation (the naturalisation of juridico-political immunity as a biological concept). In both cases, he argues that the political and the natural become indistinguishable because the former encroaches upon, and corrupts, the latter. For Cohen, this convergence is an act of transgression. In describing the means by which life comes to be infected by politics, he connotes a sense of moral trespass, as though a fundamental limit has been breached or a law violated. Here, confusion and transgression are one and the same: both imply an act of infringement that compromises the integrity of a pure and uncontaminated space (or entity) that necessarily *pre-exists the moment of infection*. When Cohen argues that life has been contaminated by politics he suggests that some natural, normal or pre-political state has been polluted or ruined.

Thus, at stake in Cohen's critique of immunity is an investment in a natural or native domain (a proper origin) that precedes the intrusion of external, foreign elements. His reliance on a causal interpretation of naturalisation presumes the existence of a prelapsarian primary domain that is subsequently altered by the interventions or transformative effects of phenomena considered secondary or epiphenomenal to this original space. As such, Cohen's argument is grounded in a

as an analytic tool for investigating and articulating 'the complex ways in which politics and biological life intersect' (Diprose, Stephenson, Mills, Race & Hawkins 2008, 272), 'the convergences of life and politics' (Cooper, Goffey & Munster 2005, 1), and 'the intense traffic between the biological and the economic spheres' (Cooper 2008, 4). Contemporary studies of biopolitics tend to take the form of detailed elaborations of specific instances of biopolitics, which demonstrate how political governance and biological life have been, or are becoming, increasingly intertwined (e.g. Cooper 2008, Diprose et al. 2008, Waldby & Cooper 2008, Rose 2007, Rabinow & Rose 2006, Waldby & Mitchell 2006). While such investigations offer fascinating insight into biopower's historical and contemporary manifestations, they rarely interrogate the assumption of life's initial separation from politics, and the implications for our understanding of politics and biology respectively. Despite Foucault's assertion that, with the advent of modernity, life becomes both the object *and* instrument of political power, the ontological status of power's 'intervention' goes largely unquestioned. If life is both the means to, and end of, political governance, how could power be exterior to life? This position is expressed by feminist philosopher Penelope Deutscher, who seeks 'a conceptual model that will best stress that life does not precede and await its investiture by power' (2010, 221). Deutscher cites Roberto Esposito's interpretation of biopower: 'Foucaultian life should be considered always already power, and biopower always already life, rather than "investing" [investir] life...or taking "possession of life"...thereby better respecting the overall radicality of the Foucaultian approach to power and resistance' (2010, 222). This reading of Foucault has altogether different implications for our understanding of power and life. It suggests that the politics/life division is an innovation of life. Moreover, if there is nothing prior to either power or life, then there is no such thing as a pre-political nature, nor can power originate anywhere other than in life itself. Consequently, life cannot be denaturalised, as Cohen argues, because there is no fixed, 'prior' point from which to deviate.

commitment to the most fundamental notion of an origin: a fixed, immutable nature. By extension, it is simultaneously invested in a notion of agency – the force that transforms this natural state – as properly human and cultural. Throughout the text, he consistently makes allusions to an authentic (primitive) beginning or an Edenic state, which often takes the form of a pure biology, that has been permanently spoiled or changed. In short, his critique is anchored in a conceptualisation of nativity as an unadulterated nature that is then denaturalised when its purity is compromised by foreign, political elements.

Significantly, Cohen's interpretation of nativity implies a correlative notion of foreignness. In viewing naturalisation as a causal interaction between native and foreign, he interprets the foreign as truly or utterly foreign. In the etymological sense of being 'out of doors' (*foris*) or 'on the outside, exterior' (*foranus*) (Barnhart & Steinmetz 1988, 399), Cohen understands the foreign as something that comes after, or exists at the limit or threshold of, the native. Thus, within the theoretical parameters of his analysis, *the foreign bears no intrinsic relation to the native*: native and foreign are construed as separate, heterogeneous entities whose confusion is a product of their subsequent interaction. To put this in Cohen's terms, *politics (and thus immunity) is in no way intrinsic or native to biology*; we come to embody our politics as a result of historical events that cause these forms of life to *become* confused.

Cohen's nature: a biological community immune to politics

The ontological distinction Cohen makes between nature/politics, or native/foreign, surfaces at various points in his account as a distinction between community and immunity. He refers repeatedly to immunity, which he equates with politics and human culture in *opposition* to the concepts of community and coexistence, which he associates with biology, nature or life itself. This dichotomy is most explicit at points where, in order to stress the essentially political nature of immunity, Cohen asserts the inherent 'naturalness' of an alternative conception –

organismic coexistence.⁸⁹ Earlier in the chapter, I referred to a number of quotations that demonstrate precisely this point. To briefly reiterate, Cohen states, '[t]he longer I work on this project, the less I understand why it seems obvious to us to use a complex legal and political concept to describe how we coexist as organisms' (2009, 14). Again he writes, 'immunity...does not transparently reveal the material processes of the living organism as it coexists with other living beings in shared environments,' (2009, 274). And in regards to Sagan's work, he argues that '[immunity's] antagonistic presumption does not entirely accord with biological thinking about how organisms coexist in shared ecologies' (2009, 8, original emphasis). In each of these statements, the notion that organisms naturally coexist in shared environments is a point Cohen evokes as axiomatic.⁹⁰

Importantly, the immunity/community distinction codes for a difference between sets of values or characteristics that Cohen associates with politics and nature, respectively. Cohen argues that the metaphor of immunity connotes war, defence and hostility, and thus a concomitant view of the organism as a bounded, atomic entity whose being is fundamentally antagonistic. He equates immunity, in a general sense, with the notions of isolation, violence and defence against others – practices or behaviours that are uniquely human. By contrast, Cohen uses community and coexistence as synonyms for connection, communication, cooperation and well-being. He associates coexistence with the ideas of connectedness, collective life and an ability to live harmoniously with others. This opposition between defendedness and connectedness recurs throughout the text. For example, Cohen asks, 'how did we come to believe that as living beings, "the body" *separates us* from each other and from the world rather than *connects us*?' (2009, 26, emphasis added). Earlier on, he writes, '[i]nstead of evoking the organism's essential connection *to* the world in

⁸⁹ See pp. 145-148.

⁹⁰ This distinction between immunity and organismic coexistence can be found at other points throughout Cohen's text. For instance, in outlining the first scientific account of biological immunity, Cohen writes, 'Metchnikoff conceives a definitive *and defensive* way to understand how organisms coexist in environments replete with others' (2009, 2, original emphasis). And in insisting on the constructed, historically situated nature of immunity, he asserts that '[d]espite our ready acceptance...immunity is not a natural choice of images for our ability to live as organisms among other organisms of various sizes and scales – nor is defense, for that matter' (2009, 3). In both these statements, Cohen identifies immunity as a 'defensive' and non-natural rendition of the (presumed) biological fact of organismic coexistence. Interestingly, in defining immunity so sharply *against* the natural, Cohen's analysis cannot accommodate the possibility that 'organismic coexistence' is a concept of life as equally politicised and constructed as immunity.

which it lives, immunity refigures medicine as a powerful weapon in the body's struggle to defend itself *from* its life-threatening context' (2009, 6, original emphasis). And finally, in discussing the modern subject's proprietary self-relation, he argues that 'the exclusivity of property ownership forecloses the possibility of peaceful coexistence' (2009, 75). In these statements, Cohen presents separation and connection, or defended individual existence and peaceful coexistence, as *mutually exclusive* figurations of life.⁹¹

In Cohen's work, immunity/community emerges as a moral dichotomy that informs his view of immunity's history. His repeated assertion of an opposition between these concepts cements the idea that these are fundamentally different and irreconcilable modes of being, and that the difference between them is an ethical one that hangs on the distinction between politics and nature. Much like Haraway, who similarly differentiates between defence and connection as conflicting views of organismic life, Cohen favours connection over defence, community over immunity, as an underlying principle of biological and political subjectivity.⁹² This is illustrated

⁹¹ These distinctions – defence/connection, immunity/community – surface at other points in the text. In a footnote to his discussion of Metchnikoff's defensive figuration of the organism and its evolution, Cohen comments that 'late-nineteenth-century bioscience contained an alternative – though nondominant – explanation that accounted for evolution through cooperation and mutuality, not through competition and the struggle for survival' (2009, 322). Here, the characteristics of competition and struggle are contrasted with those of cooperation and mutuality. In the text's conclusion, Cohen observes the same binary, but in a political, rather than biological, context. Cohen differentiates between a social world 'driven by a value system based on financial profit and individual material reward', and 'solidarity' as 'a valid precept governing human behavior' (Mbeki in Cohen 2009, 281). That is, he distinguishes between two forms of social-political life – one based in the competition between autonomous, self-serving individuals, and one grounded in a union and commonality amongst individuals that derives from shared interests, sympathies and responsibilities.

⁹² The same moral dichotomies are found in Emily Martin's critique of immune system discourse (1990). In her conclusion, Martin discusses different ways of conceptualising phagocytosis – the process by which the host organism deals with pathogens (phagocytosis was discovered by Elie Metchnikoff, and is discussed in Chapter One). She argues that the action of the phagocyte (or macrophage) – its *digestion* of foreign antigens – need not be conceived as 'destructive' but rather, as supportive of connections between different kinds of organisms which depend on one another for food. She writes: 'If the view that microorganisms serve as food for macrophages were given prominence, we could see this process as a food chain, linked by mutual dependencies. Instead of a life and death struggle, with terrorism within and war at the borders, we would have symbiosis within a life unit that encompasses the body and its environment, where all organisms are dependent on others for food' (1990, 422). Here, Martin offers the 'mutual dependency' that defines food chains as an alternative to a 'life and death struggle' between organisms. In other words, she posits the values of mutuality, interdependency and symbiosis (community) against those of terrorism and war (immunity). However, it is worth noting that the distinctions between immunity and community, defence and connection, made by Cohen, Haraway and Martin have no ontological foundation. That is, the definition of an organism as either defended against, or connected to, other organisms implies the same condition: both presume the givenness of the organism in relation to similarly given others. In each instance, self and other (organism and antigen) pre-exist their relation or encounter, be it amicable *or* hostile.

in the book's conclusion, where he muses over what might have been different if community, rather than immunity, had been adopted as a biological concept:

Imagine what might have happened if “community” had achieved the same biological status that immunity did. How differently might we live in the world imagining that our “commune systems” mediated our living relations with and in the world? How might we experience ourselves as organisms if we imagined that coexistence rather than self-defense provides the basis for our well-being? How might we have organized our care for the ill and our systems of healing, or indeed our entire political and economic relations, if we imagined that our ability to respond to corporeal challenge engages our ability to *commune* with others? (2009, 281, original emphasis)

In defining community *against* immunity Cohen demonstrates that his notion of community – organismic coexistence – is grounded in the *defensive* logic of immunity. Community, as it figures in his analysis, is established through the *exclusion* of immunity and the political values and associations it implies. In other words, the harmonious and peaceful coexistence that he equates with community (and biology or nature) is founded on the moral repudiation of immunity's violent, divisive effects. For Cohen, community describes a mode of being that embraces cooperation and mutuality only through the rejection or prohibition of antagonism, violence and war. Consequently, in advocating for community, in place of immunity, as a vision of political *and* biological life, Cohen posits an ecology without violence, or a sociality without politics: in imagining violence and struggle as foreign to nature, he conceptualises community as a phenomenon whose inclusive nature is guaranteed by the exclusion of foreign (and therefore wrong) elements. Paradoxically, then, the community he envisions as natural, and even ideal, is in fact secured by a violent defensiveness against difference – immunity, politics and violence itself.

Cohen's view of immunity and community as mutually exclusive logics demonstrates that his notion of community (and thus nature) is itself a politics. In his analysis, community is defined by its immunity to politics: it embodies, or finds its basis in, the very logic that he himself argues constitutes the political, namely, immunity as exemption. Thus, it follows that the harmonious vision of organismic

coexistence that Cohen assumes is natural is in fact a politically invested concept of biological life that parallels immunity in the violence of its exclusions and the assertion of its own universality (as a fact of nature).

What, then, are the implications of this paradox? In defining immunity and community as intrinsically opposed concepts, Cohen's analysis actively defends defendedness, violence and war as uniquely political values, and at the same time, protects connectedness, coexistence and cooperation as characteristics given in nature. Furthermore, he affirms that immunity does not constitute a form of organismic coexistence. Cohen's investment in a natural community that excludes politics is simultaneously an assertion that *immunity (and thus politics) is not native or inherent to our biology*. In discriminating absolutely between nature and politics, his analysis censors any possibility that violence, hostility, antagonism or war might stem from, or belong to, the nature of biological life. Put succinctly, Cohen rejects any sense that it is in the nature of our biology to be political.

In this chapter, I have argued that Cohen's examination of the history of biological immunity is grounded in an absolute dichotomy between politics and life, and thus also, an idea of life, nature or biology as essentially pre-political. As I have shown, his moral investment in these assumptions and a host of other distinctions (nature/culture, native/foreign, connection/defence, being/knowing) poses a central paradox, as his critical position is one firmly anchored in the principle of immunity. This contradiction raises a number of crucial questions. Why are politics and life viewed as mutually exclusive? What prevents these phenomena, or modalities of life, from being thought together? What prohibits politics and biology, representations of life and life itself, from being conceptualised as expressions of a single system (a single ecology)?

Given that immunity is the logic underpinning these divisions, it warrants closer attention. As an immunological phenomenon, immunity yields insights that are counterintuitive to its conventional perception. For instance, the biological condition of immunity (a protective immune response) is in fact *contamination*. As discussed in

Chapter Two, immunity – or any immune response – is not strictly the product of an interaction between given entities that are intrinsically foreign to one another (host organism and antigen). Rather, it is a phenomenon symptomatic of the inter-implication or ecological entanglement of organisms and antigens that enables immune responsiveness (their recognition by one another – a recognition that is always, impossibly, registered *prior* to their encounter), or the fact that the foreign was never not familiar, in every sense of the word.⁹³ From this perspective, immunity is an event that expresses a larger immunological ecology: far from reinforcing an absolute dichotomy between native and foreign, a defended self and an invasive other, it calls the discrete identities of these designations radically into question.

In the coda that follows, I suggest that the adoption of this systemic or ecological perspective on immunity can be used to reread the mutually exclusive relation of politics and biology that Cohen's analysis posits. If immunity confounds our ability to discriminate hygienically between native and foreign, then it follows that our understanding of 'foreign' needs to be rethought. Indeed, the idea that politics and biology (or representations of life and life itself) are foreign to one another needs to be refigured in light of the *impossibility* of such an absolute distinction. Rereading immunity's history from an ecological perspective would mean reconceiving biopower – the intervention of politics into biological life – as a potentiality of the very life it manipulates, utilises and invests. More simply, it would mean conceptualising immunity's juridico-political and biological identities *not* in terms of primary and secondary, native and foreign, inside and outside, nature and culture, but rather, recognising the entanglement already implicit in these rigid divisions.

⁹³ The quandary of recognition – how the very possibility of immune responsiveness rests on an event of recognition which could *not* have taken place – is discussed in Chapter Two.

Coda

Error: rereading the relation of knowledge and life

Error and representationalism

Chapters Three and Four focused on two major critiques of immune system discourse, namely, Donna Haraway's 'The Biopolitics of Postmodern Bodies' and Ed Cohen's *A Body Worth Defending*. As argued, these critiques take issue with mainstream immunological discourse (immunity and self-nonsel discrimination) on the grounds that it presents a politically invested concept of life *as* biological fact. Both Haraway and Cohen assert that this confusion between the social/political and natural, which has direct implications for political *and* biological life, poses a distinct ethical dilemma. Haraway opposes self-nonsel theory because it plays on the mutually affirming relationship (and thus confusion) between the political (value-laden) and the factual (neutral). Similarly, Cohen argues that the adoption of immunity into the field of biomedicine constitutes a *mistake* because immunity is essentially or originally political, not biological. Thus, both thinkers view immunity as a scientific concept *in error*: that is, as the embodiment of a categorical transgression that can have serious moral consequences.

Pivotal to these critical positions is a presumption that immunological discourse describes a biological reality that, by implication, it is not. Analytically, Haraway and Cohen both rely on a conventional representationalism and its assumed division between life (biology) and its authoritative description (scientific knowledge or discourse). Haraway describes the immune system as a trope – a 'map', 'plan' and 'icon' for systems of difference (1989, 4) – that *mediates* experiences of body and self and produces real life effects. And Cohen's genealogy, which insists on the political origins of immunity, is anchored in the strict ontological demarcation of politics from nature. Crucially, both critiques begin from the assumption that the political is not inherently biological, and that the discursive is not always already materially manifest. Thus, immunological discourse constitutes an error because it mistakes the

real (immutable nature) for its discursive representation (contingent, cultural description). At stake in this notion of error is an investment in a human agent that produces representations of life (scientific knowledge), which arbitrate our relations with the world.

Yet, there is something odd about judging immunological discourse a serious error within an analytic frame that defines all representation as necessarily erroneous. In the context of representationalism, discourse can only ever be an *approximation* of life – that is, a mis-representation of an inaccessible and unrepresentable reality. No model of life could ever be truly ‘correct’ because models can never be equal or identical to the phenomena they represent. Error is thus implicit in a representationalist understanding of life. The apparent error of immunological discourse, as outlined by Haraway and Cohen, derives from the absolute division of discourse from life that founds this perspective. In other words, immunological discourse manifests the mistake entailed in the representationalist presumption that discourse is *not* life.

The attachment to error in Haraway and Cohen’s critiques (and the paradox this generates within their own writings) means that both accounts avoid the question of *how* politically invested, historically specific biomedical representations have pragmatic purchase. Neither of these thinkers addresses the basic fact that immunity (as an error) works. Yet this issue – namely, the biological efficacy of political imagery – seems pertinent to the ethical dilemma that Haraway and Cohen argue immunological discourse manifests. What allows this juridico-political concept to operate so effectively as an empirically verifiable, biological concept? How could immunity function as a scientific fact if it, and therefore politics, discourse and knowledge, wasn’t somehow already native to our biology? The scientific efficacy of immunological concepts seems to insist that politics and biology, knowledge of life and life itself, cannot be intrinsically foreign to one another.

How, then, might the relationship between politics and biology, or knowledge and life, be reread or refigured? And what are the ontological implications of this refiguration for the critical offerings of Haraway and Cohen, and their notion of error?

At issue in Haraway and Cohen's critiques is an interpretation of discourse as purely cultural and descriptive. Importantly, both thinkers draw on, or are influenced by, the work of Michel Foucault for their understanding of this concept. However, as demonstrated in the previous two chapters, their readings of Foucault ultimately equate discourse with a normative cultural constructionism. Haraway and Cohen define discourse as essentially *external* to life – as a cultural force located outside life, which *affects* life.

Yet there are other ways of reading Foucault. While his work is frequently employed in the service of constructionist arguments that posit a causal relation between discourse/knowledge and life, it can equally be interpreted as suggesting an understanding of discourse *as* life. As outlined in Chapter Four, Cohen reads the concept of biopower (power over life) as implying a prior separation of political power from the life that it objectifies and governs. He understands biopower as an historically specific transgression of the boundary between the political and the natural. However, biopower can be read in terms of the ontology of political power/knowledge. As discussed in Chapter Three, in *The History of Sexuality* Foucault presents an account of power that confounds a simple opposition between politics and life. Conceptualising power as an encompassing force field of relations, he asserts that power is the life that it objectifies. In this sense, we can interpret Foucault as suggesting that discourse has *never* been distinct from life.

Genealogically, Foucault's concept of discourse can be traced to the thought of French philosopher and historian of science Georges Canguilhem. Mentor and doctoral supervisor to Foucault, Canguilhem is an intellectual figure whose work on the history of science, and whose unusual approach to the examination of knowledge, deeply influenced Foucault. As Garry Gutting and Nikolas Rose explain, Canguilhem's elaboration of science as 'a history of truthful discourses' (Rose 1998, 160) and 'a history of concepts' (Gutting 2005, 7) guided Foucault's interest in the nature of truth, knowledge and rationality, and their historical dimension. Gutting, a philosopher who writes extensively on the French tradition in the history and

philosophy of science and its relevance for Foucault's work, argues that Canguilhem's writings 'in the history and philosophy of biology provided a model for much of what Foucault was later to do in the history of the human sciences' (2010). He explains that '[m]uch of Foucault's historiography falls in the genre of "the history of concepts"' (Gutting 2005, 7), and cites *The Birth of the Clinic* and *The Order of Things* as the key texts in which Foucault directly employs Canguilhem's method and his understanding of concepts (2005, 9). As such, Canguilhem's legacy is explicit in Foucault's work, particularly his meditations on discourse/knowledge and the ontology of truth. Foucault's understanding of discourse as a truth that is *constitutive* of life speaks directly of the insights of his predecessor.

Canguilhem's work is characterised by an unconventional and innovative approach to the analysis of science. Unlike his counterparts in the Anglo-American tradition (exemplified by figures such as Thomas Kuhn), whose investigations presume an understanding of science as a human-centric endeavour, Canguilhem adopts an almost pre-critical or naive stance on this subject (Rose 1998, 159).⁹⁴ Instead of beginning from the view that science is an artefact of human, cultural life, his work is defined by its attempt to understand science (scientific knowledge and practice) as *a phenomenon of life*. Canguilhem's writings, especially those on the history and philosophy of biology, examine the phenomenon of scientific investigation from a systemic or holistic perspective – one that does not automatically assume a distinction between the natural and cultural, vital and intellectual, animal and human. In engaging with the fact of science in and of itself, Canguilhem's analyses are raw and understated; they highlight what is so remarkable about science without deferring to the established intellectual frameworks typically used to interpret it.

This coda reflects on the implications of Canguilhem's work for our understanding of Foucault, in light of their genealogical connection. Focusing on Canguilhem's philosophical account of the ontology of scientific knowledge outlined in *Knowledge of Life*, I argue that his unique elaboration of the relationship between

⁹⁴ Nikolas Rose explains: 'Epistemologically, Canguilhem undoubtedly belongs in the camp of those who believe that it is possible to write a history of rationality without deferring to the experience of a subject, against which knowledge claims are to be judged, and from which true knowledge must flow.' (1998, 159). For the details of this account, see Rose (1998).

knowledge and life animates a particular version of Foucault – namely, a reading of discourse or knowledge *as* life. Canguilhem’s notion of ‘knowledge of life’ – his understanding of knowledge production as a vital, biological activity – presents a means for intervening in a normative reading of discourse as a human-initiated, cultural description.

What follows is a brief exegesis and examination of the central problematic of *Knowledge of Life*. Drawing out some of the implications of Canguilhem’s argument for our understanding of the knowledge/life relation – and in particular, for conventional interpretations of scientific knowledge and cultural critique – this coda considers how Canguilhem’s work might be used to re-read or energise the writings of Haraway and Cohen. If the legacy of Canguilhem inheres in Foucault’s work, its spirit must also animate Haraway and Cohen’s inquiries. Through Canguilhem, this coda provides a conclusion to Chapters Three and Four, by refiguring the error Haraway and Cohen identify with immunological discourse, as well as the error (the paradoxical recuperation of the logic of immunity) that these critiques themselves manifest.

The paradox of biology

In ‘The Concept of Individuality in Canguilhem’s Philosophy of Biology’, Jean Gayon characterises Canguilhem’s intellectual activity in terms of three indissociable aspects: ‘medical philosophy, the history of biology, and the philosophy of science’ (1998, 305). These aspects, which roughly correspond to phases of his career and specific texts, each speaks to the uniquely interdisciplinary nature of Canguilhem’s scholarly training. Canguilhem completed doctorates in both philosophy and medicine: he was first educated in philosophy under the tutelage of Gaston Bachelard (mid-1920s) and later went on to study medicine (mid-1930s).⁹⁵ As a result, the content of his writings and his unusual analytic style reflect a strong

⁹⁵ For a detailed account of the key phases, concepts and texts comprising Canguilhem’s oeuvre, see Gayon (1998). See also Rose (1998).

commitment to the principles of both philosophical inquiry (the nature and meaning of truth) *and* empirical truth (the ‘truthfulness’ or material efficacy of truth).⁹⁶

Gayon argues that despite the diversity of Canguilhem’s writings, all his works demonstrate an intellectual commitment to the ‘philosophy of biology’ or ‘biological philosophy’ (1998, 305; 306). He claims that each of the phases of Canguilhem’s career is ‘marked by the development of a characteristic kind of reflection about the ultimate philosophical significance of living beings’ (1998, 307). By ‘biological philosophy’, Gayon refers to Canguilhem’s interest in ‘the philosophy of the life sciences’ (1998, 305), namely, his attempts to develop, through the examination of empirical and historical examples, a philosophical account of the phenomenon of the life sciences. Canguilhem investigates science as a phenomenon of life; he regards the very existence of the biological sciences as itself a remarkable activity. For him, the devotion of human beings to the task of conceptualising, knowing and studying life is a fascinating characteristic of biological life. Moreover, it is a practice he interprets as peculiar to this specific life-form: Canguilhem views the human as a living creature defined by its scientific, truth-seeking activity. As such, his thought is guided by a curiosity about the nature of living beings, and the expression of this nature in the unique modes of being life manifests – for instance, scientific and medical practice.

La Connaissance de la Vie (1952), or *Knowledge of Life*, is one of Canguilhem’s earlier works that explicitly foregrounds his biological philosophy. Although ‘Canguilhem’s biological philosophy will not be found in a single book, or even in a single paper...[but rather] is scattered throughout his publications, from beginning to end’ (Gayon 1998, 306), the essays featured in this volume present a sustained engagement with the philosophical significance of the phenomenon of the

⁹⁶ This dual commitment to the disciplinary tenets of philosophy and medicine is evident in Canguilhem’s unique writing style. In Canguilhem’s essays, the point or argument being made often feels elusive or incomplete. This is arguably because his work is driven as much by the use of empirical and historical examples as it is by his commitment to a central hypothesis. Canguilhem doesn’t privilege his own ideas *above* the examples he employs: these two aspects always work together and in tension with one another. Intriguingly, his analytic style is characterised by one of the most recurring concepts in his work, namely, error. Literally meaning ‘the action of roaming or wandering;...a devious or winding course, a roving, winding’ (OED 2011), the concept of error captures something essential about the nature of Canguilhem’s inquiry. In simple terms, Canguilhem’s writing *wanders*. Taking the form of wanderings or meanderings, his work makes its point in and through the exploration of examples. The notion of error will be discussed later in this chapter.

biological sciences. *Knowledge of Life* ‘illustrate[s] the common philosophical thesis of the autonomy of biological sciences’ (Gayon 1998, 320). Canguilhem claims that the biological sciences occupy a unique position among the sciences due to the particular nature of its objects. Within the biological sciences, he argues, the object under investigation and the biologist compelled to knowledge are *instances of the same living, biological being*. Because its object and investigator are both manifestations of biology, the biological sciences pose a distinct philosophical problem: that life takes itself as an object of knowledge. As such, Canguilhem’s text explores the implications of this phenomenon – the study *of* life, *by* life – for how we understand knowledge, biology and their curious involvement.

In viewing the biological sciences as a confounded relation of life to itself, Canguilhem’s analysis focuses principally on the entangled relationship of ‘knowledge of biology’ to ‘biological life’. This problematic is captured in the double meaning of the text’s French title. In the foreword to the English translation entitled, ‘Life, as Such’, Paolo Marrati and Todd Meyers explain that “‘knowledge of life’ is simultaneously and inseparably the knowledge we have of life when we take it as an object, and the knowledge that life itself produces’ ([1965] 2008, ix). In other words, it refers to knowledge as something that arises as a consequence of life’s objectification, and knowledge as something generated from within, or by, life itself.⁹⁷ This dual meaning concisely articulates the ambiguity that Canguilhem attempts to hold or preserve in his discussions of the knowledge/life relation. He argues that knowledge of life – and indeed, the *concept* of life – is always necessarily a phenomenon of life: ‘The thought of the living must take from the living the idea of the living’ (Canguilhem [1965] 2008, xx). In essence, Canguilhem maintains that the conceptualisation of biological life is an innovation and an instantiation of biology.

In interpreting scientific knowledge from within a biological frame of reference, Canguilhem plays on the *indistinction* between knowledge and biological life. This equivocation is highlighted by variations in the translation of Canguilhem’s work. For instance, Gayon translates the above quotation as follows: “‘The

⁹⁷ This interpretation of the text’s title is confirmed by Pierre Macherey, who writes that the phrase ‘corresponds simultaneously to the knowledge one may have of the subject of life considered as an object, and to the knowledge produced by life which, as subject, promotes the act of knowledge and confers its values on it’ (Macherey 1998, 114).

knowledge of life must draw the idea of the living thing from the living thing itself” (Canguilhem in Gayon 1998, 320-21). In this passage, slight differences in word choice, especially Gayon’s choice of ‘living thing’ in place of ‘living’, underscore a confusion between different notions of life (and/or knowledge) operative in Canguilhem’s analysis. Here, it becomes difficult to differentiate discretely between the general context of life, life as an individuated entity, and the *concept* of life, as Canguilhem never nominates any one term as the referent or origin of these relations. Instead, there is an indeterminacy deliberately written into his descriptions, which suggests that there aren’t clear-cut boundaries between these expressions of life.

This condensation of meanings is most clearly illustrated in the empirical example of the biologist. In his introduction to *The Normal and The Pathological*, Foucault gives a brief exegesis of this point, as outlined by Canguilhem:

...the biologist...[is] an object of a type to which he himself belongs, since he lives and he manifests the nature of the living being, he exercises it, he develops it in an activity of knowledge which must be understood as a “general method for the direct or indirect resolution of tensions between man and the environment”. (Canguilhem in Foucault [1989] 2007, 20)

Foucault explains that Canguilhem’s account of the biological sciences, which characterises ‘living being’ as an ‘activity of knowledge’, significantly complicates the difference between knowledge and life. Paraphrasing Canguilhem, Foucault asserts that the biologist ‘manifests the nature of the living being’ *in the act of investigating life*. In other words, the biologist is not separated or divorced from life in the task of objectifying it; rather, he or she is living, being – indeed, living being – in the very moment and task of producing knowledge. According to this reading, Canguilhem argues that knowledge is an activity constitutive of the living being of the biologist. In conceptualising knowledge-seeking as a biological activity, and thus biology as an act of knowing, Canguilhem demonstrates that the division between knowing and being is inherently compromised.

Key to Canguilhem’s text, then, is the argument that the biological sciences evidence ‘the paradox of biology’ ([1965] 2008, 22). He emphasises that biology is

always both the discipline of biology (an investigative practice of knowledge production) and biology itself (the actual, physical substances and processes of life) and as such, materialises *as* an incongruity: ‘biology... testifies to the recurrence of the object of knowledge in the [constitution] of knowledge targeting the nature of this object’ ([1965] 2008, 22). Canguilhem conceptualises biology as a single phenomenon that assumes the form of an impossible self-relation; as simultaneously scientist and scientific object, biology emerges as a movement of self-investigation or self-inquiry. This account suggests that biology views itself with interest, or that the biological sciences manifest the curiosity biology directs toward itself.

There is no outside life: knowledge as vital

Knowledge of Life radically refigures an orthodox interpretation of both biology and knowledge. Canguilhem’s conceptualisation of knowledge as a biological phenomenon, and biology as inherently thoughtful and knowing, troubles a host of distinctions that are proper to the division of knowledge from life, namely, mind/body, cognitive processes/biological processes, epistemology/ontology, nature/culture. Most pertinently, his intervention problematises a view of knowledge as purely epistemological or notional, an abstraction guaranteed by the human subject’s separation from the natural world.

Canguilhem contests the presumed *externality* of knowledge to life implicit in its humanist interpretation. His analysis critically interrogates the perceived separation of activities of knowledge (thinking, investigating, conceptualising) from the processes of life (innate biological and physiological processes). For Canguilhem, the idea that practices of knowledge occur subsequently to, or can be disaggregated from, the basic fact or phenomenon of the organism’s existence betrays a distinctly human arrogance:

We accept far too easily that there exists a fundamental conflict between knowledge and life, such that their reciprocal aversion can lead only to the destruction of life by knowledge or the derision of knowledge by life...the

conflict is not between thought and life in man, but between man and the world in the human consciousness of life. ([1965] 2008, xvii)⁹⁸

Canguilhem insists that there is no essential opposition between thought and life within the lives of human beings. As his general thesis suggests, thought issues from, and is a direct expression of, the life that it interrogates. Canguilhem argues that the view that knowledge takes place ‘above’ or ‘outside’ life is an artefact of human exceptionalism and the imagined removal of the human from the greater milieu of life. For him, this perspective disavows man’s status as a biological organism *of* the natural world, and recuperates agency, cognition and instrumentality as human, not natural, attributes: ‘man sometimes marvels at the living and sometimes, scandalized at being himself a living being, forges for his own use the idea of a separate kingdom’ ([1965] 2008, xix).

Canguilhem’s insistence that man’s condition (no matter how apparently advanced) is always an immediate entanglement with the natural world stems from his belief that there is no position ‘outside’ life. For him, knowledge belongs to the *context* of living being, and is an *expression* of living being. In ‘Thought and the Living’, Canguilhem makes this claim with respect to the issue of technology. He states that far from distinguishing the human from other living creatures, the phenomenon of technology (much like knowledge) affirms and evidences man’s ecological contextualisation. He writes:

Could man make a nest better than a bird, a web better than a spider? And if we look closely, does human thought manifest in its inventions an independence from the summons of need and pressures of the milieu that would legitimate man’s pity-tinged irony toward *inhuman* living beings? ([1965] 2008, xviii, original emphasis)

⁹⁸ These types of quotations hint at a humanism operative within Canguilhem’s work. There are certainly points in *Knowledge of Life* where Canguilhem demonstrates a commitment to a human subject that, at other points, his argument undercuts. Due to the scope of this coda, it is not possible to tease out the contradictions in Canguilhem’s work. Instead, I draw on the sections of his text that suggest a more provocative, unconventional reading of the knowledge-life relation.

Canguilhem conceptualises technology not as a sign of man's autonomy from, or mastery of, his environment, but rather, as empirical proof of his ecological existence. In describing technology as the means (method or resources) by which *any* living creature exists within its environment, he argues that there is nothing innately human about technology. Instead, Canguilhem asserts that technologies materially manifest the organism's ecological being – the particularity of its negotiated existence within its milieu. Understood in these terms, technologies are not physical, exogenous extensions added to the organism, they are essential or foundational to the organisms whose specific modes of being they enable and body forth (a nest to a bird, or a web to a spider). The primacy of technology to organismic life suggests that life is inherently prosthetic, or that the supplement is internal to life.

Canguilhem's discussion of technology insists that all organismic activity is proper to its milieu. Put differently, no being or phenomenon is extra-ecological. Canguilhem argues that it is *impossible* for a living being to act outside the sphere (pressures) of its environment because the organism, in its capacity to innovate, is a unique instance, or event, in/of that environment. Technology does not *mediate* the relation between an organism and an environment that pre-exists it; rather, technology manifests the particularity of the organism's ecological entanglement.

The same conceptual point is echoed in Canguilhem's claim that knowledge serves a regulative function for the organism. In contextualising the activity of knowing in the foundational conditions of life – the organism-milieu relation – he foregrounds its explicitly functional, purpose-driven nature. As Marrati and Meyers explain, Canguilhem maintains that 'knowledge is never for its own sake but belongs to a form of life that it constantly helps to renegotiate and modify' (2008, viii). In this sense, Canguilhem argues that knowing is a vital activity because it acts in the service of a specific living being. Or rather, knowledge has a meaning, and this meaning is given in the role knowledge plays in the vital functioning of the organism, or in its operation *as* vital function. Moreover, Canguilhem interprets this capacity for knowledge as a sign of life's intelligence:

...if thought and knowledge are inscribed within life so as to regulate it – as is the case with man – this very life cannot be the blind and stupid mechanical

force that one likes to imagine when one contrasts it with thought. ([1965] 2008, xviii)⁹⁹

These examples (technology and regulation) illustrate Canguilhem's commitment to the notion that knowledge and life are phenomena *proper to one system*. For him, life cannot be divided into the separate, interacting components, knowledge *and* biology. If thought serves a regulative function, then knowledge is not simply 'comparable' to other actions and processes that similarly sustain the organism's existence (automatic biological processes, such as respiration and digestion). Rather, it is precisely this logic and vocabulary – the compartmentalisation and hierarchisation of different components or aspects of organismic being – that he seeks to problematise. Canguilhem's observation that life conceives of itself through knowledge indicates that biological being *is* thinking being (being *is* knowing). However, this assertion that knowledge is original to the fact of life also means that life separates itself from itself.

For instance, Canguilhem frequently uses the phrases 'living being' and 'living form' ([1965] 2008, xix) to emphasise that biological being and knowing being are never not one phenomenon. For him, the term 'living being' offers a holistic conception of being or life. In speaking primarily of 'living being', Canguilhem avoids reducing life to mere mechanical, biological processes, and simultaneously, resists the view that human life manifests a cultural complexity and intellectual sophistication that is somehow *extrinsic* to biology. Thus, this term highlights the necessity of viewing life in its wholeness – a wholeness that does not exclude life's tendency to break with itself. As Canguilhem explains: 'Because they are totalities whose sense resides in their tendency to realize themselves as such in the course of their confrontation with their milieu, living forms can be grasped in a vision, but never by a division. It almost seems that, in keeping with its etymology, to divide is to make void [*vide*], whereas a form existing only as a whole could not be voided of anything' ([1965] 2008, xix, original emphasis).

⁹⁹ This quotation suggests an unconventional interpretation of regulation. Whereas regulation typically describes a standard, norm or rule that is external to the entity or thing subject to regulation, here, Canguilhem implies that the organism regulates itself, or is itself regulative. If thought and knowledge are regulative, then the external norm or rule is necessarily internal to the organism.

This commitment to a holism is most strikingly demonstrated in ‘Experimentation in Animal Biology’, in which Canguilhem examines practices of experimentation found within the biological sciences (e.g. dissection and vivisection). Returning to the text’s key problematic (the study *of* life, *by* life), this essay complicates the idea that experimentation is an activity different in kind, or ontologically distinct from, the functions and experiences of the organism. Playing on the ambiguity of *expérience* – the French term meaning both ‘experiment’ and ‘experience’ – Canguilhem gives the following statement:

...knowledge of the functions of life has always been experimental... For us, there exists a basic kinship between the notions of experiment [*expérience*] and function. We learn our functions over the course of experiences and our functions then become formalized experiences. And experience is first and foremost the general function of every living being, that is, its debate (*Auseinandersetzung*, says Goldstein) with its milieu. Man first experiences and experiments with biological activity in his relations of technical adaptation to the milieu. ([1965] 2008, 9, original emphasis and parentheses)

Here, Canguilhem significantly problematises the common sense idea that function (innate biological processes), experience (that which the organism suffers or undergoes) and experimentation (the action of testing or trialling) delineate distinct orders of organismic being. Describing the entanglement of these phenomena within one another, he insists that biological processes share a ‘basic kinship’ – literally, a common origin – with practices of scientific investigation. That is, Canguilhem views experience and experimentation as having the same ontological priority as biological function and argues that each is discovered through the other. In not presuming the initial separation of experiment and function – he defines experience/experimentation as ‘the general function of every living being’ – his analysis calls into question the divisions between given/learned, innate/acquired, biological/cultural, that typically secure this difference.

The terms that Canguilhem uses above deserve closer attention. Etymologically, experience refers to ‘knowledge gained by repeated trials’, whereas experiment signifies ‘a test, trial’ (Barnhart & Steinmetz 1988, 357). However, both

terms share the common root *experiri*, meaning ‘to test, try’ (1988, 357), which suggests that generally speaking, experience and experiment refer to the actions of testing, trying or trialling. Function is defined as ‘proper work or purpose’, stemming from *functio*, meaning ‘performance, execution’ (1988, 413). Thus, function refers to a general activity through which purpose (of a being or entity) is realised – it is a definitive activity, or more basically, activity in a general sense.

Rereading Canguilhem’s statement in light of these definitions illuminates a very different sense of organismic being. If function means proper or purposeful activity, and experience and experiment are synonyms for testing and trying, then one could say that the organism learns its purposeful activity through testing and trying. Or rather, the activity that defines and produces us as living beings is this questioning, investigating and conceptualising; what is *basic* to life, or most fundamental, is the process of hypothesising or the actions of testing and trying. For Canguilhem, these procedures are constitutive of life: life’s purpose is realised through continuous processes of testing, trialling, hypothesising and questioning. Life is the movement of self-inquiry.

The ontology of critique: refiguring error

Central to Canguilhem’s notion of the paradox of biology is the fact that it does not collapse or homogenise the difference between knowledge of life and life itself. Although he openly challenges a human-centric view of knowledge, he does not seek to do away with it altogether, or to deny its truth. If biology is a paradox – a self-contradiction – this implies that knowledge is immediate in being *mediating*. In the sense of ‘acting or existing without any intervening medium or agency’ (OED 2011), knowledge is immediate because life intervenes in itself (intervention is an internal possibility of life). Canguilhem does not negate the conditions that secure the operation of scientific knowledge, namely, a subject/object separation. His holistic approach to biology recuperates objectivity, and thus the division of the human from the world, and a notion of knowledge as purely epistemological, as proper to the very nature of a life that manifests in its difference from itself.

Canguilhem's analytic frame is one that precludes the notion of absolute exclusion or alterity. According to the terms of his argument, there can be no outside that is not already inside, no other that is not somehow already known. As such, his work refigures the error of a conventional representationalism – the view that knowledge is *not* life – as a remarkable characteristic of life. This reading of the subject/object relation in terms of their systematicity challenges the concept of identity (bounded and atomic) that anchors a normative notion of error (the division of right from wrong, their mutual exclusion). If every position 'outside' life is enabled by life, then life's errors (humanism and representationalism) cannot simply be deemed wrong. The very position that this judgement entails (an external point) is itself an articulation of the difference, disjunction or deviation (erring) that characterises and animates this system.

In recuperating error as fundamental to life, Canguilhem's account of the knowledge/life relation suggests an altogether different understanding of right and wrong. In proposing an ecological context in which everything that exists 'fits' – is right, appropriate or purposeful – his work dramatically alters the frame of reference that secures and gives meaning to these moral determinations (the idea that there is a frame that has strict boundaries, which demarcate an inside from an outside). If the improper is always already proper, then that which is wrong (inappropriate, deviant, pathological) is, in another sense, necessarily right or fitting. Viewed holistically, one could say that life is the ceaseless error of its own self-conception through knowledge; it is a circuit of curiosity perpetuated by a difference that is error. Life is self-correction.

What, then, are the implications of Canguilhem's work, and his notion of error, for making sense of Haraway and Cohen's critiques? How does his account of the entanglement of knowledge and life affect our readings of these texts, and their moral opposition to immunological discourse?

At issue in Haraway and Cohen's contestation of immunological discourse is the ontological status of their critiques (critical positions). In Chapters Three and Four, I demonstrated that their arguments are intrinsically paradoxical. They take opposition to this discourse and the bounded, immune self it reifies, but in doing so

reinstate the model of identity they argue is politically problematic. Haraway and Cohen's contestations of immunological discourse mirror the agonistic logic of immunity, such that in rejecting immunity they inadvertently recuperate it.

At the heart of this paradox is the adoption of a moral stance on the political correctness or appropriateness of immunological discourse. As moral guardians of sorts, Haraway and Cohen position themselves *outside* the parameters of the discourse they critique. In judging immunity 'wrong' (not right) according to the extent to which it affirms a negative politics of individualism (a politics of subjectivity they deem negative and undesirable), they dissociate their critical commentaries from the objects that these analyses interrogate. Here, moral critique assumes the form of a conventional objectivity – a belief in the given or inherent separability of subject and object, knowledge and life. This position is one that refuses any sense of implication in the repudiated object.

Yet, the paradox that Haraway and Cohen's analyses manifest affirms Canguilhem's thesis that knowledge and life are ecologically entangled. In recuperating the logic of immunity, these critiques are proper to the discursive frame or moment of which immunological discourse is exemplary. They are themselves *instances or evocations* of the object they interrogate. Thus, the assumed division of subject from object does not hold: the paradox or error of these critiques shows that any position from which we might objectively examine this discourse is itself already an instantiation of this discourse (a perspective enabled by this discourse). Just as the biologist is an incarnation of the object he/she seeks to understand, Haraway and Cohen's critiques are utterly implicated in the ontology of immunological discourse. Their works illustrate that immunological discourse *generates* instances of its own contestation – it literally opposes itself, casting itself in error.

This rereading of Haraway and Cohen has direct implications for our understanding of the ontology of critique (of what it means to take a position on anything). As their accounts attest, critique is not a privileged activity that occurs at a distance from life, nor is it a process of reflection that comes after the fact of its object. Viewed holistically, critique is the action of the object evaluating or debating itself. The externality that conditions critique is internal to the movement or

involvement of critical reflection through which life encounters itself. To critique, to practice medicine or science, or to take a moral position, is to be already entangled or implicated in the object being studied, examined or contested.

If we take these insights seriously, then Haraway and Cohen's works are not simply critiques made in error, about error. The fact that these analyses are essentially paradoxical is not a mistake in need of reparation. Canguilhem's perspective offers a means of recuperating these critical commentaries as unique instances of life's errancy – life's tendency to conceive itself in error. These critiques demonstrate that the condition of critique and ethics (what it means to adopt a moral stance) is entanglement, or as argued in Chapter Two, a systemic or ecological responsibility.

Chapter Five

Allergic biographies: the problem of locating the symptom

Causality

In contemporary immunology and biomedicine it is generally stated that our understanding of allergies is limited because we have not yet definitively determined their causes. Like many other diseases, the identity of allergic disease is tied to the elucidation of a clear etiology – that is, the identification of faulty physiological mechanisms and/or processes in the organism, or to the isolation of foreign, pathogenic entities. So far, attempts to conclusively determine the specific causes of this condition have come up short. Within immunology and the biomedical sciences allergic disease is recognised primarily as a condition bearing a strong genetic or biological basis, and caused by exposure to external, environmental factors (e.g. Janeway et al. 2005, 523). However the empirical data that supports this perspective is plagued with inconsistencies that cannot be explained by current knowledge and practice in these fields (Jarvis & Burney 1998, 607; Sublett 2005, 445). In psychosomatic medicine and psychology, allergies are often viewed as psychogenic, with various allergic conditions being diagnosed and treated using tools such as psychotherapy and hypnosis (e.g. Miller & Baruch 1956). Yet many practitioners and researchers in this area acknowledge the existence of a biological or constitutional component that underlies the operation of psychological triggers and participates in the production of allergic reactions (e.g. Dunbar 1938). Psychosomatic studies commonly report that allergic symptoms can be successfully alleviated with the use of psychotherapeutic tools, but that such tools cannot eliminate the biological predisposition itself (e.g. Hansen 1927, Diehl & Heinichen 1931). Here, the fact that allergies can be treated without treating the underlying predisposition complicates the identity or role of biology in allergic events.

Empirical evidence from these disparate fields shows that the causes of allergy are both biological *and* psychological. This suggests that the etiology of allergy

cannot be resolved with recourse to an explanation that privileges one or another of its causes. Studies that recognise this dilemma, typically within psychology, psychosomatic medicine and psychoneuroimmunology, argue that a more comprehensive understanding of the etiology of allergic disease is needed – one that accounts for the findings of psychological and biological investigations together (e.g. Banks Gregerson 2000). This perspective is exemplified by a turn toward multifactorial and biopsychosocial models of illness, which attribute the pathogenesis of allergy to a *confluence* of biological, psychological, social and other factors (e.g. Wilce 2003). As Mary Banks Gregerson explains, ‘modern systemic approaches [within psychosomatic medicine] emphasize a multifactorial model of the complex interplay of biology, psychology, and, most currently, both the social and physical environments’ (2000, 820). Allergic disease is thus increasingly viewed as the product of complex interactions between factors that are identified as distinct and capable of producing effects in one another.

Conceptually, these interdisciplinary approaches rest on the same notion of causality as the discipline-specific explanations they seek to unite – namely, a linear cause and effect relation between discrete, separated domains. Though appealing, these attempts at consolidating the insights of these diverse perspectives into one all-encompassing and comprehensive account actually reinstate the etiological dilemma that allergies present. In attributing allergic disease to the actions of many different causes, multifactorial approaches raise the question of how these distinct causal explanations (and the objects to which they refer) relate to, or interact with, one another. As a solution to the problem of a single causality, this approach foregrounds the dilemma of *how* there are multiple, different isolated factors that contribute to the production of disease. While the perceived benefit of multifactorial perspectives is that they *include* all possible variables and contingencies, it is precisely the nature of this inclusion – the reconciliation of these diverse perspectives into one – that multifactorial approaches fail to address, and which is centrally at issue in this chapter. How are we to make sense of these persuasive, though somewhat incommensurable, data sets together? How do biological causes relate to psychological causes?

The etiological puzzle that allergies pose requires us to critically engage the incommensurability of these empirical proofs, and specifically, the Cartesianism (mind-body dualism) that underwrites the disciplinary division between studies of biology and psychology, respectively. Competing accounts of allergic disease problematise the idea that allergies are a purely biological phenomenon. They challenge the notion that biology alone – a fault located in the biology of an individual – is responsible for this pathology. As such, these conflicting bodies of evidence pose questions about the very nature of biology: the diverse means by which allergic reactions are triggered (and treated) seems to contest the assumption of a pure, given, natural biology that pre-exists the incursion of the psychological. The fact that allergies can be triggered by phenomena other than allergenic substances (e.g. traumatic events, strong emotions), or rather, that what constitutes a substance *as* allergenic is not straightforwardly materially inherent in that substance (as shown in Chapter Two), suggests that biology is not simply separable from psychology (sociality, environment). Allergies demonstrate the impossibility of quarantining the psychological, social or environmental from the biological in any final sense, and in doing so, foreground the very notion of etiology – the belief in a discrete, immutable origin or cause – as a problem in itself.

In order to show how allergies complicate a conventional understanding of biology as divorced from psychology, sociality or the environment (construed as separate factors), this chapter focuses principally on *atopy* – allergic diseases recognised as having a genetic component, namely, asthma, hay fever and eczema. The first half of the chapter investigates the empirical data, diagnostic tools and reasoning that underpin the immunological concept of allergy as a genetically or biologically based condition. It critically examines immunology's account of the biological causes of allergy, and specifically, the antibody commonly identified as its primary causal agent: immunoglobulin E (IgE).

This first section concentrates on how IgE is animated as a biological cause. It shows that our ability to locate 'cause' within a discrete body is significantly complicated by the events of sensitisation (the series of exposures of an organism to an antigen that initiate allergic responsiveness). Focusing on asthma, I argue that the role of heredity in allergic disease challenges an orthodox understanding of what

constitutes the initial conditions of allergic phenomena, and thus complicates the task of demarcating the scene of sensitisation, temporally and spatially. In cases of inherited asthma, where (in what body?) and when (at what point in time?) is asthmatic symptomatology manifest? When is allergy present and/or when is it absent, or perhaps latent?

The second half of the chapter deals with psychogenic accounts of allergy and the means by which its psychological causes have been determined. Concentrating on case studies from the field of psychosomatic medicine, this section carefully examines how the notion of a 'psychological cause' is conceptualised and operationalised by this unique group of practitioners. It critically considers the role that immunological modes of investigation, such as skin prick testing, have played in establishing psychological accounts of allergy. How have psychological triggers been isolated in clinical analyses? How did these practitioners differentiate between the effects of psychological and material stimuli? And how do these studies complicate a notion of biology as definitively non-psychological?

This chapter does not attempt to do away with a conventional notion of causality, nor does it, in problematising the idea of a discrete cause, aim to erase the difference between biology and psychology. In complicating the concept of identity (atomic) foundational to this model of causality, it does not seek to homogenise the terms of these bifurcations (cause and effect, organism and antigen, biology and psychology, etc.). The point of this analysis is to critically interrogate the taken-for-granted notions of identity and causality that govern contemporary understandings of allergy, illness and the body, and to illuminate the entangled, initial conditions that underpin and secure their self-evidence.

Poststructuralist feminism: refiguring matter

As already mentioned, the following analysis of allergies is centrally concerned with troubling the distinction between biology and psychology (and its synonyms, sociality, culture, etc.). It contests the assumption that the material body pre-exists its social and cultural contextualisation, or that biology is, in some sense,

essentially different and separate from the aspects of life we typically view as social, emotional, familial or historical. The empirical evidence that this chapter presents about the allergic body suggests a view of biology as psychically, socially, culturally and historically complex. Thus, at the heart of this investigation are questions concerning the ontological status of the body, biology and matter. If biology does not precede or underlie the social – if the capacities and qualities routinely attributed to culture and sociality can be shown to be capacities of biology – how might we rethink biology’s exclusion from these domains?

These types of questions situate this project within a lineage of philosophical and political debates that define recent poststructuralist feminist engagements with corporeality. The divisions between biology and culture, nature and nurture, body and mind, have received considerable attention from feminist scholars who have deployed, contested, problematised and/or refigured these dichotomies in the service of a range of different arguments. Specifically, thinkers such as Moira Gatens, Judith Butler, Elizabeth Grosz, Vicki Kirby, Elizabeth Wilson and Karen Barad, have critically engaged the distinction between nature and culture, and its broader conceptual and political implications for doing feminist work.¹⁰⁰

As early as 1949, when Simone de Beauvoir famously stated ‘One is not born, but rather becomes, a woman’ ([1949] 1972, 273), the nature/culture division has been a central concern within feminism. In claiming that the feminine – the lived experience of being a woman (and the systemic oppression this entails) – is not a fate governed by biology, psychology or economic circumstance, but is something created by civilisation as a whole, Beauvoir drew a distinction between sex and gender, an organising dichotomy that has been a pertinent issue within feminist politics ever since. Her assertion that femininity is produced through cultural processes, and is thus not the natural corollary of a fixed biological sex, opened up the question of the agency that is responsible for producing gendered and sexed subjects, and of the complex interrelation between gender and sex. Most importantly, Beauvoir’s intervention highlighted biological determinism and cultural constructionism as ways

¹⁰⁰ This section provides a brief outline of some of the key thinkers and issues that define this area of feminism. While it is beyond the scope of this chapter to cover the many figures, texts and concerns that make up this rich area of intellectual engagement, this sketch describes one of the important themes of this inquiry.

of understanding subject formation that would be taken up extensively in future feminist debates.

The questions animated by Beauvoir's concern with the sex/gender distinction and its correlates (biology/culture, determinism/agency) were reinvigorated by the feminist inquiries of the 1980s and 1990s. In 'A Critique of the Sex/Gender Distinction' (1983), Australian feminist Moira Gatens examines the ways in which a sex/gender, or biology/culture, division underpins existing feminist accounts of the subject and crucially, the subject's agency to affect social and political change. Noting the tendency within these accounts to privilege *gender* over sex as the category of greatest political import for feminists, Gatens is critical of a feminist politics grounded in a disavowal of the agency and specificity of the body's materiality.

More recently, the sex/gender distinction has been notably taken up by feminist philosopher Judith Butler. In *Gender Trouble* (1990), Butler significantly complicates this division and its implied temporal hierarchy (sex then gender). Arguing that subjectivity is always already discursively constituted, she claims that gender is 'the discursive/cultural means by which "sexed nature" or "a natural sex" is produced and established as "prediscursive"' ([1990] 1999, 11). For Butler, the very notion of a given biological sex that exists prior to culture is itself a cultural invention. This encompassing figuration of discursive construction problematises the foundation of subjectivity, destabilising the terms of reference that orient conventional understandings of nature, biology and materiality.

While Butler presents a theoretically sophisticated account of discursive construction, her work is nevertheless defined by its exclusion of biology.¹⁰¹ This exclusion, which is typical of feminist arguments that privilege gender (culture) as the agent of subject formation, over and against biological sex (a given nature), has been explicitly addressed in a strand of feminism that deals with the body, namely corporeal feminism, and more currently, material feminisms. Elizabeth Grosz's *Volatile Bodies: Towards a Corporeal Feminism* (1994) takes issue with the ways in

¹⁰¹ For a detailed critique of Butler's work that addresses this point, see Kirby (2006).

which corporeality and embodiment have been dealt with in recent feminist scholarship. She argues that feminist accounts of the corporeal are based in a Cartesian legacy which prohibits a more ontologically complex understanding of the body *as* social, political, cultural, etc. Challenging the discipline to examine the dualistic logic implicit in its conceptualisations of the body, Grosz advocates a ‘corporeal feminism’ which grapples with the problems that dualism and reductionism pose for the task of thinking the body.

In *Volatile Bodies*, Grosz argues that feminism’s reliance on a Cartesian tradition is politically and philosophically problematic. She states that in the Western philosophical tradition ‘soul, reason [and] mind’ have been secured against matter and the body, an opposition mirrored in the ‘binarization of the sexes’ (1994, 5) – such that the body and its conceptual correlates have been routinely equated with ‘woman’ and the feminine. Grosz stresses that woman has been consistently figured as reason’s other – a ‘formless, passive, shapeless matter’ (1994, 5) that constitutes the ground of knowledge, but in itself lacks the capacities of agency, intellection and cognition.¹⁰²

One of the most important contributions of corporeal feminism is that it ‘retrieves the body from its conventional status as inert and passive matter, refiguring it as the source of subjectivity, knowledge and ethics’ (Keane & Rosengarten 2002, 261). Corporeal feminism is deeply critical of a view of the body as a fixed, given substance that merely receives cultural inscription – an immutable, material entity whose significance derives from its articulation by external, cultural forces. Importantly, Grosz’ provocation has been met with astute responses from feminist thinkers including Vicki Kirby and Elizabeth Wilson, whose works ‘[take] up the project of refiguring the biological’ (Keane and Rosengarten 2002, 261). Pivotal to these accounts is a concern with the ontological status of biology.

¹⁰² This notion of woman as a denigrated subject defined by her exclusion from the projects of reason and knowledge is examined in detail by French feminist, Luce Irigaray, in *The Sex Which is Not One* (1977). Irigaray argues that Western philosophical discourse forms a closed, phallogocentric economy of signification based in the absolute exclusion or absence of the feminine; consequently, woman is that which cannot be represented. The equation of maleness and reason in Western philosophy is also discussed by Genevieve Lloyd in *The Man of Reason: ‘Male’ and ‘Female’ in Western Philosophy* (1984).

In her much cited article, ‘Introduction: Somatic Compliance – Feminism, Biology and Science’ (1999), Elizabeth Wilson argues that despite the centrality of the body within contemporary feminist debates, discussions of corporeality and embodiment have occluded an active examination of biological detail. ‘[F]eminist accounts of the corporeal’, she writes, have been grounded in ‘refusals of biological detail’, such that ‘biology remains an established adversary of feminist theory and politics’ (1999, 8). Wilson cites feminist discussions of hysteria as a case in point. Hysteria, a condition in which ‘psychic and cultural conflict’ (1999, 9) are realised *as* biological symptoms, has served as a key example for feminists who explore the entanglement of biology with culture. Despite the fact that hysteria so vividly encapsulates the ontological complexity of mind-body relationality, she explains, ‘feminists have tended to theorise hysteria as primarily ideational’ (1999, 9). For Wilson, this reluctance to think biology and culture together affirms a mind-body separation that inhibits an understanding of *how* psychosomatic events actually take place. In recognising culture as the sole author of biological transformation – in attributing the complexity of this event to the action of just one agent – many feminist theorists inadvertently recuperate a reductive reading of biology.

Crucial to this chapter is the thought of a number of contemporary feminists whose works directly engage the issue of biology’s (or matter’s) separation from culture (or meaning), and offer frameworks for thinking biology and culture as expressions of a single system. Elizabeth Wilson’s analyses of conversion hysteria (1999), bulimia (2004b) and depression (2008) offer detailed empirical demonstrations of how our biology is already social and cultural. Vicki Kirby, whose work critically interrogates the nature/culture division with respect to a range of different issues, including the relationship of language to corporeality, and the efficacy of scientific models (1997, 2007, 2008, 2011), offers an account of life’s ontology that recognises the entanglement of nature and culture as primary or originary. Contesting the idea that we are ‘Culture-bound...alienated from a nature whose properties and capacities we can never know’ (2008, 6), Kirby’s work is defined by a commitment to thinking nature and culture as a single system: ‘it is in the nature of Nature to evolve and rewrite itself’ (2008, 11). This viewpoint has been explicitly elaborated more recently by Karen Barad, a theoretical particle physicist and feminist, whose work explores the matter-meaning relation through specific

experiments and concepts in quantum physics. Grounded in a critique of representationalism – a perspective that presumes an ontological distinction between representations and the entities they represent – Barad’s work explores the ontological dimensions of scientific practices, and specifically, argues that subjects and objects, discourse and matter, are ontologically implicated in the enactment of specific experimental apparatuses. Common to these thinkers is a rigorous theorisation of the nature/culture or matter/meaning dichotomy that offers tools for critically considering what is at stake in arguments that claim or presume the separation of biology from culture, or similarly, their naïve ‘addition’.¹⁰³

Part I.

Biological causes of allergy

In 1921, German physicians Carl Prausnitz and Heinz Küstner conducted an experiment in which they successfully demonstrated the passive (cutaneous) transfer of allergic sensitivity. The two investigators had been attempting to establish the presence of specific antibodies they believed responsible for allergic reactions in the serum of allergic individuals (Silverstein 1989, 226). Using themselves as guinea pigs, they sought to prove the existence of these entities by transferring serum from an allergic individual to a non-allergic individual. Serum was taken from Küstner, who was highly allergic to certain fish, and a small amount injected into Prausnitz’s skin. A day later, the allergen (fish) was administered locally to Prausnitz. ‘[A] typical wheal and erythema hypersensitivity reaction’ (1989, 226) appeared at the site of infection, and persisted for over four weeks. With this experiment, Prausnitz and Küstner established the existence of particular antibodies that mediated the allergic response, and named this agent or substance ‘reagin’ (Prausnitz & Küstner, 1921). In 1966, Japanese couple Teruka and Kimishige Ishizaka identified ‘reagin’ as

¹⁰³ The legacy of corporeal or material feminisms – a concern with the materiality of the body and the importance of matter in thinking through the issues of subjectivity, agency and politics – is evident in the works of numerous contemporary scholars, including Helen Keane (1999, 2002), Marsha Rosengarten (2009), Catherine Waldby (2000), Robert Mitchell (2006), Myra Hird (2009), Jean Walton (2002), and Celia Roberts (2007) to name a few. For a more detailed discussion of material feminism and the arguments of its different protagonists see Keane and Rosengarten (2002) and Davis (2009).

immunoglobulin E (IgE), the specific antibody implicated in type I hypersensitivity (Silverstein 1989, 227).

Since the identification of reagin, and later IgE, allergy has been characterised in terms of the presence and biological action of this antibody. At a basic level, allergy is defined as an antigen-antibody (IgE) reaction generative of a harmful inflammatory response in the host organism. Allergic reactions are overreactions of the immune system to innocuous substances that are misrecognised as toxic – exaggerated defensive responses initiated by the organism against its own tissues. According to mainstream immunology, these injurious reactions are caused by highly elevated levels of antigen-specific IgE in the organism's serum – IgE antibodies that bind with high affinity to specific allergenic substances (e.g. house dust mite) (Janeway et al. 2005, 519).¹⁰⁴ Allergic reactions are commonly referred to as IgE-mediated reactions, and allergic disease as IgE-mediated disease. This definition is summed up in the widely used textbook, *Immunobiology: The Immune System in Health and Disease*:

Allergy is one of a class of immune system responses that are termed **hypersensitivity reactions**. These are harmful immune responses that produce tissue injury and can cause serious disease. Hypersensitivity reactions were classified into four types by Coombs and Gell... Allergy is often equated with type I hypersensitivity (immediate-type hypersensitivity reactions mediated by IgE) (Janeway et al. 2005, 518, original emphasis)

IgE – and specifically, elevated levels of IgE – is broadly accepted as the principal biological and empirical marker of allergy. High IgE is recognised as concrete scientific evidence of allergy and, in general, of a genetic predisposition toward allergic disease. In clinical examinations, the exaggerated presence of this antibody confirms the status of an allergy as a definitively biological pathology with a

¹⁰⁴ In non-allergic individuals, 'IgE is found in very low concentrations' in serum (Beers & Berkow 1999, 1015). Outside its role in producing pathological responses, IgE is believed to serve a protective function in the organism against multicellular parasites and other pathogens. Janeway et al. explain that IgE is part of a 'defense system [that] is anatomically distributed mainly at the sites of entry of such parasites – under the skin, under the epithelial surfaces of the airways (the mucosal-associated lymphoid tissues), and in the submucosa of the gut (the gut-associated lymphoid tissues)' (2005, 521). For more on the protective function of IgE, see Janeway et al. (2005).

clearly identifiable biological cause. Elevated IgE is determined using skin prick testing, a simple clinical diagnostic procedure that measures for antigen-specific IgE. Thus, IgE provides the necessary material evidence to support a conventional biomedical or bioscientific explanation of allergy. Today, a causal association between allergy and IgE is more or less taken for granted – a fact demonstrated in the definitions offered by most standard immunology textbooks: ‘Much human allergy is caused by a limited number of inhaled small-protein allergens that reproducibly elicit IgE production in susceptible individuals’ (Janeway et al. 2005, 519).

The authority of these immunological accounts of allergy stems from the isolation of a material entity directly implicated in the pathogenesis of this condition. Since the discovery of IgE, immunological investigations of allergy have been largely IgE-centric, usually involving demonstrations of *how* IgE participates in the etiology of specific cases. Importantly, this trend is not limited to immunology. Beyond the biomedical sciences, clinicians of other fields have, and continue to, directly engage with immunological research on IgE, incorporating its findings and diagnostic techniques into their own studies of allergy. For instance, throughout the early to mid twentieth century, practitioners of psychosomatic medicine routinely conducted skin prick tests as part of their preliminary studies of patients.¹⁰⁵ The tests, often performed in conjunction with psychological and psychoanalytic examinations, were used to determine the presence or absence of a biological predisposition to allergy. By equating the absence of reagin with the absence of a biological cause, these clinicians were able to isolate cases in which disease production was more likely to involve a psychological component. Consequently, the skin prick test armed these practitioners with a basic means of differentiating between biological and psychological causes.¹⁰⁶

The centrality of IgE to biological *and* psychological studies of allergy relates to its utility and transparency as a form of scientific evidence. The self-evidence of IgE as a biological cause – a material correlate of allergy – is secured through the

¹⁰⁵ Use of skin prick testing in psychosomatic medicine was extremely widespread throughout the twentieth century. For examples of the use of these tests see the many studies of allergy recorded in Dunbar’s collection *Emotions and bodily changes: a survey of literature on psychosomatic interrelationships, 1910-1933* ([1935] 1938).

¹⁰⁶ Skin prick testing, psychosomatic studies of allergy, and the use of skin prick tests by psychosomatic practitioners are each addressed at later points in this chapter.

efficacy of skin prick testing as a diagnostic procedure, and the very literal, visual demonstration of exaggerated IgE it provides. The identity of allergy as a biologically based condition, the perception of IgE as a causal agent and the method of skin prick testing are thus intimately interrelated. As we shall see, the skin prick test supports a concept of biology as given, immutable and distinct from psychology. Importantly, it is this notion that a clear distinction exists, or can be drawn, between biology and psychology (phenomena deemed non-biological) that this chapter principally interrogates.

Atopy: the biology of allergic disease

Elevated IgE levels are typical of individuals who suffer one or a combination of the three primary allergic diseases: asthma, hay fever and eczema. In immunological parlance, the tendency to mount an exaggerated IgE response which results in any of these conditions is called *atopy*. Individuals who experience asthma, hay fever and/or eczema are often described as *atopic*. The term atopy refers to a group of allergic diseases recognised as having a tangible biological cause (IgE) and a strong genetic and familial foundation. James Sublett defines atopy as ‘the genetic potential to manifest the trinity of classic allergic diseases – atopic dermatitis, allergic rhinitis (hay fever), and asthma’ (2005, 445). Atopy is thus synonymous with both a genetic predisposition toward allergy and high IgE. This is summed up nicely by Janeway et al.:

As many as 40% of people in Western populations show an exaggerated tendency to mount IgE responses to a wide variety of common environmental allergens. This state is called **atopy**, has a strong familial basis, and is influenced by several genetic loci. **Atopic** individuals have higher total levels of IgE in the circulation and higher levels of eosinophils than their normal counterparts. They are more susceptible to allergic diseases such as hayfever and asthma. (2005, 523, original emphasis)¹⁰⁷

¹⁰⁷ Eosinophils are white blood cells that play a role in defending the host against the invasion of organisms such as multi-cellular parasites. Like IgE, eosinophils are found in tissues where these invasions typically occur - the gut, respiratory tract and urogenital tract. Because eosinophils are

The equation of atopy with ‘the production of specific IgE in response to common environmental allergens’ (Pearce et al. 1999, 268) means that positive diagnoses of atopy are determined using skin prick tests, and as a result, these tests are commonly used in epidemiological studies to establish instances of atopy (1999, 268). Thus, for the practical purposes of biomedical research, atopy and high IgE are loosely interchangeable.

However, the identity of IgE as a biological cause and evidence of atopy is as widely contested within the medical and scientific community as it is generally accepted. Both inside and outside immunology, researchers of allergy have long noted significant inconsistencies in the correlation between elevated IgE levels and actual manifestations of atopy. Numerous studies indicate that high levels of antigen-specific IgE do not necessarily correspond with the presence of specific allergies – one can test positive for high IgE but never manifest an allergy, even upon encountering substances to which they are supposedly sensitive. And conversely, having normal (low) levels of IgE is by no means a guarantee that an individual will be allergy-free – one can develop atopic allergies regardless of an absence of sensitivity. Deborah Jarvis and Peter Burney explain:

Atopy is defined as the production of specific IgE in response to exposure to common environmental allergens, such as house dust mite, grass, and cat. Being atopic is strongly associated with allergic disease such as asthma, hay fever, and eczema, but not everyone with atopy develops clinical manifestations of allergy and not everyone with a clinical syndrome compatible with allergic disease can be shown to be atopic when tested for specific IgE to a wide range of environmental allergens. This is particularly so for asthma. (1998, 607)

Instances of allergy both do and do not coincide with instances of elevated IgE.

There is a strikingly inconsistent relationship between IgE (cause) and allergy

responsible for killing microorganisms and parasites, their action produces tissue damage and works to amplify the immune system’s inflammatory response (Janeway et al. 2005, 531). Thus, higher levels of these cells in atopic individuals means a more exaggerated inflammatory response.

(effect), a fact that renders the status of IgE as empirical evidence of allergy questionable. In what sense can IgE be understood to cause allergy if its presence only *sometimes* results in allergic reactions? What is a biological cause that does not always produce the same physiological effect?

The ambiguous causal relation between IgE and allergy is elaborated in detail by Erika Isolauri, Samuli Rautava and Marko Kalliomäki in their study of food allergy and irritable bowel syndrome:

Detection of antigen specific IgE is invariably taken as an attribute of causality, a condition called “IgE mediated disease” and, more specifically, of “allergy”. However, empirical data are accumulating to suggest that transient increases in antigen specific IgE antibodies prevail in most healthy asymptomatic children during the first five years of life. Secondly, generation of these antibodies (sensitisation) on antigen exposure may not necessarily induce clinical disease (atopic disease). Thirdly, reducing the risk of atopic disease does not necessitate reduction of sensitisation and, finally, resolution or aggravation of clinical disease is not invariably associated with a corresponding alteration in antibody [IgE] concentration. (2004, 1391)

Isolauri et al. highlight several incongruities that render the conventional equation of allergy with IgE questionable, if not scientifically untenable. In the specific studies they cite, the relationships between IgE, sensitisation and clinical disease cannot be explained by immunological orthodoxy. Instead, this body of evidence challenges the belief that the manifestation of atopy is governed by a proper order of events (high IgE *then* allergy) or series of equations (high IgE = atopy, or low IgE = no allergy). These data show that no single or definitive causal narrative or set of rules reliably accounts for the relation between IgE and allergy. At stake in these inconsistencies is the integrity of IgE as a discrete biological cause and correlate of allergy, and thus also the identity of allergy as a genetically based condition. Crucially, the ambiguity of the atopy-IgE connection throws this genetic foundation into question.¹⁰⁸

¹⁰⁸ Throughout this chapter, the terms ‘genetic’ and ‘biological’ are frequently used as synonyms. Firstly, this is because in orthodox immunological accounts of allergy (immunology textbooks), confirmation of a genetic basis is often taken as an indication of an identifiably biological origin.

The problematic status of IgE as a biological/genetic determinant of allergy is illustrated most starkly in cases of atopy that have no demonstrable biological basis. Sublett explains: ‘all of the classic trio of diseases can present with identical clinical symptoms to their allergic counterparts, with no identifiable IgE-mediated response: atopic eczema/dermatitis syndrome (AEDS), nonallergic rhinitis, and intrinsic asthma’ (2005, 445). One can manifest an atopic illness in the absence of elevated IgE, and thus also in the absence of a genetic predisposition. This anomaly is confirmed in a case study by Hyman Miller and Dorothy Baruch (a physician and child psychologist team) that explores ‘paradoxes in the physical pattern of allergy’ (1956, 10). Examining the relationships between the results of skin prick tests, family histories of allergy and actual manifestations of allergy in a large experimental sample, Miller and Baruch single out a category of allergy sufferers that experience some form of atopy but test negative for elevated IgE. They state:

...there are individuals in whom the usual allergy tests, as well as eye tests, passive transfer tests, and inhalation tests are negative, apparently because there is no immunologic basis for their disease – that is, no reagins. They are not immunologically allergic, and yet their symptoms cannot be distinguished from those obviously resulting from immunologic roots. They develop the very same asthma, the identical hay fever, the same clinical manifestations of eczema. (1956, 12)

Remarkably, these data point to the existence of two types of atopy that are scientifically and genetically distinct, but *clinically indistinguishable*. Whilst there are instances of atopy that are IgE-mediated, or which conform to an orthodox

Secondly, the scope of this chapter and its disciplinary commitments preclude a more detailed examination of the genetics of allergy (an enormous field in itself). This chapter deals with the genetics of allergy in a broad sense. Also beyond the scope of this chapter is the literature on post-genomic work which complicates the simple notion of a gene (or genetic heritage), and suggests a far more complex interrelation of gene, organism and environment. For instance, Paul Griffiths and Karola Stotz explain that ‘in contemporary molecular bioscience genes are not straightforward, structurally-defined entities... Instead genes are “things an organism can do with its genome”; they are ways in which cells utilize available template resources to create biomolecules that are needed in a specific place at a specific time’ (2006, 509). Evelyn Fox Keller’s *The Century of the Gene* (2000) also discusses how a reductionist understanding of the gene has become outdated by advances in our knowledge concerning evolution and heredity. For a more detailed discussion of these issues, see Griffiths & Stotz (2006) and Keller (2000).

immunological definition of atopy, there are simultaneously cases that have no demonstrated biological basis, but whose symptoms are identical to their IgE-mediated counterparts. This division raises the question of whether or not we are dealing with the same group of conditions in both scenarios.

In recognition of this difference, contemporary immunology distinguishes between *atopic* and *non-atopic allergy*. Importantly, non-atopic allergy represents a statistically significant anomaly. In a study investigating the extent to which incidence of asthma are attributable to atopy, Pearce et al. explain that ‘standardised comparisons across populations or time periods show only a weak and inconsistent association between the prevalence of asthma and the prevalence of atopy’ (1999, 271). Surveying a wide range of literature on this subject, they report, ‘the available epidemiological evidence suggests that the population based proportion of asthma cases that are attributable to atopy is usually less than one half’ (1999, 271). These statements show that non-atopic allergy is by no means an exception to the rule that atopy is predominately IgE-mediated: instances of atopic and non-atopic allergy are approximately *equal*.

The distinction between atopic and non-atopic allergy poses the dilemma of how these conditions can be simultaneously identical and different. If these afflictions are evidenced by the same symptoms, in what sense can one, and not the other, be described as possessing a biological foundation? Additionally, this division animates a host of questions about the precise nature of allergy as a genetic, immunological condition. The fact that a set of symptoms, consistent with a specific genetic predisposition, arises frequently in individuals who do *not* possess this trait seems to cast atopy’s genetic basis in doubt. If atopy describes a genetic predisposition to allergy, what is a non-atopic (non-genetic) form of atopy? What is atopy if *not* (or when it’s not) an IgE-mediated disease? The dual status of atopy as a clinical disease both with and without a genetic foundation compromises the evidentiary value of IgE as a biological cause of atopy, and renders the distinction between genetic and non-genetic deeply ambiguous.¹⁰⁹

¹⁰⁹ The observation that some instances of atopy have a biological basis and others do not has strong resonances with the phenomenon of hysteria. Although, historically, hysteria comes in many different forms, one of its defining features is its capacity to *mimic* organic conditions. The manifestation of

Animating atopy: gene-environment interaction

Concentrating on orthodox cases of atopy, it is noteworthy that the manifestation of atopic conditions is not reducible to the presence of IgE alone. High IgE, or a genetic predisposition, is not in and of itself causative of allergy. In textbook cases of atopy, causation is complicated by the fact that a genetic predisposition has to be ‘animated’ by exposure to specific environmental antigens. *That is, in order to become causative, IgE has to first be triggered by contact with something foreign or external.* Sublett explains, ‘the atopic state is a function of genetics waiting for environmental influences to manifest disease’ (2005, 446). Similarly, Stephen Holgate states that ‘gene-environmental interactions are critical to the pathogenesis of allergic disorders’ (2004, 104). The necessity of this interaction is especially noted in cases of asthma (e.g. Janeway et al. 2005, 536; Martinez 1997, S117):

In recent decades it has become routine to describe asthma as an atopic disease. A theoretical paradigm has evolved in which allergen exposure produces atopic sensitization and continued exposure leads to clinical asthma through the development of airways inflammation, bronchial hyperresponsiveness, and reversible airflow obstruction. (Pearce et al. 1999, 268)

hysterical illness problematises the distinction between organic (biological) and non-organic (psychological) illness. The fact that the symptoms of an organic condition are reproduced (albeit imperfectly) by the hysterical body, suggests that anatomy and psychology are already or inherently involved in one another in a way that defies disaggregation. Hysteria troubles the biological/psychological division by destabilising the point of reference that anchors our understanding of this difference. As Elizabeth Wilson explains, hysteria demonstrates that the capacity to mimic an organic condition is itself a possibility of biology: ‘hysteria does not point to what is *beyond* the organic body...it directs us right back into the heart of organic matter; hysteria is one particular mode of biological writing’ (2004b, 78, original emphasis). Similarly, the fact that atopic and non-atopic allergy share a common symptomatology poses the question of what constitutes the proper reference point for interpreting allergic phenomena. As we shall see in the second half of this chapter, the difference between atopic and non-atopic (organic and non-organic) allergy plays a pivotal role in investigations of allergy within psychosomatic medicine. For a detailed discussion of hysteria and its relationship to organic illness, see Wilson (1999; 2004b). For examples of key cases of hysteria in the history of psychoanalysis see Breuer & Freud (1956).

These studies show that the cause of atopy is ecologically complex: it relates as much to a process of specific sensitisation as it does to the presence of an innate biological predisposition. Elevated IgE signals the genetic potential to develop allergy, but it does not become a genetic determinant until sensitisation has occurred. Put slightly differently, specific sensitisation is the condition of elevated IgE being a biological cause of atopy.¹¹⁰

Importantly, the above assertion relies on the assumption of a linear temporal logic that is itself significantly complicated by the phenomenon of sensitisation. As we saw in Chapter Two, Pirquet's study of allergy shows that sensitisation describes a spatio-temporal entanglement of entities and moments that completely disrupts a conventional understanding of linear time or Euclidean space. In trying to pinpoint what causes allergy, or at which point during the process of sensitisation an altered response is triggered, Pirquet stressed that the scene of reactions could only be examined as a whole (first exposure, second exposure and the interval between them). That is, his studies demonstrated that neither the first nor second exposure could be disaggregated from the wider scene of the organism's reactivity as a stand-alone immune event responsible for allergy: for him, the change in response is, counterintuitively, secured by the inter-implication of these temporally discrete exposures.

The complex interrelation of exposures that Pirquet's work highlights is an insight applicable to the event of sensitisation itself. Just as it is impossible to view specific organism-antigen encounters within the frame of sensitisation as located discretely in time and space, it is impossible to finally determine where the boundaries of sensitisation lie. If the lesson of sensitisation is that no immune event can be taken in isolation, then sensitisation must itself be utterly implicated in the events that constitute the broader frame of the organism's reactivity. Thus, the task of designating a point *subsequent* to sensitisation – the point at which genetic potential

¹¹⁰ Interestingly, the specific sensitisation of genetically predisposed subjects does not always produce allergy. Immunological evidence shows that gene-environment interaction sometimes results in precisely the opposite effect. For instance, Sublett notes that sensitisation can act to *suppress and prevent* allergic reactivity (2005, 445). In other words, despite exposure to antigen-specific IgE, there is no guarantee that an injurious, rather than protective, response will definitely occur. See Sublett (2005).

becomes determinant – is by no means straightforward, as the very idea of ‘when’ sensitisation takes place is directly at issue.

Recognition of the role of environmental factors in awakening the allergic predisposition has led to a general view that atopy is caused by a specific gene-environment interaction. It is widely accepted that the existence of a genetic predisposition, coupled with exposure to environmental antigens, is consistent with the development of atopy. Here, ‘cause’ is not located in the substance, IgE, but rather, in the material or biological inter-implication of two entities: antigen-specific IgE and environmental allergens, or more basically, organism and environment.

Fundamental to this etiological perspective is the idea that the genetically predisposed organism and sensitising agent are separate, given entities whose meeting or interaction initiates allergic disease. The notion of a ‘gene-environment interaction’ presumes the prior existence of an organism in possession of fixed genetic traits, and thus also an external environment, populated by foreign life forms and substances. Immunological accounts of the pathogenesis of atopy are grounded in the view that organism and environment are ontologically distinct phenomena, and that allergy signals an event of cross-contamination between them.¹¹¹

Yet, close attention to the conditions that enable sensitisation reveals a situation that is not reducible to a conjunction of organism and environment. The very possibility of a gene-environment interaction is given or written in the identities of the immunological components involved, namely, antigen and antigen-specific IgE. The material being of each of these entities (antibody and antigen) is a corporealised response to the call or provocation of an other, which has yet to take place. Elevated IgE produces an allergic reaction once it has been triggered into action by exposure to something both immunologically foreign and yet *already specified by the genetic potential of the organism*. In the context of this relation, the genetic predisposition, which is viewed as innate, does not simply precede the event of sensitisation: the production of antigen-specific IgE by the organism demonstrates

¹¹¹ The argument being made here is similar to that made by Karen Barad. In *Meeting the Universe Halfway* (2007), Barad critiques ‘the metaphysics of individualism’ – the idea that the world is populated by autonomous entities with given properties, that pre-exist their interactions with one another. For a complete account of her argument, see Barad (2007).

that it has already been sensitised to this specific antigenic stimulus. Thus, the condition of possibility of atopic sensitisation is not the existence of two autonomous entities that are materially exterior to one another, but rather a complex interrelation of organisms and antigens, genetics and environment, *in the first place*.

This perspective has direct implications for our understanding of the etiology of atopy. As the above discussion demonstrates, sensitisation is an immunological phenomenon that cannot be explained according to the framework of discrete interacting entities or consecutive moments. The ontological interrelationality of genetics and environment means that cause cannot be located in any one body or event; it does not inhere in the substance of an antibody or genetic make-up of an individual, nor does it reside in a relationship between discrete immunological components. Atopy is genetically determined insofar as what constitutes it as a genetically based condition is a scene in which genetics and the environment have always been utterly inter-implicated.

These insights render a conventional understanding of genetics as a set of pre-existing biological traits deeply problematic. The pathogenesis of atopy makes it impossible to properly demarcate ‘genetics’ because its determinant quality arises in an already anticipated conversation with entities that are (apparently) non-genetic and alien to the organism.¹¹² Consequently, the phenomenon of sensitisation forces us to critically consider what it means to describe something as ‘genetic’ or ‘biological’.

Skin prick testing

So far, I have established that the animation of atopy depends upon a process of specific sensitisation. I have argued that the cause of atopy cannot be traced to a single entity (IgE or antigen) or event (organism-antigen encounter). Organism and environment are always given as an ecological relationality that defies linear causality.

¹¹² A similar argument is made by Keller in *The Century of the Gene* (2000), where she complicates a conventional understanding of the gene as a stable biological trait that determines a specified outcome.

Yet modern immunology favours a linear, causal view of immune phenomena.¹¹³ It conceptualises the immune response as a cause and effect relation between two discrete things, an antigen and an organism, or a stimulus and a response. The immune response is interpreted primarily in terms of a linear narrative of infection, in which the physical integrity of the organism (or immune self) is breached by the intrusion of a foreign (non-self) element or substance. Organism and antigen are imagined as separate entities, bearing fixed material properties, which enter into relation in the event of response. However, this concept of the immune response as an isolatable interaction between predetermined entities suggests the ontological interrelation of organism and antigen is an *effect* of their meeting. As a model, it does not explain how organism and antigen exist in a relation as different and opposed, and yet biologically correlative and implicated: that is, it cannot account for how a stimulus comes to be provocative for an organism that is already receptive to this very specific provocation. In presuming the spatial separation of organism and antigen, this perspective actually obscures the question of *how* these unique biological pairings arise.¹¹⁴

This view of immune phenomena is epitomised in the skin prick test – one of the most common diagnostic methods of testing individuals for allergic disease. The procedure measures for levels of IgE and specific sensitivities by exposing the subject to a range of common environmental allergens typically associated with atopy (Walls 1997, 11-12).

Although there is some variation in the way skin prick tests are conducted, the general procedure is as follows. First, the patient's inner forearm, which functions as the site of the test, is cleaned to remove any impurities (Walls 1997, 13). A large gridded stamp is inked and imprinted on the skin. A rectangular grid, which normally

¹¹³ In presuming the existence of a defended immunological self, immunology can only make sense of immune phenomena in terms of interactions between different kinds of given entities. This logic is discussed in detail in Chapter One.

¹¹⁴ A similar argument is made by Lyle Muller and Anne Fausto-Sterling with respect to the conceptualisation of stimulus and response in neuroscientific experiments. In 'The Logic of the Receptive Field' (in preparation), Muller and Fausto-Sterling consider the relationship between events designed to stimulate a neural response and their neural representation. They argue that neuroscientific experiments presume the localisation of stimulus and response, and thus a linear, causal model of neural responsiveness. Through a detailed examination of the role that representation plays in these experiments, their analysis significantly complicates a conventional understanding of stimulus and response. See Muller and Fausto-Sterling (in preparation).

contains between 10 and 20 squares, is marked out as the site at which a range of common allergens (corresponding with the number of squares) will be introduced under the patient's skin. 'Drops of glycerinated allergen extract are placed on the skin [in the centre of each square] and a prick is made through the drop with a...lancet' (1997, 13). In addition to these allergens (which may include house dust mite or different animal danders),¹¹⁵ two control substances are included: normal saline is used as the negative control, which should yield no response, and histamine as the positive control, which should produce an inflamed response (1997, 13). The patient then waits for 10-15 minutes for a reaction to form. The result is a series of red welts on the skin – a wheal and flare response – whose appearance and physical size indicates either a positive or negative diagnosis of allergy. Walls explains: 'A wheal equal to or greater than 3mm is taken to indicate a positive diagnosis, provided there is no reactivity to the negative glycerosaline control' (1997, 13).

The skin prick test provides a precise visual, spatial and temporal representation of a linear causal account of stimulus and response. The geometric table imposed on the skin's surface is a device that rationally and numerically organises the patient's responses to a variety of allergens. By demarcating individual welts in this localised 'field' of responses, the grid indicates that these are *separate immune events*. The physical organisation of neat rows and columns of little red bumps gives the impression that each welt constitutes a contained response to a specific allergen. As such, the test infers that each welt can be read in isolation, or rather, *only* in relation to the control substances.¹¹⁶ Crucially, the practice of quarantining individual responses, conceptually and biologically, suggests that each symptom can be accurately and reliably interpreted *without* reference to neighbouring substances or symptoms. It is assumed that the spatially ordered administration of stimuli (exemplified by the grid) yields a similarly ordered and categorised series of responses from the patient. Consequently, the structure of the test affirms that the

¹¹⁵ Walls explains: 'Allergens are selected on the basis of the clinical history [of the patient] and are determined by their prevalence in the area from which the patient comes' (1997, 13).

¹¹⁶ The only other exceptions to this rule are cases in which the patient experiences a systemic allergic reaction, such as anaphylaxis. In these instances, individual responses to specific substances can no longer be physically located or pinned down on the body's surface. The complex, systemic, diffuse nature of the reaction (i.e. hives all over the body and extreme difficulty breathing) compromises the neat compartmentalisation of responses required for an objective diagnosis of allergy in the skin prick test.

patient's immune system deals with each substance specifically, and thus autonomously of other substances present.

In conceptualising each welt as a stand-alone 'event' composed of clearly discernable parts, the test treats the immune response as a phenomenon that can be delimited temporally – to the timeframe of the test, and spatially – to the square of skin in which the welt appears. It locates the immune response firmly in a particular time and space. As a diagnostic tool, it does *not* accommodate the possibility that the boundaries of response might exceed the observable and measurable parameters of a single welt. For instance, some clinicians warn that if there is insufficient space between injection sites, '[l]arge reactions can reflexively cause positive reactions in adjacent sites' (Walls 1997, 13). That is, if injection sites are too close together, they literally infect one another, resulting in a general field of contagion from which individual responses cannot be objectively separated. Yet despite the clinical knowledge that a response may not be confined to the physical outline of a welt – that these responses are not necessarily immune to one another – the efficacy of the test rests on their capacity to be read as isolates.

Similarly, the test leaves no room for doubt about the identity of the allergen. Within the parameters of the clinical procedure, there is no sense that what causes or stimulates a specific swelling might be derivative of *more* than the inherent properties of a specific allergen, or more interestingly, that the particular properties of this substance (its allergenicity) are given or emergent within a matrix of other factors. For instance, one could argue that the test abstracts grid, stamp, needle, clinic and clinician, as well as the other allergens present, from the materiality or agency of the stimulus, discounting them as external factors that do not affect the objectively controlled event of response. Here, cause is confidently located in (what is presumed to be) a fixed, immutable substance.

Governed by a logic of separability, the skin prick test compartmentalises stimulus from response, individual welts from one another, individual allergens from one another, and clinician from patient. Most provocatively, it abstracts the event of the test itself from the broader context of the patient's reactivity. Viewed as an objective medical intervention, the test is treated as an exceptional event that does not

participate in the patient's clinical history of allergy. That is, it is assumed that the test can have no effect on the patient's allergic status because it is not already implicated in his/her reactivity. Yet, the notion that this clinical intervention does not interfere with, or affect, its object is called into question by the fact that every antigenic challenge faced by an organism is a potentially sensitising one (*especially* those involving common environmental allergens). There is no logical sense in which the test can occur outside the events of sensitisation: it is always already located within the scene of sensitisation and as such, is deeply implicated in the patient's reactivity.

Thus, the skin prick test neatly demonstrates the impossibility of the discrete bifurcations that it takes as its point of departure. In the context of the test, nothing is strictly external to anything else – the very possibility of a response, and thus the efficacy of the test itself, are secured by the contamination that (pre)conditions these divisions.

Atopic asthma: complicating inheritance

Atopic asthma is a condition that foregrounds the problematic of location. As an illness in which heredity plays a key role, asthma significantly complicates the task of etiological explanation, as what is past and present, actually manifest and latent, become confused. The following discussion emphasises the explicitly historical nature of genetics, focusing on how our genetics are a contemporary rendition of the historical, or a phenomenon that evidences the 'presentness' of history. The historical, temporal dimension of genetics and its relationship to one's family or ancestry is key to the pathogenesis of asthma. To a larger extent than perhaps any other allergy, asthma highlights the relevance of history in the actualisation of allergic symptomatology.

The association between allergy and IgE is so deeply sedimented in the scientific imagination that some immunologists have extended their investigations beyond antigen-specific IgE to IgE more generally. In recent decades, a number of researchers have sought to establish a connection between incidence of asthma and

high levels of total serum IgE (Pearce et al. 1999, 270). This connection has been studied in detail by Benjamin Burrows, Fernando Martinez and others, who argue that ‘some type of IgE mediated process may be involved in almost all asthma cases, even when skin test reactivity to common allergens is not found’ (1999, 270). In a 1989 study, Burrows et al. demonstrated a correspondence between incidence of asthma and total serum IgE in subjects that tested positive *and* negative to common environmental allergens in skin prick tests (Martinez 1997, S119). They found that regardless of the presence of antigen-specific IgE, total serum IgE levels served as a reliable indicator of asthma.

In an effort to definitively demonstrate this causal correlation, Burrows et al. conducted further investigations, but this time centred their analysis on ‘the intrafamily relations between total serum IgE and asthma’ (Martinez 1997, S119). Burrows et al. examined ‘the extent to which the strong familial aggregation of asthma could be explained by the known association between parental IgE levels and those of their children’ (1997, S119). They sought to account for patterns of asthma inheritance in terms of the relationship between the total serum IgE levels of parents and their children. Martinez, one of the chief investigators, reports that the study made two important findings: firstly, it confirmed ‘the expected strong parent-offspring correlation of...total serum IgE levels’ (1997, S119), and secondly, it found that incidence of asthma in offspring was dramatically increased in cases where one or both parents also suffered asthma. Thus, Burrows et al.’s study singled out two variables associated with the inheritance of asthma – parental IgE and parental asthma.

Crucially, however, the study showed that parental IgE levels and incidence of parental asthma were *not* simply interchangeable as variables. Remarkably, Burrows et al. ‘found no statistically significant association between prevalence of asthma in children and serum IgE levels in their parents when the mother or the father did not have asthma’ (Martinez 1997, S119). Martinez explains:

These results suggested that inheritance of a tendency to develop high total serum IgE levels is only one factor related to the inheritance of asthma susceptibility and that, by itself, it has limited ability to predict asthma

inheritance...*parental serum IgE seemed to increase the likelihood of developing asthma only when the parents themselves had asthma.* (1997, S120, emphasis added)

In other words, the chances of inheriting asthma were found to be contingent upon one's parent/s having a genetic predisposition toward allergy *and* the actualisation of this predisposition as asthma.

It is worth pausing here to consider the provocative implications of these findings. Burrows et al. observed that what was inherited by offspring depended not only upon the genetic traits of the parent(s), but on what occurred immunologically in the parent(s) within his or her lifetime.¹¹⁷ The child's inheritance was found to be directly related to circumstances and events in the parents' lives – factors (presumably) *beyond* the realm of fixed, biological characteristics. These findings suggest that offspring do not become asthmatic purely as a consequence of a pre-given, genetic make-up. The significance of contingent, circumstantial factors in *activating* one's genetic inheritance challenges this conception. Here, *the offspring inherits and materially manifests a genetic predisposition that has already been (or will be) awoken at a different point in time, in a different body (or bodies).*

The role of parental asthma (as opposed to parental IgE) as a causal variable implicated in the inheritance of asthma completely destabilises the basic conventions of analysis, namely, the perceived givenness of biology, and the assumption that bodies are fixed in time and space. For instance, it complicates any simple notion of this condition as genetically determined. What the offspring inherits is not strictly genetic, in the orthodox sense of a set of pre-existent genetic traits transmitted, via birth, from one body to another. If what invests the parent's genetic make-up with its authorial capacity is a much wider field of factors that appear non-genetic, then the parent's biological legacy cannot be defined in terms of a fixed code in a bounded body. The inheritance of atopic asthma implies a far more enlarged sense of genetics,

¹¹⁷ Interestingly, this finding suggests a breaching of Weismann's barrier – a foundational principle in evolutionary and biological theory which states that the genetic code contained in DNA and RNA molecules (genetic information) can be translated into proteins, but this translation can never occur in the opposite direction. Here, the inheritance of asthma seems to demonstrate that biological events experienced by the parent can alter the genetic information passed on to their offspring. For more on Weismann's barrier, see Robinson (1979).

biology and the corporeal – one that challenges our ability to delimit the biological – materially, conceptually and historically.¹¹⁸

The complexity of genetic determination in atopic asthma similarly complicates a commonsense notion of inheritance. If one's genetic inheritance is decided by significant immunological events over the parent's lifetime, then it is not clear that the inherited property strictly precedes its heir. If the determinant quality of a parent's genetics is realised in conversation with environmental factors, it follows that they might also be realised *after* the birth of the child. If this were the case, how would this 'genetic potential' be transmitted or inherited? Like the contaminated scene of skin prick testing, the inheritance of asthma confounds a conventional understanding of location – of discrete moments in time, or bodies in space.

What, then, do these complications mean for our understanding of atopic asthma? The recurrence of parental asthma as a causal factor over many generations challenges a linear notion of causation, and thus also, the given identities of the units on which this model is based. The repetition of this variable suggests that the specific gene-environment interaction deemed responsible for the occurrence of asthma in one generation cannot be identified as an originary event that then determines its manifestation in the following generation. Instead, the recurrence of parental asthma means that any one instance of asthma must necessarily be caused by *all* other instances; parental asthma is only constituted as a cause of inherited asthma by the cases that comprise a whole atopic lineage. Thus, although any individual case of asthma is highly localised – it manifests in one body at one moment – it is simultaneously a unique possibility bodied forth by, and rooted in, a whole genetic and family history. The boundaries of any single case are compromised by the complex distribution of its cause across many bodies, generations and moments.

Consequently, it is not clear that the asthmatic who reacts is the sole 'author' or 'agent' of their attacks because what constitutes that individual in his/her specific reactivity is a whole history. In this sense, the asthmatic individual emerges as a

¹¹⁸ Mike Fortun's *Promising Genomics: Iceland and deCODE Genetics in a World of Speculation* (2008) discusses the increasingly expansive nature of genetics and how contemporary genomic research is coming to terms with such an enlarged canvas. See Fortun (2008).

biographical index that evidences the contamination of the genetic, familial and environmental. It is as though atopic asthma is symptomatic, not of an isolatable cause, but of the impossibility of circumscribing cause within a discrete domain, such as biology or genetics. The causal problematic that atopic asthma manifests foregrounds the difficulty of locating sensitisation, temporally or spatially: it requires us to rethink the relationship between past, present and future, as well as our understanding of biology as a natural domain that pre-exists the environment or family relations. It raises the question of what is at stake in the conceptualisation of any entity or phenomenon as ontologically enclosed (e.g. organism, individual, ancestry, biology, environment).

Part II.

Non-atopic allergy: from biology to psychology

Up to this point, I have focused principally on atopic allergy – allergies evidenced by the presence of elevated IgE, and recognised as having a genetic or biological foundation. However, as noted earlier, there exists a group of allergic conditions that are clinically identical to atopy but have no known biological basis. Non-atopic allergies are those that share the same symptomatology as their atopic counterparts, but when subjected to skin prick tests, show no evidence of elevated IgE. Non-atopic allergies make up approximately 50% of all instances of asthma, hay fever and eczema, which means that half of all cases of allergic disease cannot be explained scientifically. Intriguingly, this statistic suggests that the other half of cases (those that comply with immunological criteria) cannot be explained either, as it threatens the evidentiary value of elevated IgE as a biological signature of atopy.

The categorical distinction between atopic and non-atopic allergy stems from the method of skin prick testing, and its affirmation of a particular notion of what constitutes biological evidence of allergy. The only perceivable difference between these conditions, the absence or presence of elevated IgE, is one rendered evident by the use of this procedure. However, inasmuch as the atopic/non-atopic distinction is the product of one type of evidence (and thus one diagnostic method), the distinction

itself suggests that there must be other, different forms of evidence that also attest to the presence of allergy. One could argue that allergy is equally demonstrated by the bodily manifestation of atopic symptoms in individuals without elevated IgE. In this sense, allergic disease is defined by two forms of evidence (IgE or symptoms) that correspond with unique diagnostic procedures (skin prick testing or physical examination).

Despite these different forms of evidence, IgE is privileged as the most reputable, reliable indicator of allergy. This adjudicating hierarchy is reflected in basic descriptions of atopic and non-atopic allergy. Non-atopic allergy is frequently referred to as ‘identical’ to atopic allergy, or as a condition that ‘mimics’ its more authentic, immunologic twin. For instance, Sublett, an allergist and immunologist, states that ‘all of the classic trio of diseases can present with identical clinical symptoms to their allergic counterparts’ (2005, 445). Here, atopic allergies are characterised as ‘allergic’, that is, correlative with skin prick test positivity, and by implication, non-atopic allergies are viewed as ‘non-allergic’ or lacking in a biological basis that can be reliably demonstrated by the skin prick test. Miller and Baruch, practitioners of psychosomatic medicine, differentiate between ‘immunologic and clinical allergy’ (1956, 12), and define atopic allergy as ‘immunologic’ and non-atopic allergy as ‘clinical’. In their work, allergies are defined according to their method of diagnosis: an allergy is deemed ‘immunologic’ if skin prick tests are positive and ‘clinical’ if a biological basis cannot be shown. Leon Saul describes non-atopic allergy as an ‘imitation’ of a real, biological condition:

...the emotional state leads to physiological changes which either 1) imitate the allergic symptoms or 2) render the tissues more sensitive to allergens or 3) do both; and conversely an individual who is allergically sensitive on presumably an entirely organic basis might conceivably through the very fact of this sensitivity more readily produce symptoms which are psychologically determined. (1941, 71)

Saul equates non-atopic allergies with the action of emotional triggers, and describes atopic allergies as those that have an ‘organic basis’. Although he concedes that

emotions may be responsible for atopic as well as non-atopic manifestations, his discussion privileges an understanding of atopy as a properly biological illness.¹¹⁹

These kinds of descriptions indicate that non-atopic allergy is understood almost solely with reference to atopic allergy, as it has no explanatory scientific basis of its own. The privileged etiological status of IgE as a natural correlate of allergy means that non-atopic allergy is imagined as a copy of an original, authentic and legitimately immunological condition. Underlying this distinction is a concept of biology as a fixed, stable material substrate, and a concomitant notion of organic disease as any pathology that behaves according to the pre-determined rules of anatomy and physiology. Atopic allergy is understood as organic because it adheres to these rules. Non-atopic allergy is characterised as non-organic because it appears to operate outside these parameters – it manifests atopic symptoms in spite of, or without regard for, the rules that govern normal anatomical and physiological function. In lacking the necessary biological prerequisite, it is instead viewed as a product of the fluxing, erratic and unpredictable nature of psychic factors. The atopic/non-atopic division affirms a series of familiar distinctions, nature/culture, body/mind, biology/psychology, even when the evidence entirely contradicts this opposition.

History of the relationship between allergy and the emotions

The distinction between biology and psychology has long been associated with allergies, and in particular, with asthma and hay fever. Since Hippocrates, countless physicians have documented that strong emotional states or ‘passions’ play a crucial role in the pathogenesis of allergic conditions (as well as disease in general). In his writings on the symptoms of asthma, Hippocrates ‘recognized that *anger* and *hostility* influenced the asthmatic paroxysm’ (Abramson 1948, 7, original emphasis). In the late seventeenth century, the idea that asthma was attributable to emotional

¹¹⁹ Further examples of this distinction can be found in the extensive studies documented by Dunbar ([1935] 1938), as well as in her own narration of these findings. For instance, in relation to a discussion of ‘true bronchial asthma’, Dunbar differentiates between ‘psychic and allergic factors’ (1938, 257). Here, correlations between biological/psychological and organic/inorganic illness are apparent.

disturbance was pioneered by Thomas Willis, who argued that asthma was ‘a nervous disease’ (Abramson 1948, 7-9). This view was supported by Sir John Floyer’s *A Treatise of the Asthma* (1698), which emphasised that passionate emotions intensified the experience of allergies; Floyer stressed ‘the importance of avoiding or subduing excessive anger and fear in patients predisposed to the condition’ (Jackson 2009, 139). The significance of this connection continued to be documented by medical practitioners well into the late nineteenth century, and most famously by Henry Hyde Salter in *On Asthma - Its Pathology and Treatment* (1864), who also counted asthma amongst the nervous diseases. So sedimented is this connection that Mark Jackson describes it as ‘one of the least contentious aspects of the disease’ (2009, 140).

However, following the birth of immunology and the identification of reagin (IgE), studies of the relationship between allergies and the emotions shifted dramatically. Prior to the early twentieth century, hypotheses and diagnoses of allergy as psychogenic had been based primarily on clinical studies of patients – on the observations and anecdotal evidence of physicians. While allergies were largely considered to be an essentially biological or physiological condition, clinicians viewed the susceptibility of allergic individuals to their own emotions as an indication of the involvement of non-biological factors in disease pathogenesis. That is, before immunology, the biological and psychological aspects of allergy were imagined as separate, yet interconnected phenomena; however, neither factor had been defined empirically, nor had any mechanism accounting for their interrelation been convincingly elaborated.

Thus, the isolation of reagin (in 1921) constituted a major turning point in the history of studies of allergy. It led to the formal segregation of allergy’s biological and psychological aspects into separate, specialised fields of study: immunology and psychosomatic medicine.¹²⁰ It enacted a conceptual and an empirical distinction between biology and psychology, or body and mind. In enabling clinicians to reliably differentiate the operation of psychological influence in allergy from any biological

¹²⁰ Allergies have been studied in more disciplines than just immunology and psychosomatic medicine, for instance, traditional chinese medicine, kinesiology, etc. However, it is beyond the scope of this chapter to investigate more than a few of these different disciplinary approaches in detail. Immunology is considered because it offers the most mainstream account of allergies within Western medicine. Psychosomatic medicine is chosen because it uses the insights of immunology to develop an account of allergy that aims to overcome the Cartesianism implicit in the immunological perspective.

foundation, the establishment of biological evidence of allergy clarified and empirically sharpened psychological accounts of this condition. For the first time clinicians were able to test for the presence of an allergic constitution and accurately judge whether or not a patient's response was caused by exposure to an allergen to which they were biologically sensitive. This capability allowed clinicians to identify cases in which reactions could not be explained by biological predisposition, and therefore might be more likely to involve psychological variables. Because the use of skin prick testing gave clinicians a practical means of isolating psychological variables, immunological research played a major role in the development and clarification of psychogenic accounts of allergy in the early and mid twentieth century: it was against the backdrop of immunology's biological reductionism that the implication of psychological factors in disease pathogenesis could be demonstrated.

Psychosomatic medicine and the mind-body interrelation

The role of psychological factors in triggering allergic disease has been studied extensively in the field of psychosomatic medicine. This discipline, which emerged in the late 1930s, was established 'as a reformist movement against biomedical reductionism' (Lipowski 1986, 5) that aimed to overcome the disciplinary restrictions (of either mind *or* body) of both psychiatry and medicine. Rather than concentrating on 'the isolated problems of the diseased mind or the diseased body' (Dunbar, Alexander, Atchley, Hull, Cobb, Liddell, Davis & Powers 1939, 4), psychosomatic medicine was founded on the general principle that health and disease always involve psychological *and* biological factors, and that the successful treatment of any illness hinges on an awareness of how these factors interrelate. As the editors of the journal *Psychosomatic Medicine* explain, the object of the discipline is 'to study in their interrelation the psychological and physiological aspects of all normal and abnormal bodily functions and thus to integrate somatic therapy and psychotherapy' (Dunbar et al. 1939, 4).

Psychosomatic medicine was born of the need to formally recognise and study the role played by psychosomatic relations in disease phenomena. In 1935, Helen Flanders Dunbar published *Emotions and Bodily Changes: A Survey of Literature on*

Psychosomatic Interrelationships, 1910-1933, an encyclopaedic compilation of literature from the early twentieth century addressing psychosomatic phenomena. Now viewed as foundational to the field, this canonical text collated an enormous amount of empirical research on the mind-body relation from different areas of specialisation, uniting these disparate studies under a single banner for the first time. Dunbar states: ‘the aim [of the text] was to bring together all the fragments of knowledge we possess, pertinent to the problem of psychosomatic interrelationships’ ([1935] 1938, xii).

This specific concern with the mind-body relation defined psychosomatic medicine as an unusual kind of discipline. The essentially interdisciplinary nature of its object meant that it couldn’t easily be reconciled with traditional notions of medical specialisation. This point is detailed in the ‘Introductory Statement’ published in the first issue of *Psychosomatic Medicine* – an academic journal founded by Dunbar in 1939, which officially inaugurated the field by providing a forum for the publication of new research relating to psychosomatic phenomena. Describing it as ‘both a special field and an integral part of every medical specialty’ (1939, 5), the editors write:

Psychosomatic medicine is not restricted to any specific field of pathology. Medical specialties such as internal medicine, pediatrics, dermatology, ophthalmology, etc., may be so restricted. Psychosomatic medicine, however, is not a medical specialty of this kind; it designates a method of approach to the problems of etiology and therapy rather than a delimitation of the area. (1939, 3)

In other words, the authors envisioned a research area that would overcome the inherent perspectivalism of traditional medical disciplines, and offer insight into a problem pertinent to all medical fields.

The difficulty of defining psychosomatic medicine as a discipline is further reflected in the ambiguity and contestation surrounding the meaning of the term ‘psychosomatic’ in the early works of some of the field’s key protagonists. In his historical account of the field, Zbigniew Lipowski argues that psychosomatic

medicine was exemplified by two concepts that presented competing interpretations of the mind-body interrelation – psychogenesis and holism (1986, 2). Some practitioners, he explains, championed theories of the psychogenesis of illness, seeking to account for how ‘psychological factors may cause bodily disease’ (1986, 2). Proponents of this perspective (such as psychoanalyst Franz Alexander) viewed illness as the product of a causal relation between psychological events and somatic phenomena: presuming a mind-body separation, they argued that disease is always ‘co-determined’ by psychological and biological factors (1986, 2). However, others (most notably, Dunbar) advocated a holistic perspective and asserted ‘that mind and body constitute an indivisible unity, or whole, and that the study and treatment of the sick need to take into account the whole person rather than isolated parts’ (1986, 4). Though these clinicians maintained that disease ‘always encompasses both somatic and psychologic aspects’, they insisted that these aspects ‘are not separate entities acting on one another’ (Lipowski 1984, 161).¹²¹

This tension is evident in the introductory statement to *Psychosomatic Medicine*. In outlining the discipline’s key conceptual and empirical concerns, the editors appear to oscillate between dualistic and holistic readings of the mind-body relation. Throughout this short document, there is a constant slippage between the concepts of psychogenesis and holism, suggesting that they were not definitely perceived as conflicting ideas. The editors write:

...there is no logical distinction between “mind and body”, mental and physical... divisions of medical disciplines into physiology, neurology, internal medicine, psychiatry and psychology may be convenient for academic administration, but biologically and philosophically these divisions have no validity...psychic and somatic phenomena take place in the same biological system and are probably two aspects of the same process. (Dunbar et al. 1939, 4)

These kinds of statements, which stress a holistic view of the organism, are juxtaposed with others that can be read as evoking a mind-body dualism. For

¹²¹ This is a very brief sketch of the conceptual differences that defined psychosomatic medicine as a field. For details of these debates and their key protagonists, see Lipowski (1984; 1986).

instance, at different points in the text, the editors refer to ‘the influence of specific emotional tensions upon physiological changes’; they underline ‘the need for more accurate information concerning the effect of the emotions upon visceral function’ (1939, 4). In both these quotations the authors characterise the relationship between the emotional and the physiological or visceral in terms of the ‘influence’ or ‘effect’ of the former on the latter. Here, the language of ‘influence’ and ‘effect’ implies the existence of two things organised in a relation of cause and effect – it suggests an interpretation of mind and body as ontologically discrete entities that affect one another. Nevertheless, underpinning these linear, causal descriptions is a sustained appreciation of the fact that the expression of emotional states *as* physiological effects means that mind and body, psychology and biology, are never properly external to one another.

The equivocation evident in the above statements is indicative of the elusive nature of the object of psychosomatic medicine – the ontology of the psyche-soma relationality – and reflects the difficulty of maintaining a holistic view of the organism, especially when it comes to demonstrating this phenomenon empirically. On the one hand, psychosomatic medicine rejects the Cartesianism on which medical specialties are based, and argues that individual health sciences are inadequate in terms of taking account of the psychosomatic nature of health and illness, generally. On the other hand, it is heavily reliant on these limited disciplinary perspectives to actually *do* its empirical work. In order to be taken seriously as a science, psychosomatic medicine must engage with and utilise existing investigative methods and forms of evidence.

The confusion that this position entails is plainly illustrated in attempts by some of the field’s key investigators to clearly define the discipline’s object, as well as their own task as psychosomatic practitioners. In these texts, ambiguity emerges as a consequence of characterising psychosomatic phenomena in terms of a relation between mind *and* body, or psychology *and* biology. For instance, physician and psychiatrist team, Edward Weiss and Oliver Spurgeon English write:

Psychosomatic...does not mean to study the soma less; it only means to study the psyche more. It is reaffirmation of the ancient principle that mind and

body are one, that they function as interactive and interdependent organs... As a science psychosomatic medicine aims at discovering the precise nature of the relationship of emotions and bodily function. (1944, 3)

Weiss and English refer to emotions and bodily functions as distinct phenomena of the organism, and argue that ‘psychosomatic’ means a greater emphasis and study of the psyche *as opposed to* the soma. Although they describe mind and body as ‘one’, they nevertheless affirm a Cartesian split in compartmentalising psyche from soma, and in referring to these phenomena as ‘interactive organs’.

This notion of separate interacting aspects of the organism is affirmed by Miller and Baruch, who state ‘[j]ust as there is a physical climate in which a person lives, so is there also an emotional climate’ (1956, 16). Miller and Baruch conceptualise the organism as simultaneously occupying two distinct environments – physical and emotional. This distinction is applied directly to the case of allergies: ‘the two most significant factors in the production of allergic symptoms are an allergic constitution and a characteristic pervasive emotional environment’ (1956, 45). For Miller and Baruch, allergy results from the *combination* of allergic and emotional, or biological and psychological factors.¹²²

However, there are some texts in which the division between emotional and bodily processes is a lot less clear, and their relationship far less causal. For instance, Felix Deutsch, a medical physician turned psychoanalyst, describes this interrelation as follows:

A mutual interaction between emotional and physiological processes must be considered permanently present in every human being, independently of

¹²² This additive logic can be found in the works of many other psychosomatic practitioners, most notably, that of psychoanalysts Franz Alexander and Thomas M. French. Alexander and French advocated a linear, causal account of psychogenesis, which they studied and developed with respect to a variety of different chronic conditions, including ‘hypertension, rheumatoid arthritis, thyrotoxicosis, peptic ulcer, ulcerative colitis, bronchial asthma, and neurodermatitis’ (Lipowski 1986, 3). These practitioners argued that ‘unresolved unconscious conflicts [could]...engender chronic emotional tensions’ that would produce physiological dysfunction, or as they put it, ‘organ neuroses’ (1986, 3). In other words, through numerous studies they investigated the relationship between cerebral processes and organic disease. Alexander and French authored one of the most influential accounts of bronchial asthma from a psychosomatic perspective: the maternal rejection thesis. For more on these authors, see Alexander & French (1941, 1948).

whether the total function of the organism precedes normally or abnormally. This presupposes a continual fusion between somatic and emotional processes inherent in physiological or pathological function. (1939, 252)

Deutsch characterises the relationship between emotional and physiological processes as a ‘mutual interaction’ and a ‘continual fusion’. Here, ‘interaction’ and ‘fusion’ imply the pre-existence of two entities that subsequently enter into a relation. Yet in describing the interrelation of these processes as both ‘permanent’ and ‘continual’, Deutsch suggests that their entanglement is a basic condition of organismic life. Put succinctly, the inter-implication of psychology and biology is not the consequence of an event that takes place at a particular point in life, but foundational to the very nature of the organism.

This perspective, which renders the isolation of psychology from biology highly problematic, is expressed by Saul in his study of the relationship between allergy and the emotions. Provocatively, Saul claims that the emotions originate in biology (or the individual’s biological existence):

...when we refer to psychogenic factors we do not mean certain intellectual ideas of the patient, but on the contrary, the emotions, which are powerful and eminently biological. The child’s longing for the parent, its anxiety when left alone are deeply biological; they are concerned with the individual’s very existence, and when such deep seated emotions are aroused, they produce far reaching biological changes. (1941, 71)

Saul argues that the emotions *are* biological, in the sense that they are fundamental to the biological existence of the organism. Although there are inconsistencies in his account – he distinguishes the emotions from ‘intellectual ideas’, and argues that emotions produce biological effects – his insistence that the emotions are *biological in origin* suggests a reading of the mind-body relation that does not assume the prior integrity of these phenomena. Crucially, this is not the same as a simple biological reductionism: Saul is *not* suggesting that our emotions are biologically determined, but rather, their capacity to produce biological change means they cannot be foreign

to biology. Within an economy where emotions are essentially biological, they cannot be said to affect a biological substrate of which they are not already a manifestation, in their very difference from biology. The observed correlation between the arousal of strong emotions and biological change evidences an economy in which the emotional (or psychological) manifests *as* a biological symptom. It is because the emotions are already a biological expression that changes in emotional states are concurrent with physiological alterations.

Case study of psychosomatic asthma

As the above discussion shows, the empirical demonstration and conceptual articulation of psychosomatic phenomena presented considerable difficulties to practitioners of psychosomatic medicine. The practical challenges of actually illustrating mind-body interrelation clinically and/or experimentally, coupled with the fact that there wasn't a definitive consensus among these clinicians about the meaning of psychosomatic (dualism or holism?), made early work in this field extremely difficult. Faced with the task of proving specific cases of illness to be psychosomatic, it was common for practitioners to stress the role of psychological factors in disease events (Lipowski 1986, 3). It is worth emphasising that these studies emerged at a point in time when medicine was increasingly defined by biologically reductive approaches to, and understandings of, disease. Investigators of psychosomatic phenomena favoured psychogenic accounts of illness to assert their difference from these approaches, and to prove the existence of a mind-body interrelation. Studies focused on isolating the psychological causes of illnesses were used to foster a more basic appreciation of the inter-implication of emotional states and biological processes implied by the holistic perspective.

I would like to pause here to examine a typical case study from psychosomatic medicine, and specifically, the methods by which psychosomatic phenomena were investigated. The following discussion details a case of psychosomatic asthma documented by Miller and Baruch. Focusing on the various processes through which a diagnosis is reached, it pays particular attention to the meaning of the term 'psychosomatic' as employed by these practitioners. What evidence leads Miller and

Baruch to diagnose this instance of asthma as psychosomatic? And what definition of psychosomatic does their study support?

In *The Practice of Psychosomatic Medicine, as Illustrated in Allergy*, Miller and Baruch outline the case of a three year old boy, Donald, who suffered from severe asthma attacks that could not be explained purely by allergen exposure. Their extensive case analysis consisted of two main parts, immunological and psychological. Prior to any psychological examination, the investigators undertook a detailed study of the immunological aspect of Donald's condition. Skin prick tests to common allergens were carried out, and test results revealed that the patient was highly allergic to grass pollens, a variety of inhalant substances and several foods, including egg white (1956, 15). The investigators note that Donald's sensitivity to pollen was so severe that his reactions to these allergens in skin tests lasted for as long as two days. The findings of this test were examined alongside a comprehensive analysis of Donald's clinical history of allergy.

Miller and Baruch studied Donald and his asthma over a ten month period. Throughout this time, the patient's asthma, as well as his behaviour surrounding asthma attacks, were monitored closely. Twelve instances of asthma were reported. Each of these episodes was analysed 'in relation to climatologic conditions, pollen counts, food intake, and the introduction of unusual substances into the environment' (1956, 15). On two of these 12 occasions, Donald suffered severe, extended attacks, experiencing 'persistent, severe wheezing dyspnea [breathlessness] over a period of six days each time' (1956, 15). Miller and Baruch observed that the first severe attack occurred at a time when the grass pollen count was unusually low – far lower than would normally precipitate an allergic reaction: 'the attack of asthma, despite the marked skin sensitivity to grass pollens, occurred well after the peak of the grass pollinating season' (1956, 15). This evidence suggested that Donald's attack was *not* caused by allergen exposure, a theory confirmed by the observation that 'during the season of highest grass pollination, his attacks of asthma were either mild and brief or nonexistent' (1956, 11). This inconsistent correlation between the occurrence of Donald's attacks and his exposure to specific allergens was also characteristic of his second major attack. With regards to this incident, Miller and Baruch state: 'Nothing illuminating showed up in the study of the immediate physical environment, of the

climatic conditions, or of the diet diary. The absence of pollens in the air was particularly striking' (1956, 16). Moreover, the investigators note a further ambiguity: 'Thirteen days after the [first] attack was over, the child ate a whole egg without any clinical sequelae' (1956, 16).

For Miller and Baruch, the establishment of an incongruous relation between Donald's exposure to known allergens (the patient's immunologic status) and the actual manifestation of symptoms is proof that his asthma is not purely biological in origin, but may involve a psychological component. The fact that Donald's reactivity does not adhere to the physiological rules of immunologic allergy suggests that it obeys a different causal logic. Here, Miller and Baruch use immunological evidence to eliminate the possibility that Donald's symptoms are the product of biological causes.

The psychological aspect of Donald's condition was studied simultaneously throughout this ten month period. As a means of establishing 'situational and life-stress data associated with each of the 12 attacks', Miller and Baruch conducted individual psychological studies of Donald and his parents: 'the patient had 32 psychotherapeutic play sessions, the father 73 psychoanalytically oriented psychotherapy sessions, and the mother 95 similar sessions' (1956, 16). Miller and Baruch's analysis of the interfamily dynamics is extensive, however its general findings are as follows. Over the course of these sessions, they discovered that Donald harboured extreme anger toward his parents, which he greatly feared expressing. This was particularly the case with his mother. Feeling unloved and unwanted by her, he openly craved the attentions of a doting mother figure. Miller and Baruch established that the mother was ambivalent about having children; when questioned about them she expressed frustration and resentment. As a consequence, she was reluctant to interact with, or display affection toward, Donald, and this dynamic negatively impacted the relationship between the child and his father (1956, 17-20).

In psychotherapy play sessions, Miller and Baruch encouraged Donald to express his anger towards his parents. They observed that at times when this was achieved, his wheezing would stop almost immediately (1956, 19):

We saw in this case that clinical symptoms developed repeatedly when the child blocked his hostility. We saw, too, how his symptoms cleared when the hostility could be unblocked and expressed directly against those whom he felt had incited it. (1956, 22)

Donald's parents were advised to take this insight into the home and find ways of allowing their child to feel comfortable demonstrating his anger. His father reported that on occasions where Donald overcame his fear and made his feelings clear, the patient's allergic symptoms dissipated (1956, 19). Miller and Baruch explain:

...each of the 12 asthmatic episodes in the period studied were examined in relation to the blocking versus the letting out of hostility. Of the 12 episodes, three stopped dramatically at home when the father was able to help the child allay fear sufficiently to express his anger. During the other nine episodes the child came into psychotherapy sessions. In eight of these his psychotherapist was able to help him discharge his anger in a single session and, with such discharge she noted the cessation of symptoms. In the remaining instance the child's anxiety persisted and the blocking remained throughout the session, as did the wheezing, both running on into the next. (1956, 23)

Miller and Baruch claim that strong emotions (unexpressed anger and hostility) played a crucial role in triggering Donald's asthma attacks. More specifically, they argue that Donald's fear of expressing anger caused him to redirect it toward himself in the form of asthma: 'in this child the holding in or blocking of hostility went together with the breaking out of symptoms, as if through the illness he were releasing his hostility but turning it against himself' (1956, 23). This was illustrated literally in one session when Donald, in making the gesture of hitting his father, accidentally 'struck his own hand against the side of his bed and moaned "I've hurt myself." Immediately then, as though his symptoms were following this anger turned-against-self, his arm broke out in hives' (1956, 18).

A number of things about this study are noteworthy. The division of Miller and Baruch's investigation into two parts – immunological and psychological –

suggests that a distinction between biology and psychology is implicit in their analysis. The diagnosis of Donald's asthma as psychosomatic hinges on the investigators' ability to differentiate between asthma attacks triggered by biological causes and those that bear no correlation with instances of allergen exposure. This investment in a biology/psychology distinction is supported at other points in the text; as cited earlier, Miller and Baruch state that 'the two most significant factors in the production of allergic symptoms are an allergic constitution and a characteristic pervasive emotional environment' (1956, 45). The authors argue that allergies involve the contributions of two distinct sets of variables – a given biological predisposition and the emotional environment in which the individual lives.

Miller and Baruch argue that Donald's allergies are animated by psychological, not biological, factors. Their examination, which establishes that Donald has a biological predisposition to allergy, shows that his attacks occur almost exclusively in response to emotional, familial stimuli. The fact that Donald's asthma attacks are successfully alleviated with the expression of his repressed anger is proof for these investigators that his illness is psychologically-induced. Grounded in the belief that allergies may be triggered by biological or psychological causes (factors from the physical or emotional environment), their study argues for the existence of an isolatable psychological cause that initiates the allergic response. Consequently, Miller and Baruch's work demonstrates an investment in the idea of two systems (biology and psychology) whose interaction gives rise to disease.

Psychogenesis

In the above study, the notion of the psychosomatic functions as a synonym for psychogenic. Psychogenesis, which literally refers to 'the fact of having a psychological origin or cause (esp. as opposed to a physical one)' (OED 2011), is based in the view that illness originates in either the biology *or* psychology of an individual. However, studies such as these, which emphasise the role of psychology over biology in disease events, are entrenched in the same logic as exclusively biological accounts of illness. In substituting one reductionism for another, these

approaches circumvent the more fundamental issue of the conditions that enable psychological phenomena to effect biological change.

Yet, the phenomenon of psychogenesis poses a problem for the very notion of a discrete psychological cause. The most definitive feature of psychogenic conditions is the difficulty of differentiating between the agency of psychological and biological factors in the production of symptoms. That is, psychogenic illness complicates the task of identifying the source or cause of disease in a stable origin or entity. In cases such as Donald's, psychological provocations (repressed anger and hostility) manifest *as* biological effects (bronchial constriction and hives). Here, the physiological expression of emotion suggests that psychology and biology are not simply separate, interconnected aspects of the organism. In order for psychogenic illness to occur the *location* of these 'aspects' must be intrinsically compromised – if one manifests as an effect in the other, each must already be, in some sense, present to its other. How, then, can a psychological cause be understood outside or apart from its corporealisation? To what extent does the physiological character of emotional expression alter a linear, causal understanding of psychogenesis?¹²³

This ontological dilemma has been explored by a number of practitioners of psychosomatic medicine through experiments that directly engage the interplay of biology and psychology in the event of illness. In *Emotions and Bodily Changes*, Dunbar details two investigations that critically examine the nature of the allergic constitution – that is, the biological predisposition to allergy. These experiments are intriguing as their basic construction complicates the idea that allergy's so called biological component exists, at any point, outside psychology.

¹²³ This issue is captured succinctly by Fabienne Smith in an article that attempts to consolidate the many disparate, existing theories of allergy. He writes: 'The great problem for allergic people...is that their illness is thought to be psychological – that is to say, self-induced and not an organic condition. Fluctuating symptoms, especially when induced by psychological stress, are seen as confirming it. (The equally damaging effect of physical stress gets ignored or misinterpreted as somehow psychological too.) This misdiagnosis arises from the idea that allergy is simply a matter of antigen-antibody reactions. But this is an outdated concept. Any other type of sensitivity reaction is seen as psychosomatic – that is, psychologically induced – though it is never explained how the allergic person is misguided or artful enough to accomplish it' (Smith 1998, 205). Smith's statement draws attention to the difficulty of maintaining such a stark division between biology and psychology: if the physical and psychological are essentially different, how could a psychological trigger give rise to a biological effect? How could something psychological be physical?

The first of these is a study of bronchial asthma by Karl Hansen. In this investigation of the underlying biological basis of asthma, Hansen seeks to establish whether or not this constitutional component is at all altered in cases of individuals whose asthma attacks have been successfully relieved with psychotherapy. The experiment involves the simultaneous use of two methods: Hansen employs skin prick testing as a measure of the biological component of asthma, and hypnosis as a means of influencing the outcome of tests psychologically. That is, patients are hypnotised whilst skin prick tests are carried out, and this dual procedure establishes the extent to which psychic factors (namely, suggestion by the clinician) influence the nature or occurrence of allergic welts elicited by the skin tests. Upon conducting this experiment, Hansen discovers that it is impossible to completely eliminate a response to allergen exposure:

It does not seem possible to change the allergic constitution of the patient by psychotherapy. In all my relevant cases the cutaneous reaction remained positive even after the elimination of the asthmatic attacks, i.e., the allergic and specific constitution remained. (Hansen in Dunbar 1938, 258)

For Hansen, this outcome demonstrates the existence of an underlying biological component in asthma, which remains immune to psychological influence. The fact that psychotherapy cannot completely alter the biological constitution – that biology remains, at some level, resistant to psychological conditioning – is proof that the constitutional element in allergy is *non-psychological*.

One could argue that the experimental apparatus Hansen employs presumes the prior existence of a ‘proper’ biological cause (a constitutional predisposition) that is ultimately responsible for producing allergic symptoms. However, Hansen’s interest in the allergic constitution is motivated by the success of psychotherapeutic treatment in alleviating the symptoms of asthma. Although he reads his findings as confirmation that, at a *fundamental* level, the allergic constitution exceeds the scope of psychology, the experiment from which this conclusion emerges is one anchored in the knowledge that asthma attacks can be cured using psychotherapy – that allergy’s constitutional basis is intrinsically responsive to psychological influence. Thus, regardless of the study’s conclusion, Hansen’s investigation proceeds from the

intuition that psychology cannot be completely alien to the allergic predisposition, or rather, that biology is, in some sense, already psychological.

This constitutive ambiguity is also illustrated in an experiment by F. Diehl and W. Heinichen, which similarly explores the effect of hypnotic suggestion on the outcome of skin prick tests. Dunbar describes the study as follows:

For the interaction of allergic and psychic factors there is ...some experimental evidence. F. Diehl and W. Heinichen...investigated by way of careful experiment the psychic influencing of allergic reactions. With hypnotic suggestion, they succeeded in increasing or decreasing the reaction to intracutaneous injection of an allergen extract by from (sic) 28 to 81 percent... They note as a striking fact that only a quantitative influence was possible, not a qualitative one, i.e., that it was not possible entirely to prevent the development of the wheal... Thus, the authors conclude, psychic factors are not to be neglected in the therapeutic program even in cases where the allergic basis of the disease is certain. (1938, 406-407).

Using hypnosis, Diehl and Heinichen are able to alter the intensity, but not the *quality*, of the allergic response. As in Hansen's study, this result is viewed as demonstrating that two factors, different-in-kind (psychological and biological), are involved in the manifestation of allergy. The investigators' inability to affect the quality of the response is taken as proof of the enduring integrity of allergy's constitutional basis in the face of psychological stimuli.

At stake in these experiments is the precise nature of the allergic constitution – that is, what constitutes biology as a phenomenon different from psychology. In Hansen's usage (and in common usage with regards to allergy) 'constitution' is another term for biology and specifically, it denotes the given biological make-up of an individual. In Diehl and Heinichen's study, allergy's biological or constitutional component is simply referred to as 'allergic'. However, the word constitution refers more generally to the establishment or organisation of any entity or body – the arrangement or combination of elements that determine its character or structure. Here, that entity is the allergic body or individual. While in an

immunological context, constitution signals a concept of biology founded in the exclusion of psychology, it simultaneously captures a broader sense of the interrelation of the psychic and somatic that constitutes the allergic individual. This latter notion of constitution is centrally at issue in these investigations of the biology of allergy.

In combining skin prick testing and hypnosis, Hansen, Diehl and Heinichen employ an experimental framework that differentiates implicitly between biology and psychology. They bring together distinct, disciplinary techniques that each exclusively addresses the action of biological *or* psychological factors. Skin prick testing establishes the effect of biological causes by facilitating the measurement of the subject's physiological response to allergen exposure. And hypnosis provides a means of *introducing* psychological factors into this scene of immunologic reactivity – it is used to gauge the *added* effect of psychological influence on an individual's given biological reactivity.

However, I would argue that far from being modelled on the assumption of two discrete interacting systems, these studies capture the complexity of mind-body interrelationality that psychosomatic medicine strives to make explicit. In these experiments – skin prick testing under hypnosis – the physical symptoms elicited by allergen exposure are simultaneously evidence of the subject's biological predisposition *and* suggestion by the clinician. The welts on the subject's skin are the effect of hypnosis and skin prick testing, psychological and physiological provocation.¹²⁴ However, the design of the experiment renders the identity of the provocation (stimulus) that produces allergic welts deeply unclear; the allergic welts are not simply the result of the conjoined action of two discrete triggers. In establishing that the intensity of an allergic response is susceptible to suggestion,

¹²⁴ Here, it is worth asking why hypnosis is regarded as psychological and skin prick testing biological. What would happen if we analysed these studies using a different set of assumptions? Why isn't skin prick testing understood as having a significant psychological influence on the patient? Surely the situation of the patient, in a state of anticipation, watching welts grow on their skin, is a psychological event. The biology/psychology dichotomy is often equated with a distinction between fixed and mutable. That is, biology is conventionally imagined as a given substance, whereas psychology is figured as fluid and changeable. However, once we concede the mutable nature of biology (as demonstrated in Chapter Two) – that change is a characteristic proper to biology – there is no longer a defining referent against which change can be understood as psychological. I am grateful to Vicki Kirby for pointing this out.

Diehl and Heinichen show that clinical and psychic factors are *already* operative in the patient's response to allergen exposure. In order for the patient's response to be modified by clinical and psychic factors (such as suggestion, the clinical scenario, etc.), these factors must already be implicated in the subject's reaction to skin prick tests (allergen exposure). The severity of welts can be controlled with hypnotic suggestion because suggestion is always already at work in the individual's reactivity, or the psychological is never not active in the response elicited by an allergen.¹²⁵ Consequently, these experiments demonstrate that the event of an allergic response evidences the entanglement of psychology and biology, as well as the patient's reactivity with the practitioner's clinical intervention.

Holism

The complexity of mind-body interrelationality that the above experiments capture is explicitly outlined in the introduction to the volume in which these studies appear, *Emotions and Bodily Changes*. As mentioned earlier, *Emotions and Bodily Changes*, an extensive literature review of research relating to psychosomatic phenomena, is regarded as the foundational text of psychosomatic medicine. Helen Flanders Dunbar's introduction (and the revised version that appears in the text's second edition) explains the rationale behind the collection and offers a working definition of the term psychosomatic. Significantly, her discussion centres on the relationship between the study of health and disease, and specifically, the organisation of medical knowledge into discrete disciplines, and our conceptualisation of the organism as inherently divided along a psychic/somatic axis. Dunbar insists that this issue is at the heart of the problem of psychosomatic interrelationships.

¹²⁵ A similar point is made by Elizabeth Wilson in 'Ingesting Placebo' (2008). In this article, Wilson examines the relationship between drug and placebo responses in clinical trials of antidepressant medications. With reference to empirical studies of the difference between these responses, she argues that drug and placebo responses are 'parasitic on each other' (2008, 34) – that is, the efficacy of the drug hinges on its complex relationality with the placebo response. Having demonstrated that drug and placebo (suggestion) produce identical pharmacological effects, Wilson shows that it is impossible to separate a 'true drug response' from that of placebo. She argues that the operation of placebo in producing 'true drug responses' means that there is no purely biological response, caused by a discrete pharmacological agent, that is not always already an effect of suggestion. For further details of this fascinating study, see Wilson (2008).

Dunbar states that although evidence of psychosomatic relationships can be found in many disciplines, a lack of communication between fields has resulted in a notion of the organism that is literally fragmented. For her, the disciplinary divisions that organise our investigations of health and illness obstruct a more fundamental appreciation of how the objects of these specialised perspectives – namely, parts and processes of the organism – operate as a whole:

...we have reached a point where progress in the specialties themselves is being blocked by a lack of understanding of the relationship between them. Scientists commenting on the tremendous gain which has accrued to us during the last decades of specialization, are calling attention to the fact that many of the most vital of our problems lie between the sciences and cannot be even perceived without going beyond the confines of a specialty. One of the major problems of the “between fields” is the question of psychosomatic interrelationships, and here, as so often happens, we know more than we know we know...the actual scientific information available, having been achieved along the lines of different specialties, has never been gathered together, correlated, and evaluated. ([1935] 1938, xi)

Dunbar identifies medical specialisation as a form of intellectual organisation that is at odds with a holistic view of the organism. She argues that the more narrowly focused our gaze becomes, the more we relinquish an ability to understand the organism as a whole. While specialisation leads to greater and more detailed knowledge of specific parts of the organism, this depth comes at the expense of an equally complex understanding of how these parts interrelate. Dunbar cites psychosomatic interrelationships as exemplary of this problem, and states that psychosomatic phenomena are literally imperceptible to the observer of a specialised field. The limitations of specialisation, she suggests, might be overcome by the collection and comparative analysis of research from these many diverse perspectives.

As Dunbar sees it, the real challenge for psychosomatic medicine is how to grapple with or overcome the Cartesian dualism that governs our notions of health and disease. She argues that this divisive, dualistic logic forms a basic premise of our methods of investigation:

Our difficulty arises from the fact that although the organism is a unity we see it as having psychic and somatic aspects. For the understanding and management of these aspects we have developed fundamentally different methodologies. We have been unable to approach them simultaneously or in the same terms; science has seemed not to supply the tools. There has been a dichotomy in our basic assumptions and in our training. Students of psychology and psychiatry, of physiology and internal medicine, until recently have been brought up in disciplines restricted and separated from each other. (1938, xvii-xix)¹²⁶

Dunbar asserts that the separation of the organism into ‘psychic and somatic aspects’ is a by-product of different investigative and therapeutic practices. She states that the distinction between mind and body, or the division of the organism into different elements and processes, is symptomatic of *the means by which knowledge of organismic life is obtained and organised*.¹²⁷ Here, Dunbar distinguishes between the organism as it is conceived by different medical specialties (a divided entity) and the organism as pre-existing these scientific representations (a natural unity).

Crucially, Dunbar locates the fault of a Cartesian split in our *perception* of the organism, not the organism itself. She insists that this dichotomy does *not* reflect the nature of the organism:

If...there be any dichotomy lurking in the term “psychosomatic” it is...inherent not in the organism observed, but in the mind of the observer and

¹²⁶ Interestingly, the problems Dunbar identifies with increased medical specialisation are the same problems that Pirquet aimed to overcome in his unconventional organisation of the Vienna Kinderklinik. In Chapter Two, I argued that Pirquet’s reorganisation of the operations of the hospital – and specifically, his efforts to train all staff members (doctors, nurses, ward maids, etc.) in multiple disciplines, or for multiple roles – demonstrated a holistic approach to practicing medicine. See Chapter Two.

¹²⁷ Interestingly, the terms organism and organisation share the common etymological root *organizare* meaning ‘instrument, organ’. Historically, organism is defined as ‘organic structure, organization’, and in contemporary usage, it refers to ‘a whole with interdependent parts...an organic system’ (OED 2011). Organisation is used to describe ‘the arrangement and coordination of parts into a systematic whole’ (OED 2011). Importantly, then, the notion of organisation is already implicit in the very concept of the organism. In the frame of Dunbar’s discussion, the organisation of knowledge (into different disciplines) is pertinent to our understanding of organismic life. The fact that the term organism always already implies the idea of organisation (the relation between part and system) is pertinent to the problem Dunbar addresses.

in our methods of observation. The term “psychosomatic” is descriptive rather of the observer in his endeavor to apprehend than of the organism observed. Psychic and somatic represent merely two angles of observation. Our understanding of disease rests on pictures taken from these two angles viewed simultaneously, united stereoscopically. (1938, xix)

Dunbar argues that the word ‘psychosomatic’ more accurately describes the observer in the act of observation – who can assume a psychological *or* a somatic perspective – than the organism itself. She maintains that it does not refer to a naturally occurring division within the organism, but is a product of the practices through which we have come to know and understand life: it describes an intellectual and therefore artifactual distinction that originates in human culture, rather than nature. As such, the term psychosomatic refers to the organism’s subdivision by the health sciences into psychic and somatic components. Dunbar notes that in order to get a sense of the organism as a whole, modern medicine has to repair the perceptual disparity between the disconnected viewpoints of different medical specialties.¹²⁸

In each of these quotations, Dunbar clearly differentiates between the organism itself (life) and practices of knowing the organism (knowledge of life). This is most emphatically expressed in the above citation in which she makes an absolute distinction between the organism observed and the mind of the observer. However, recalling Canguilhem’s notion of knowledge of life, and his assertion that biological life takes itself as an object of knowledge, Dunbar’s distinction between observation and its object (or mind and body) does not hold. The observer, which she views as external to the object of inquiry, *is* the organism observed. In the very act of observation – the act of assuming a psychic or a somatic perspective – the observer is an instance, or specific manifestation of the organism it seeks to understand. Here, Dunbar’s emphasis on the ontological division of organism from observer (object

¹²⁸ This distinction between object and method is noted by other clinicians in the field. For instance, James Halliday writes: “Another source of obscurity is to confuse the technique of approach with the object of study. A common example is the mysterious phrase ‘mind and body.’ This seems to indicate that an individual is composed of two distinct and contrasted entities, a mind entity and a body entity. If the phrase has any meaning, it is this: The individual may be studied by a psychological approach and the individual may be studied by a structural or physical approach. It is our techniques or methods of investigation which are diverse and multiple not the individual, who is a unity” (Halliday in Weiss & English 1944, 10).

from subject, body from mind) reiterates the problems of separation and location that her own discussion identifies as obstructing a more holistic view of the organism. In her attempt to rethink the division that defines a conventional understanding of the mind-body relation, her own work evidences the insistence of these bifurcations.

For instance, the issue of disciplinarity, which Dunbar highlights as an obstacle that prevents a more holistic view of the organism, is echoed in her own attempt to cement the foundations of psychosomatic medicine as a field in its own right. In both the introduction to *Emotions and Bodily Changes*, and the editors' 'Introductory Statement' to the journal *Psychosomatic Medicine*, the legitimacy of this field as properly scientific is secured through its dissociation from philosophical inquiry. In *Emotions and Bodily Changes*, Dunbar writes:

The problem of psychosomatic interrelationships is continually a stumbling block to the specialist in any phase of research or personality study. Now and then a courageous investigator has taken it up, examined it, considered methods of studying it, only to relegate it to the philosopher again. ([1935] 1938, xi)

In stating that the problem of mind-body interrelation has traditionally been the stuff of philosophical scholarship, *not* the medical sciences, Dunbar conceptualises science and philosophy as opposing or mutually exclusive enterprises. This disciplinary boundary is also evident in Dunbar et al.'s assertion that '[psychosomatic medicine] is not concerned with the metaphysics of the body-mind problem' (1939, 4).

Underpinning both these statements is a belief that science and philosophy are radically different projects – both presume that in doing scientific work, one is not doing philosophy, and vice versa. Yet the problematic studied and debated by so many of the key protagonists in this field suggests that it is precisely the physical/metaphysical distinction that is at stake. If the aim of psychosomatic medicine is to demonstrate the originary inter-implication of psychology and biology, then the issue of the metaphysical is not outside the scope of this discipline, but absolutely central to it. In question here, is the very identity of scientific work: if mind and body are expressions of a single phenomenon, then metaphysics and philosophy are the stuff of scientific inquiry.

Consequently, Dunbar's position contains a fundamental contradiction: on the one hand, she argues for a holistic view of the organism, but on the other hand, she is adamant that our ways of knowing the organism are essentially external to it. Dunbar insists on the unity of the organism, but affirms a Cartesian division in characterising (disciplinary) knowledge as an error (a representation) that is not itself life. Yet if we take the unity of the organism seriously, as Canguilhem does, then it follows that our methods of inquiry cannot be foreign to the organism. Rather, these modes of observation – and the somatic and psychic viewpoints they embody – must be, in some sense, intrinsic possibilities or potentialities of organismic life. This position significantly complicates any sense that the organism is either a unity *or* divided (that there exists, in actuality, a single truth of the organism). Viewed holistically, our unique modes of investigation (medical and scientific practices) are *of* the very reality they seek to understand: as argued in the preceding Coda, inquiry is the act of biological life seeking to understand itself. Put slightly differently, critique and inquiry are expressions of a life-form that engages in these formalised practices to better know itself.¹²⁹

Ironically, it is precisely in its equivocation and lack of resolve that Dunbar's work points to the truth of the complexity of psychosomatic phenomena. In her text, the issue of what constitutes biology or psychology, and how these aspects of the organism interrelate in the event of illness, is utterly entangled with questions concerning the ontological status of the modes of investigation that call these phenomena forth. The fact that Dunbar's attempt to define the psychosomatic leads her to interrogate the relationship between disciplinarity and the truth of the organism's being, complicates any simple sense of an ontological gap between life and knowledge of life. Importantly, it is this very notion of separation, be it between mind and body, object and investigation, patient and practitioner, or any two systems, that psychosomatic medicine grapples with – conceptually, empirically and therapeutically.

¹²⁹ The implicated relationship between object and observer is something discussed at length by Karen Barad (2007). Barad analyses experiments in quantum physics, most notably, the two-slit experiment, to illustrate the ontological entanglement of object and observer in the study (or production) of scientific phenomena. For a detailed account of this experiment, and her argument, see Barad (2007).

Ecological entanglement

At the beginning of this chapter, I argued that immunological, psychological and multifactorial accounts of allergy all rely on an identical conceptual logic: a linear, causal relation between two or more discrete entities (e.g. biology, psychology, sociality, the environment, etc.). Each of these positions is grounded in the belief that the agency which produces allergic symptoms stems from one, or a number, of contained, causal entities (e.g. IgE, a specific emotion, environmental allergens). In other words, from the very outset these perspectives maintain that causes and their effects are ontologically discrete, or more specifically, that the provocation which initiates an allergic response precedes it temporally, and is necessarily materially exterior to it.

However, as shown throughout this chapter, the agency that animates a specific cause is not strictly derivative of, or delimited by, an atomic causal entity. Rather, what constitutes any trigger as ‘triggering’ is a system of factors that are ecologically inter-implicated. As illustrated in Chapter Two, the capacity of an allergen to provoke a change in response is not a property inherent to that substance, but a possibility given by its entrenchment within the wider spatio-temporal entanglement of sensitisation. This point was further demonstrated in Part I of this chapter, which showed that elevated IgE is not in itself causative of allergy, but is constituted as a biological cause by its role in the events of sensitisation – a role of which it is already a unique biological signature. Thus, while cause is conventionally conceptualised as a bounded entity surrounded by a context from which it is distinct, this chapter argues that a cause is always an individuated expression or manifestation of its context. Because sensitisation forms the broader immunological context for understanding causes, and because it is an event that, by its very nature, defies location (it confounds Euclidean space and linear time), the identity of cause is as unstable and unlocatable as its context.

I would like to illustrate this point by returning briefly to the case of psychosomatic asthma discussed earlier. In their study of Donald, Miller and Baruch isolate the patient’s unexpressed anger as the psychological cause of his asthma

attacks. After extensive psychotherapeutic and immunologic investigation, they identify this emotion as the primary author of his reactions. However, Donald's anger is not alone causative of his attacks. As a symptom of the relationship between Donald and his parents, the emotion itself is not strictly isolatable: it cannot be confined to the boundaries of the patient because the conditions or context that give rise to it are a complex family dynamics. What constitutes Donald's anger as a catalyst of his asthma attacks is his inability to freely express this emotion toward his parents. In other words, Donald's anger is allergenic only within a particular familial arrangement – an arrangement that speaks directly of the ontological implication of the parents in their child's reactivity.

The central issue here is not that the causative emotion needs to be interpreted within its 'proper context' (family dynamics), but rather that the emotion itself *is* an immediate expression of this environment. The emotion is not contained within a fixed, given context, and therefore separate from it, but inhabited and animated by it. Donald's allergic reactivity is a biological referent of these family dynamics.

Ecological entanglement means that a cause does not occupy a discrete location outside the other aspects of the phenomenon that produce this cause in its specificity. What invests a particular factor with its unique identity is a complex of the biological, genetic, psychological, social and environmental, which *contests all of these identifications as aggregates*. What constitutes any individuated entity in this system – be it a cause, antigen, organism, discipline or specific clinical procedure – is its originary inter-implication with the seemingly autonomous factors that give this entity context.¹³⁰ From this viewpoint, no-thing is truly isolated, cut off or external to anything else: every entity is a symptom of its ecology. This commitment to an understanding of identity as an entanglement is crucial as it reminds us that when we observe something in isolation, or as bounded and distinct from us (e.g. an object, patient, cell), we are implicated in, and produced through, this act of isolating, such that our isolation is, in fact, impossible.

¹³⁰ A similar argument is made by Vicki Kirby in 'Original Science: Nature Deconstructing Itself' (2010) which takes seriously Jacques Derrida's claim that grammatology is a positive science. See Kirby (2010).

Throughout this thesis I have consistently drawn attention to the fact that, in medical and scientific work, and in social and political critiques of science, a separation between body and mind, nature and culture, biology and sociality (and a range of other correlative divisions) is often taken for granted. I have argued that this assumption of an ontological gap between these apparently discrete domains negates the ecological entanglement that actually conditions these divisions. If the boundedness of any thing is always a boundedness against, or division from, something else, then this perceived autonomy denies that object's essential or fundamental involvement with the things (or context) that it is *not*. Thus, the act of dealing with any phenomenon as isolated – that is, from a starting point that presumes the givenness of the investigated object, or of one's own critical position *outside* that object (be it political, clinical or scientific) – is a negation of the entangled initial conditions that enable its containment and separation.

At stake in the difference between these concepts of identity is an appreciation of the ontological complexity of life. If we are always already implicated in the objects, issues and others we define ourselves against, then our autonomy, objectivity, and agency as individuals is only guaranteed through, or given *as*, a lived relationality. In Chapters One and Two, this point was made with reference to the organism-antigen relation. I showed that organism and antigen do not straightforwardly pre-exist their encounter; rather, the difference between organism and antigen (the capacity of one to provoke a response in the other) arises from an event of contamination that cannot be located (sensitisation). In demonstrating that the organism-antigen relation has no identifiable starting point (that it is always already initiated) Pirquet's studies of allergy suggest an understanding of the immune response as an ecological responsibility that contests the very notion of a confined entity. In Chapters Three and Four, I showed that the denial of this entanglement, exemplified in Haraway and Cohen's opposition to the discourse of a defended self, evidences and further reinforces the pervasive operation of this logic in the very act of its disavowal. In attempting to occupy critical positions outside their object – to preserve the autonomy and objectivity necessary to conduct an intervention (in the orthodox sense) – the paradox of Haraway and Cohen's critiques highlight the

implicated initial conditions that ground inquiry of any sort. And this final chapter has shown that the same logic governs the efforts of clinicians and scientists to describe the causes of allergy as either biological or emotional/psychic. However, as psychosomatic studies of allergy illustrate, every individuated factor expresses the interrelationality of the whole.

Beginning from the view that life is an entanglement holds dramatically different possibilities for how we understand the phenomena of health and illness and their relationship to medical and scientific practices. But more broadly, it is a perspective that can be brought to any subject – an outlook defined by an awareness of the ontological complexity of its own perspectivalism. In this thesis, I have examined the work of a number of interdisciplinary thinkers whose works embody this ecological or holistic viewpoint, namely, Pirquet, Canguilhem and Dunbar. In doing so, I have highlighted the kind of insights (e.g. about the nature of the organism, inquiry, disciplinarity, evidence, etc.) that can come from a perspective that does not assume discrete, atomic entities.

If life is contamination – if we are not coherent in ourselves, but always already infected, dispersed and outside ourselves – then it becomes necessary to acknowledge this scene of implication as fundamental to our endeavours. If, as Pirquet's work shows us, mutation, rather than fixity, is the departure point against which difference arrives, then agency, authorship, responsibility, and thus what it means to be a body or a subject (which all rely on a logic of aggregated entities), need to be understood as localised only insofar as the local is always already systemic.

In *Psychodynamics and the Allergic Patient*, Harold Abramson outlines the case of a 24 year old woman who suffered from ongoing asthma attacks. He writes:

Clinically sensitive to pollen, dust and a variety of foods, she was unequivocally classified as an allergic individual. At times she had difficulty in controlling her seasonal asthma as well as the asthma attacks which

occurred between seasons. Very often she lost her usual response to ephedrine and epinephrine. (1948, 22)

Having determined that the patient's asthma was atopic, but did not respond consistently to standard asthma medications (ephedrine - a common bronchodilator, and epinephrine - adrenaline), Abramson explored the patient's life situation. However, no psychological, emotional or situational causes could be found for the unpredictable nature of her attacks.

Unable to identify an obvious cause, Abramson instructs the patient in a unique form of asthma management:

I finally decided that I would try to control her asthma by teaching her a form of breathing exercise, in itself a very definite type of psychotherapy. In it, the patient is instructed to extend the hands forward while inhaling; on exhalation the hands are brought to the side, but during expiration the expiratory breath is made very slowly and a humming, crying sound is made through the closed lips...the patient took readily to this type of exercise and reported her ability to avert attacks by doing the breathing exercises when she felt an attack coming on... As a matter of fact, she was able to use this exercise in the subways when she felt heaviness in the chest, by *thinking* of the movements and of the crying expiratory whimper which she had been instructed to carry out. (1948, 22, emphasis added)

Here, Abramson prescribes the patient a breathing exercise to control her attacks. He describes the exercise, which can be performed in the absence of the therapist, as itself a form of psychotherapy. Abramson reports that use of the exercise by the patient was successful in controlling her attacks. Indeed, they were so successful that in situations where it was not possible to perform the exercise (in the subways) she could avoid an attack by simply *thinking about performing them*. In other words, the *suggestion* of the exercises by the patient to herself was enough to prevent an attack.

In this case, the mental and physical performance of exercises produces the same outcome. The patient's physiology, which Abramson describes as

‘unequivocally allergic’, responds to the imagined performance of a breathing exercise, but not to asthma medications. The fact that there is no discernable difference between *actually* performing the exercises and *imagining* performing them raises the question of the distinction between real and imagined, physical and mental. If both produce the same biological result, in what sense is one ‘imagined’ and the other ‘real’ or actually carried out? If to ‘imagine’ is to form an image of something to oneself, then the action of doing the exercise cannot be differentiated from its (mental) representation. Here, the processes of body and mind, or the realms of reality and imagination, are *empirically indistinct*.

The difficulty of maintaining clear demarcations in this example is similarly reflected in any attempt to delimit the boundaries of the clinical encounter. According to Abramson, the breathing exercise is a form of psychotherapy that can be performed in the absence of a therapist. Psychotherapy is something that takes place with equal efficacy inside *and* outside the physical trappings of the clinical setting. As such, it is not clear where the clinical encounter – which presumably involves the participation of patient and psychotherapist – begins and ends, spatially or temporally. The efficacy of the breathing exercises beyond the clinic suggests that it is hard to determine where the boundaries of the clinic lie, and indeed, whether the patient can ever truly reside outside these limits. When the patient visualises the performance of breathing exercises in the subway and her asthma subsides, where is the psychotherapist? When the patient’s bronchial muscles relax with this imagined performance, where is she located? In a psychotherapy session? On a train platform? And who or what acts in the transformation of her bronchial muscles?

Appendix

DIVISIONS OF ALLERGY

I. ALTERED REACTIVITY ACCORDING TO TIME, COMPARED TO A FIRST REACTION AFTER EIGHT TO TWELVE DAYS

1. Early reaction (immediate reaction) within twenty-four hours.
This can be obtained by:
 - (a) Intravenous injection: associated with general symptoms (death).
 - (b) Subcutaneous injection. Here we have to distinguish:
 - (a) General symptoms (fever, exanthema).
 - (b) Local symptoms (*Stichreaktion*).
 - (c) Co-reaction of other foci.
 - (c) Cutaneous vaccination.
 - (d) Conjunctival application.
2. Torpid early reaction—second to fourth day.
3. Accelerated reaction—fourth to seventh day.

II. ALTERED REACTIVITY ACCORDING TO QUANTITY

1. Re-enforced reactivity (hypersensibility, paradoxical reaction, anaphylaxis).
2. Lessened reactivity (hyposensibility).
3. Abolished reactivity (insensibility, immunity).

III. REACTIVITY ALTERED ACCORDING TO QUALITY. (CHANGES REGARDING COLOR, MICROSCOPICAL OBSERVATIONS, ETC.).

Figure 1

‘Divisions of Allergy’ – Pirquet’s classificatory schema of changed reactivity (1911, 426)

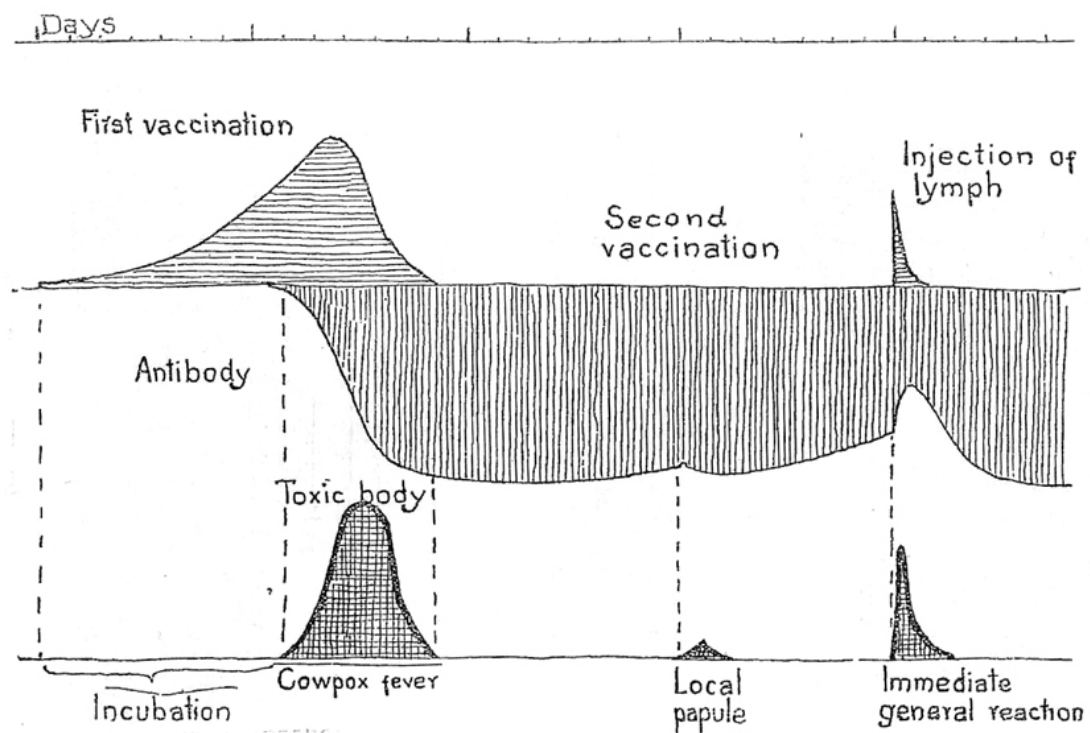


Fig. 8.—Effects of first and repeated cowpox vaccination in man.

Figure 2

An example of one of Pirquet's illustrations of the events of sensitisation (1911, 414)

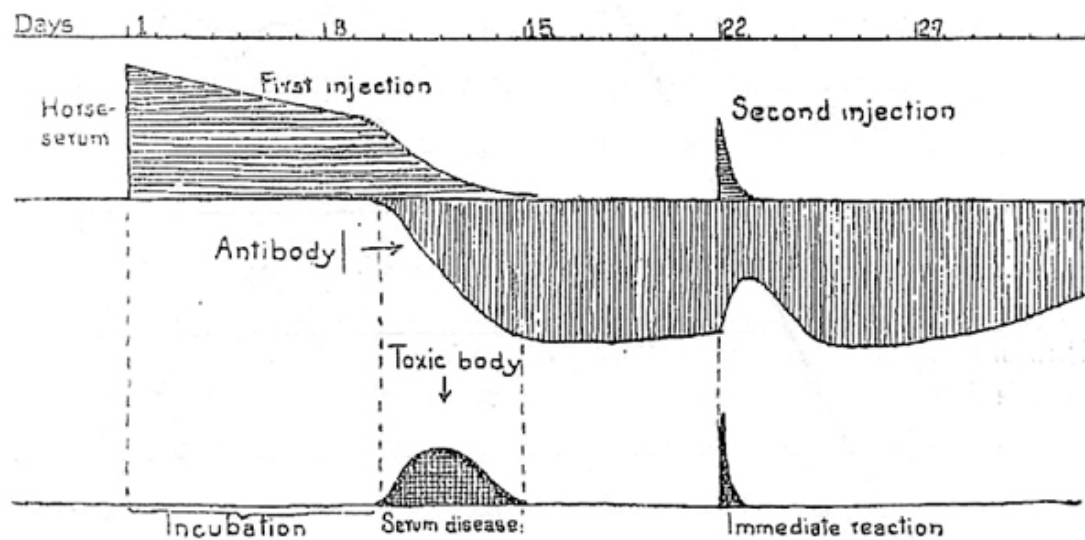


Fig. 3.—Effects of horse-serum in man.

Figure 3

Pirquet's illustration of the effects of horse serum in man (1911, 410).

Note that the appearance of the 'toxic body' corresponds with the periods of time in which antigen and antibody are simultaneously present.

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