

SPECIES TROUBLE:
FROM SETTLED SPECIES DISCOURSE
TO ETHICAL SPECIES PLURALISM

by

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DISSERTATION ABSTRACT

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In this dissertation, I develop and defend the importance of species pluralism (the recognition and use of multiple species definitions) for both environmental and humanist ethics. I begin from the concern that, since the concepts of the human and animal have been rightly challenged for their essentializing and exclusionary social function, the concept of species has come to serve as a supposedly more accurate, value-neutral, and ethical ground on which to negotiate moral claims. Yet I show that in the absence of critical evaluation, and with very little attention to the complexity and uncertainty of species boundaries as articulated in the sciences, much environmental philosophy and ethics instead deploy a myopic understanding of species that is both scientifically reductive and morally problematic. I draw insights from philosophy of biology, as well as Native American and Latinx philosophies to identify and challenge what I call *the settled species discourse*, or the widespread tendency to understand species as self-evident, mutually exclusive groups with singular, clear boundaries and stable natures. By understanding species this way, the concept of *Homo sapiens* in ethics plays a similarly and dangerously normative role to that of the human, while essentialized understandings of species can undermine the very ethical goals for which they are deployed. I thus turn from monism to multiplicity to develop a heuristic I call *ethical species pluralism*. Specifically, I argue that accounts of epistemic and ontological

pluralism from within anti-colonial traditions can productively supplement the important framework of species pluralism in philosophy of biology, even as the former also provide tools for making such pluralism actionable in society, ethics, and policy. Building on this heuristic, I conclude by showing that approaching ethical species pluralism historically (generating counter-histories that do not take species as givens) can helpfully track and challenge the way make specific species or species groups are made legible and disposable in science and society. By placing Indigenous and Latinx perspectives together with philosophy of biology and environmental science, this dissertation hopes to help bridge the gap between these literatures while also producing more scientifically and morally responsible interspecies ethical frameworks.

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TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION:	
The Trouble with Species, or a Day in the Life of Marius the Giraffe...	1
i. Why Species and Why Now?.....	5
ii. Chapter Outline.....	12
PART I <i>THE SETTLED SPECIES CONCEPT: PROBLEMS WITH PURITY</i>	
II. THE ANATOMY OF THE SPECIES TURN.....	18
i. The Anthropoc Critique.....	18
ii. The Ecocentric Critique.....	36
iii. Conclusion.....	51
III. PROBLEMATIZING TAXONOMIES OF PURITY AND THE SETTLED SPECIES CONCEPT.....	55
i. The Problem with Taxonomies of Purity: From Butcher Blocks to Mestiza Kitchens.....	60
ii. Securing <i>Homo Sapiens</i> Sovereignty: The Settled Species Concept.....	71
iii. Monophilia and Power.....	82
iv. Conclusion.....	87
PART II <i>ETHICS, PLURALISM, AND PATHS FORWARD</i>	
IV. ETHICAL SPECIES PLURALISM.....	88
i. Species Problems.....	90
ii. Species Pluralisms.....	95
iii. Ethical Species Pluralism: Pluralism and Values.....	102
iv. Ethical Species Pluralism: Pluralism Facilitates Resistance.....	110
v. Ethical Species Pluralism: Pluralism Elicits Responsibility.....	116
vi. Conclusion.....	119
V. SEEING WITH COMPOUND EYES: ETHICAL SPECIES PLURALISM AND THE CASE OF MOSQUITO VECTORS.....	120
i. Guerrilla Pluralism and Compound Vision as Resistance.....	125
ii. Entomology in Europe and China, 1875-1900: Nursing Mosquitoes and Conditions of Acceptability.....	135
iii. England and America, 1901-1921: The Vector Jumps.....	146
iv. Winged Enemies: Biopower Renders Mosquitoes in War and Law...	150
v. Conclusion.....	156
APPENDIX A: MATHEMATICS, 1840-1910: ELECTRIC DEBATES OVER VECTORS.....	158
APPENDIX B.....	164
REFERENCES CITED.....	165

LIST OF FIGURES

Figure		Page
i.	Figure a.....	148
ii.	Figure b.....	148
iii.	Figure 1.....	159
iv.	Figure 2.....	159

I. THE TROUBLE WITH SPECIES, OR A DAY IN THE LIFE OF MARIUS THE GIRAFFE

Introduction

In 2014, Marius, who became known in the media as “Marius the giraffe,” was killed by the Copenhagen Zoo after much outcry from the world’s public, wild animal sanctuaries, and animal rights groups and scholars. Marius was killed, like many, many, many others in zoos around the world before and after him, because his genes were already represented in the species’ reproductive pool. The idea that genes already represented in a gene pool would be sufficient reason to kill someone made little sense to the outraged public, for whom “giraffe conservation” largely meant the conservation of and protection for the members of the species called giraffe. But conservation, like many other areas of biology, wildlife science, and so on, was operating from a *specific* species concept and definition that looked at those beings we call giraffes not primarily as a set of organisms, but, rather, as a unified collection of genes. This is technically called the biological species concept: organisms who share one genetic lineage and are an isolated breeding population are considered in the singular, as a set of genes that constitute an evolutionary unit (Mayr 1963, p. 17). On this definition, and from an evolutionary or conservation perspective, removing genetic material already represented is akin to removing an extra liver or a third arm. But this is, quite obviously, not how most folks think of species. Actually, it is not even how all biologists think of species. But it is one prominent way that receives very little contestation in conservation, even though it is rarely clear or straightforward how information on genetics should impact conservation (Woolston 2016).

At the same time, animal organizations, scholars, and sanctuaries who offered to take in Marius so he might live out his life in relative peace and comfort argued against his killing on the basis of a very different understanding of species. Marius was a member of a unified set of beings called “giraffe,” each of whom, as individuals in this set, were taken to have the morally relevant traits worthy of protection: sentience, the capacity for pain and pleasure, the ability to thrive, rich internal experiences, and so on. This is what we might think of as the

more everyday concept of species: species are just natural, self-evident groups whose traits or natures unify them as a collective. That is, one is a giraffe because one participates in giraffeness, or in what it is to be a giraffe. This version of the species concept is not really working off of any biological concepts at all, but instead seems to treat species as though they were natural kinds with inherent traits that make them what they are. While this might have seemed more helpful for mobilizing support of Marius, and is the formulation often implied in animal rights literature for similar purposes, it is also a rather simplistic, essentializing, biologically problematic concept.

I take this incident and the outrage it caused as evidence of a certain gap in the way the concept of species gets articulated or considered in our ethical conversations. In each of the positions above (conservationists and biologists on the one hand, and animal rights groups and scholars on the other), the concept of species does a certain amount of moral work making Marius intelligible, justifying or clarifying why actions with or against him are permissible or impermissible, and so on. But the concept of species itself was not really raised as a question or in any way interrogated. The debate seemed to be about how one treats a member of a species while the category of species remained beneath the level of moral analysis. Both communities and interests spoke past one another, each assuming an obviousness and straightforwardness to what a species is, even though they were not using similar concepts.

Alas, the concept of species is not as clear, straightforward, or taken-for-granted as either of the above interests assumed. In fact, at any given time, there might be between four and twenty-four different, often incompatible species concepts deployed across the life sciences, and which definitions one uses can make a huge difference in which someone is thought to belong to (Mayden 1999). And it turns out that whichever definition of species is used to make decisions really did matter for Marius's fate. At the time of his killing, Marius was considered part of a subspecies that was not rare, either in the wild or in captivity. These subspecies were primarily based on morphological and regional differences, but giraffes were collectively still a single species. Then, just two years later, in 2016, a scientific study of giraffe genes published in *Current Biology* (Fennessy et al. 2016) provided deeper genetic (specifically mitochondrial DNA) analysis. It was claimed that giraffes are not a single species, but four distinct species (each with their own subspecies). This is far more closely aligned with the phylogenetic species definition, the idea that species are irreducible groups

whose members all share a common ancestor (usually discovered through parental genetic ancestry and decent). The phylogenetic definition divides biodiversity into a *lot* more species than the biological species concept (Groves 2012). Under this new articulation of giraffe species differences, Marius would have found himself in quite a different situation, where the presence of his “over-represented genes” would not have been quite so over-represented after all.¹

This particular story and its moral lessons are not isolated from the very troubling politics of zoos, the publicly espoused value of conservation, or the ethical frameworks which facilitate the permissibility of killing nonhuman animals when science, the public, medical discourses, food preferences and systems, and so on articulate that need or desire. Yet, even as the concept of species is not fully extricable from these sets of practices, mechanisms, beliefs, and so on, I believe it is nevertheless important to develop a treatment of the species category that might all the better enable us to track, understand, contest/resist, and take responsibility for how the concept itself functions. In other words, I take this debate around Marius as important, not only for the many reasons one might expect—for revealing certain problematic practices at zoos, for raising questions about power, management, the disposability of other lives—but also because it is but one of many instances in which more informed, richer, and less taken-for-granted species concepts could play a vital role.

This dissertation is an effort toward improved inter-species ethics, where what “species” means is never fully settled; where it is a matter of critical and explicit concern for ethics; and where the stakes of and responsibility for these definitions and their uses are clearly recognized. My explicit aim is to place the category, concepts, and definitions of species on the table as a matter in which ethicists and social theorists, as well as biologists, need to be invested. Rather than taking the species concept or the groups it names for granted, such that the only moral or ethical concerns around species happen after speciesed groups arrive to us fully categorized and unified, I want to take their process of being unified

¹ This is not isolated to giraffes, of course. A 2004 study (Agapow et. al) found that when using phylogenetic species concepts, there was, to use Richard Richard’s (2012) summary, “a 300% increase in fungus species, a 259% increase in lichen species, a 146% increase in plant species, a 137% increase among reptile species, an 88% increase in bird species, an 87% increase among mammals, and a 77% increase among arthropods. Meanwhile, there was a 50% decrease in mollusk species. Overall, there was an increase of 48.7% when the phylogenetic species concept replaced other ones” (42).

and made legible as itself a matter in which ethics and power are involved. As such, this project is an attempt to close the gap between the groups represented above in Marius's story: the scientists and conservationists, those concerned with animal welfare, the taxonomists classifying groups, and even Marius and other speciesed kin themselves, for whom the stakes of these definitions are undeniably the highest.

In this dissertation, I track how the concept of species functions in various environmental, social, theoretical, philosophical, biological, and historical venues to develop a rich and plural attention to the many ways the concept gets used, challenging some and advancing others. To state the obvious, the thematic and philosophical content of each of my chapters are important for my overall argument and for the many smaller arguments I make along the way. But the content of each chapter is no more important than its strategic intent: to destabilize and generate curiosity about the concept of species and its many uses. I want the reader to begin developing a suspicion or, better yet, inquisitiveness around the word, an attention its contingency, historicity, and multiplicity, and an accompanying hope for all the ways it could be used or understood otherwise. I hope that my dissertation results in a pause, such that when one hears or sees the concept of species used, rather than rapidly or automatically making a conservation or moral inference, we have space to question the very grounds of such conclusions. I want the concept of species to start standing out from the discursive background, to get noticed and attended to, the way a mosquito's buzz, though very small, can fill up a whole room or tent until she is tenderly caught and released back into the evening.

Having articulated some general motivations for and interests of this project, and before getting to the chapter outline, I want to lay out some background and a few more details. In Section I below, I briefly answer the questions, why species and why now? Of all the pressing inter-species moral and political concerns that one could write about or strive to intervene in, how does a dissertation like this hope to help? What has made the idea of species take on importance in this moment? As someone who is invested not only in theorizing about but in concretely improving interspecies relations in and outside of my writing, I take these questions and my answer to them very seriously. Then, in Section II, I will lay out a general map of the dissertation.

i. Why Species and Why Now?

The concept of species is, as it were, having a moment. Not that the word was not being used before, of course. But I think it is doing a whole lot of work in the world today, more than before, especially in organizing the understandings of life and diversity, ethical relationships, constructing narratives of climate change and apocalypse, deciding whom we eat or don't or not, arguing for or against biomedical practices that might change our "species nature," thinking about reproductive technologies, advancing and defending human rights, and so on. I have been tracking the way the concept of species is gaining prominence and being used in all manner of ethical and political conversations (in particular) for the better part of fifteen years now, and I am inclined to follow Ladelle McWhorter's wisdom that "philosophers would do well to pay close attention to any concept that attains such centrality and exercises such power in our thinking" (McWhorter 2016, xi). Like McWhorter, I also am inclined to think about the use of words and concepts in terms of their history and the functions they serve: where do they come from, what other claims do they permit, what practices of power are they imbedded within, what material realities are they aligned with and based on, who is using them and how and why?

One way of making sense of the under-theorized prominence of the species concept today requires that we go back a ways and explore one set of conditions which prompted this concept to become so central to many contemporary ways of understanding and organizing the world and ethical and political relations within it. Specifically, I believe the prominence of the species concept emerged in the wake of a widespread turn away from the binary terms "human" and "animal" or "human" and "nature" (even as I will argue the species concept often serves very similar social functions as those terms). In the past hundred years, scholars, communities, and storytellers from all over the world have challenged the way the concepts of the human and animal do not so much track clear biological or ontological realities as function as historically contingent formations that circumscribe hierarchies and naturalize the priority of certain humans over the rest of the known world. As Michel Foucault notes, this concept of the human (or "man," as he says), is itself actually only a fairly recent formation.

In fact, among all the mutations that have affected the knowledge of things and their order, the knowledge of identities, differences, characters, equivalences, words—in short, in the midst of all the episodes of that

profound history of the Same—only one, that which began a century and a half ago and is now perhaps drawing to a close, has made it possible for the figure of man to appear. And that appearance was not the liberation of an old anxiety, the transition into luminous consciousness of an age-old concern, the entry into objectivity of something that had long remained trapped within beliefs and philosophies: it was the effect of a chance in the fundamental arrangements of knowledge. As the archaeology of our thought easily shows, man is an invention of recent date. And one perhaps nearing its end (Foucault 2004, 422).

In the United States context, this observation has been widely credited with setting the stage for critiques of the naturalization of making by taking the human as an object of inquiry rather than a prediscursive biological reality. Yet already at the time of Foucault's writings, decolonial and race scholars like Franz Fanon (1952), and Aimé Césaire (1963) had observed that the concept of the human needed to be revalued and reimagined from the margin in order to break open the colonial ontologies and essentialism of Enlightenment man's presentation of itself as the natural and universal human.

Since the initial concern with the problematic ontology and epistemology supported by the concept of the human, scholars from diverse disciplines have criticized the concept from two primary perspectives, or related but distinct constellations of concerns. I have roughly divided these critical perspectives into two distinct camps, which I name the *anthropic critique* and the *ecocentric critique* of the human. The former calls out and seeks to correct the way dominant definitions of "the human" have historically excluded certain members of the species from being fully human. The latter problematizes the way the concept of the human is produced as an identity and category over and against nature and the animal. Both perspectives are concerned that the human is not an ethically or epistemically neutral identity, but is rather negatively constructed as possessing certain essential and unique traits over and against all who lack those traits (or possess them in impure ways or to lesser degrees).

As I will elaborate in Chapter II, these perspectives are both critical of the ontological claims of essentialism, uniqueness, and unity associated with the human. They also share a concern that the supposed naturalness and neutrality of the concept of the human covers the production process whereby certain traits are taken to be essential and unique, definitive of what is proper to the human, at the exclusion of other lives. The *anthropic* and *ecocentric critiques* both recognize that the exclusionary effect of the human

identity results from its placement in the human/animal or human/nonhuman binary, where all that is nonhuman defines, in the negative, what (and who) is human. This, in general, is where the two positions divide their focus. I characterize the *anthropic critique* as having a concern for the *Homo sapiens* excluded by normative definitions of the human, while the *ecocentric critique* is concerned that the category is produced over and against nonhumans, with whom humans are both entirely enmeshed and with whom they share many, if not all, supposedly distinguishing traits. Still, rather than constituting two opposing positions, these two critiques exist on a continuum: many scholars fall on either side, and some fall somewhere in the middle, seeing the two critiques as necessarily related.

It is in the historical wake of these decentered concepts (that is, the human and animal), that the concept of species has gained prominence in a move I am calling *the species turn*. In the effort to formulate solutions to what are taken to be the inaccurate, culturally constructed, value-laden categories of the human and animal or human and nature, a seemingly more accurate, specific, value-neutral, and biologically real category like species seems like a great alternative. In general, the species turn is characterized by two moves: first, a problematization of the inaccurate, general, and social constructions of the categories of the human and animal (as sketched above) and second, a simultaneous turn toward the multiplicity of species. Two binary, mutually exclusive groups are replaced by a multitude of groups. In this context, the species concept is presented as a natural, unbiased representation of reality that objectively (or more objectively) apprehends discrete, natural kinds as well as their exact traits or natures (self-consciousness, language, etc.), and is thus thought a more fair, ethical way to understand the *Homo sapiens* and other species. In response to both anthropic and ecocentric critiques of the concept of the human, the category of species has replaced the human and animal, becoming the central way of rethinking how, why, and to whom we must be ethical. The species turn is common both among scholars who rely on *Homo sapiens* species unity to clarify harms of dehumanization and those using concepts like cross-species, sentient, and endangered species to expand ethical obligations and challenge speciesism. As I elaborate in Chapter II, paradigmatic instances of this species turn include the work of a wide set of theorists representative of multiple approaches in contemporary philosophy, including Judith Butler (2006; 2015), Iris Marion Young (1990), Sylvia Wynter (2003), Peter Singer (1975), Martha Nussbaum (2006), and Jacques Derrida (2008; 2011), to name only a few.

Contesting these and other theorists, I do not take the concept of species to be a more neutral, less constructed, prediscursive, more accurate way of conceptualizing the many lives and communities of the world. I do not believe the species concept was somehow a mind-independent reality finally and salvifically discovered beneath the socially produced concepts of the human and animal or human and nature. To paraphrase Foucault, the species category does not represent “the entry into objectivity of something that had long remained trapped within beliefs and philosophies” (2004, 422). Instead, the concepts, definitions, and uses of the species category are also effects of the arrangements of knowledge, material life, bodies, language, and power. This particular relationship between seemingly socially constructed categories (human and animal) and their biologically really, value-free underlying truths (the reality of species), is why my title borrows the formulation of *Species Trouble* from Judith Butler’s *Gender Trouble* (1990). Similar to the way gender was interrogated as socially constructed long before feminists realized the supposedly underlying biological realities of sex were also made legible through a heteronormative gender matrix, many insights can be gained by understanding the category, concept, and definitions of species as the result of historically contingent discourses and knowledges rather than a neutral reality.² I am concerned that, even as the species concept is doing all of this moral work, it is not itself critically evaluated in these contexts.

In the absence of critical evaluation, it is tempting to relax vigilance about essentialism and purity and to treat species concepts and the groups any given definition picks out as value-neutral and prediscursive (a habit found in biology and philosophies thereof as much as in the public sphere). By seeing species as supposedly self-evident, obvious, and biologically unambiguous groups in need of no definition or clarification, it is possible to render this multiplicity and plurality of lives through mutually exclusive frameworks very similar to those used to construct the concepts of the human and animal. I argue that uncritical uses of the species concept can and do lead to understanding both the species category and particular species groups in ways that are both morally problematic and scientifically reductive. Specifically, without attending to both the complexity and multiplicity

² I am conscious of the problems with conflating oppressive paradigms or frameworks across differences. I want to be clear that I am not claiming that these categories (gender/sex and animal/species) are equally constructed or constructed in the same way. I am mostly pointing to the fact that both gender and animality have had assumed biological correlates, sex and species, respectively, such that, like sex, species too needs to be carefully analyzed.

of species concepts, as well as the way various definitions and uses are developed and deployed within different social, moral, epistemic, and power relations, the concept of species is often treated as “settled.”

Borrowing a play on the word “settled” from Megan Bang and Ananda Marin (2015), I refer to uncritical uses of the species concept as the *settled species discourse* or *settled species concept* and argue they are settled in (at least) two senses. First, the everyday, essentialist conception of species I challenge treats the question about what a species is and how it is defined as a settled issue, as though species were a word with an obvious, self-evident, and unquestioned (and unquestionable) biological correlate that is beyond or before discourse and part of the facticity of material life. Yet the concept and definition of species are notoriously unsettled issues in the sciences and philosophy thereof. In fact, “the species problem”—the seeming necessity of many different, conflicting, and irreconcilable species definitions used by the sciences—remains one of biology’s longest-standing and seemingly irresolvable issues (Slater 2013, 61). By deploying the concept of species without sufficiently complex accompanying definitions or concepts, and by taking for granted that the concept of species implies a unified, pure, and clear natural group, we risk erasing the boundary-blurring and multifaceted nature of biological groups and relations. In this context, the *settled* prefix for the settled species concept or discourse intends to highlight the multiplicity, complexity, and contingency of species concepts and relations that drop away, or become invisible, when processes of power generate and naturalize a uniform concept. As Robert and Baylis articulate it, however fluid the metaphysical concept of species is, it plays a significant role in moral thinking: “notwithstanding the claim that biologically species are fluid, people believe that species identities and boundaries are indeed fixed, and, in fact, make everyday moral decisions on the basis of this belief” (2003, 6). The notion of clear, fixed species with specific natures or essences determines how “we live our lives and treat other creatures, whether in decisions about what we eat or what we patent” (6). But are there ways to use the species concept in more robust, less essentialist ways that do not drop away or erase biological complexity and the plural accounts of species? And how might that impact ethical conversations?

Second, this way of talking about species concepts as “settled” corresponds to what Bang and Marin call settled nature-culture frameworks (2015, 532), and what I claim, via Lugones, constitutes a love or logic of purity (1994, 463) according to which certain

metaphysical systems (particularly those dominant in settler-colonial societies) render differences and categories as fixed, pure, discrete, and mind-independent, with stable natures and traits. Bang and Marin also use the term “settled” to recall the multiplicity of Indigenous and anti-colonial ontologies and conceptions of nature/culture relations that must continually be erased or excluded in order for essentializing, settler conceptions to gain prominence. Furthermore, in assuming the human and animal are simply social misunderstandings of naturally divided *speciesed* collectives, this approach ignores the fact that the discourse of species often relies on the same troubled mechanisms (essentialism, unity, and uniqueness) to divide the world into distinct groups, and that these groups are produced through processes of power; in short, species is also a highly fraught historical and social construct. I argue that in the effort to divide the world into discrete natural kinds, we risk maintaining the *Homo sapiens* as a unified and pure collective, and this, I will demonstrate, resecures the gap between man and other animals under the guise of an uncontestable natural framework. By leaving the *Homo sapiens* intact as a unified, distinct, group with a specific nature, the species turn simultaneously fails on its own terms to sufficiently problematize the production of a privileged, unique, human collective and reproduces the very ontological (essential, unique, and unified) and epistemological (natural and neutral) problems it strives to resist. Thus, while the species turn is characterized by efforts to blur, deconstruct, and problematize the human in the interests of other excluded humans and animals, it instead perpetuates the negativizing effect of the human.

Now, to be clear, and as I strive to reiterate a number of times throughout this project, I do not take the turn toward a multiplicity of species to be a problem as such. I very much agree with a general movement away from binary, hierarchically organized, pure, and mutually exclusive categories (like human and animal or human and nature) and toward a differentiated and complex, non-hierarchically organized multiplicity of groups and relationships. I think that move is the right one to make—or *a* right move, anyway—and want to affirm this growing attention to the multiplicitous relations and resemblances that cut across, connect, and curdle biological life. I simply want to invite critical, curious, and creative attention to the species concepts and definitions that get used. If we are going to use the category of species so prominently to understand the world and to organize relationships, management structures, ethical arguments, laws and political norms, and so on,

then we should, as McWhorter suggests, pay very close attention indeed (McWhorter 2016, xi).

This project is thus one effort to show the need for contemporary philosophy to articulate alternative, plural concepts of species that can be more responsible, both scientifically and morally. I know that “according to the modern ordering of things science and politics [or science and morality] are like water and oil and should not mix” (Negin 2019). And I agree with Anishinaabe botanist Robin Wall Kimmerer that there is much value in the “language of science” “of careful observation” with “an intimate vocabulary” that “polishes the gift of seeing” (48). I do not want to reduce all scientific strivings to moral or political agendas or pure instances of ideology. But I do follow Maria Lugones (2003) in believing that the distinction is a bit more curdled. Rather than collapsing science and morality or politics into the exact same enterprises, I want to talk about them as coagulating, as coalescing, as mixing in ways that require degrees of responsibility that scientists, social theorists, conservationists, even the public, should take seriously. I take the position of Foucault, Lugones, and many of my other interlocutors here that scientific knowledges, concepts, and forms of objectivity cohere in historically contingent ways and could happen otherwise. I want to track both some of the explicit moral and political functions of species concepts, as well as the more intricate social and value-laden contexts in which species concepts come to be and be used.

To achieve all of these goals, I bring key strains of environmental philosophy, animal ethics, and social/political philosophy in closer contact with accounts of biological complexity from biology and philosophy of biology in the hope of producing more scientifically and ethically responsible interspecies ethical frameworks. Furthermore, by centering Indigenous and Latinx perspectives in a conversation with philosophy of biology and environmental science, and by articulating the practical and ethical payoff of concepts like species pluralism, I strive to bridge a gap between these literatures and draw attention to all that is lost by excluding the former traditions. It has been deeply rewarding if also challenging to bring these perspectives together, since each set of literature I engage employs concepts, frameworks, and languages that are unfamiliar if not downright nonsensical to the others.

Nevertheless, I take this rather ambitious philosophical pluralism and interdisciplinarity to be not only a challenge but also, I think, a strength of this project. In

the pages that follow, I engage biology, philosophy of biology, and conservation science; social and political, Native American, Latinx, and Caribbean philosophers; ontologists, epistemologists, and even entomologists. There is applied and theoretical biology, arguments guided by culinary metaphors for taxonomy, and even a chapter on mosquitoes. It turns out that trying to tackle an issue this vast, spanning this many literatures, requires casting a very (very) wide scholarly net and maintaining a good deal of naïve optimism. But what I hope you find here are some resources for engaging in a kind of work that started long before and I hope well exceeds the confines of this project itself.³

ii. Chapter Outline

The four major chapters of the dissertation are divided into two thematic parts. Part I comprises Chapters II and III and focuses on outlining the way the concept of species is largely deployed within the species turn and the problems with that deployment. This is the section that deals most explicitly with contemporary ethical and political scholars, or, rather, the ethical and political uses of the concept of species. Chapter II will more or less lay out a map of the species turn, working through a number of thinkers, and the ways the concept of species is used or understood for both humanist and environmental ends. This map is necessarily rather short and limited, but I hope it provides an idea of the many ways the concept of species is taken for granted and some of the ways this can undermine the very reasons it is deployed. Chapter III will bring together the work of Maria Lugones with philosophy of biology to challenge the way the turn toward species multiplicity (instead of the human/animal or human/nature binary) reproduces what Lugones calls a “logic of purity” and “love of unity.” In this chapter, I articulate that the species turn itself is not the problem; my concern is with the particular way that the multiplicity and plurality of species are understood and regulated. I believe, with Lugones, that other versions of plurality and multiplicity are available to us and that they offer better ways around the essentialist tendencies of the settled species concept. Part II, comprising Chapters IV and V, focuses on some ways to resist or move through the settled species discourse. In these chapters, I draw

³ I have explored this kind of philosophically pluralist approach in other publications, including Sinclair and Pringle 2016; Sinclair 2020a; and Sinclair 2020b.

on a version of pluralism that does not subscribe to the logic of purity in order to advance a way of treating the species concept as productively unsettled in ways that allow for resistance, responsibility, and revisioning. In Chapter IV, I draw together work on pluralism from philosophy of biology, Latinx philosophy, and Native American philosophy to develop a heuristic I call *ethical species pluralism*. I take this to be a way of understanding and mobilizing the ethical saliency of the paradigm of species pluralism from within philosophy of biology. Finally, Chapter V will continue this attention to pluralism by advocating that we develop alternative or subjugated histories of the way *specific* species or groups of species become legible within Western science and society as a way of opening up paths to understand and relate to specific speciesed collectives otherwise.

To assist the reader, I include here fuller descriptions of each chapter. Chapter II further articulates the species turn and the settled species concept—what they are and how they operate—within a range of environmental, ethical, and political philosophy. In this chapter that is also a literature review, I outline the function of the species concept within what the *anthropic* and *ecocentric* critiques of the human. I begin by situating the use of this settled species concept in the broader philosophical context in which I argue it is deployed. I show that this settled species concept is used to ground and explain the inaccurate, general, and social construction of the human over and against the animal in ways that facilitate the nonhuman status of some humans and wholesale exclusion of nonhuman life. Here, the concept of the human is widely understood to function in a fundamentally exclusionary way, by casting aside all those who are not thought to share in the nature or traits that make one human. The category of the human is thus contested as a social production, a biological fiction that relies on false ideas of unity and sameness at the expense of those who fall outside its normativizing moral domain. In many of the thinkers I consider, the species turn is evident in their very framing of the problem, since critiques of “the human” frequently take the shape of identifying the particular identities and discourses—like gender, sex, race, coloniality, and disability—through which certain members of the *Homo sapiens* species are excluded from the category of being human, while other members of the human species are included. Thus, the turn away from the morally problematic and clearly biologically suspicious concepts of the human and animal are at the same time accompanied by an appeal (sometimes implicitly and sometimes explicitly) to the supposedly more biologically accurate, specific, and morally neutral category of species which unifies humanity behind and

before these divisions. I argue that a similar species turn occurs in environmental literature, when attention to morally relevant traits or conditions of fellow animals (from sentience to invasivity and nativity) get addressed along the lines of species. Once again, in these contexts, the concept of species is rarely accompanied by a specific definition—as though any and all definitions of species would capture and refer to the same essential group in nature. In short, I show that the species category is widely treated as prediscursive and value neutral and species themselves as unified groups with clear boundaries and natures, precisely to undermine the punitive power of the human/animal binary. In this fairly wide literature review, covering social and political philosophers, decolonial scholars, and environmental or animals scholars.

In Chapter III, I draw primarily on the work of Argentinian philosopher Maria Lugones and philosopher of biology Maria Kronfeldner (2018) to demonstrate at least a few ways that the settled species discourse is both ethically dangerous and scientifically dubious. I argue that the problem with species is more generally a problem with a certain understanding of difference and multiplicity in the context of taxonomy. That is, I show that a turn to multiplicity of species is not sufficient, since there are many ways this multiplicity might be organized, some of which do more to reproduce problematic frameworks than others. Specifically, I claim that framing species in terms of discrete, mutually exclusive kinds, bodies, and identities is an example of what Lugones articulates as a love of purity and ontological unity, or the logic of purity (2003). In Lugones, this love of purity corresponds to Western (settler-colonial) ontological frameworks *and* particular forms of power which strive to control the multiplicity of people and things by formulating an underlying purity beneath plurality. I mobilize the work of Lugones in arguing that mutual exclusivity or pure unity are not logically necessitated features of reality—and certainly not of our understanding of species. They are instead imposed, and morally laden, norms. I then deploy Kronfeldner’s critique of essentialist species concepts to provide some evidence that the settled species concept, though treated as a biological concept, actually corresponds instead to the very socially constructed concept of the human it is deployed to undermine. Kronfeldner shows that, given our knowledge of evolution and the many definitions of species currently operative, each of which divide and collect beings into different species groups based on different criteria, one cannot divine species boundaries in pure, clear, or set terms. I draw on Kronfeldner’s work to demonstrate that, despite accusing concepts of the human and animal

of being both biologically inaccurate and morally troubling, the settled concept of species is nevertheless far more akin to these concepts of the human and animal than the far messier understanding of species that we get from biology.

In Chapter IV, I turn from monism to multiplicity and argue that accounts of epistemic and ontological pluralism from within anti-colonial traditions can productively supplement those of species pluralism in philosophy of biology, even as they also provide tools for making such pluralism actionable in society, ethics, and policy. Specifically, I develop the heuristic I call *ethical species pluralism* as an alternative to settled approaches to species. I build this framework by first articulating and advancing two versions of species pluralism (one ontological and one epistemological) which I take to be significant for a truer anti-essentialist approach to species that takes the species problem seriously. Species pluralism names a family of anti-essentialist responses to the species problem within biology and philosophy of biology that acknowledge that biological complexity struggles to be captured by the kinds of closed, pure, and unified categories on which scientists (but also some ethicists) have traditionally relied. Species pluralism instead seeks to pluralize this concept and category. Yet if one simply treated species pluralism as a result of objective and value-neutral observations, as is mostly the case in biology and philosophy of biology, and without a way of understanding species pluralism as a morally salient paradigm, we risk continuing to treat species concepts and definitions as settled—as lying on the “fact” side of the fact/value distinction. Even within ongoing species debates, where biologists and philosophers thereof explore the empirical dilemma behind why science needs so many species definitions, how definitions variously overlap or conflict, and what we ought to make of this plurality, the only kinds of questions the species category raises are conceptual, ontological, and epistemic. Thus, I implement a form of what José Medina calls *guerrilla* pluralism and bring species pluralism from philosophy of biology together with accounts of epistemic and ontological pluralism from Native American and Latinx philosophies. The latter two accounts (which are themselves internally diverse) generally take pluralism itself to arise from and prompt attention to the different values, contexts, communities, and goals of various knowledges. By centering pluralist insights from Native American and Latinx philosophy, I build scientific species pluralism into the heuristic of ethical species pluralism. I take this heuristic, this way of reading, to be a *lens* for interpreting species pluralism morally by evidencing the existence and function of values in the construction and use of different

species concepts and definitions. But it is also a *strategy* for turning species pluralism from a mere outcome of observation into a tool for resistance and better ethical relations. And, finally, this heuristic is a call to accept the impossibility and responsibility of choosing rightly (between equally valid species definitions and concepts), even as we also take responsibility for the outcomes and costs of these impossible choices on the lives of others.

Most of the chapters in this dissertation look at and analyze the concepts and definitions of species in general (though I also hope to bring these to life through sufficient examples). For this reason, Chapter V zooms in quite a bit to take an insect-eye view of the problem and considers the way *specific* species or groups of species become intelligible within Western science and society.⁴ Here I will deploy another version of Medina's *guerrilla* pluralism to provide a critical genealogy of the way mosquitoes became intelligible in Western science and taxonomy through a particular (and particularly problematic) framing of their role in transmission. For Medina, building from Foucault, *guerrilla* pluralism focuses on producing multiple or plural histories, what Medina also calls "counter memories" and what I call "counter-visions" (2011, 9). These counter-visions can disrupt and resist dominant, official histories and narratives by providing alternative views on our present and opening space to generate new ways of understanding and relating to the many-speciesed world. I take this approach to be useful for undermining the settled and taken-for-granted ways that species groups become intelligible within science and society, seeming to arrive to already fully packaged and articulated. In this chapter, I analyze the construction of the vectorial framework of transmission, which I show was generated at the intersection of colonial, racial, gendered, and species discourses in occupied China. Because this is a genealogy, I explore some fairly specific geographical and historical moments and show just how contingent this vectorial reading of mosquitoes was (and is). But I think this *guerrilla* pluralism is an excellent way to treat the species concept and its divisions with suspicion and curiosity, developing similar historical alternatives around all manner of speciesed others.

Returning to where we began here in this introduction, Marius "the giraffe" might have benefitted from just this kind of attention. As one article in *Nature* pointed out, the so-called discovery of "separate giraffe species could have come sooner, but the animals have

⁴ Megan Bang and Ananda Marin, "Nature-Culture Constructs in Science Learning," *Journal of Research in Science Teaching* 52, No. 4 (2015): 530-44, p. 532. I follow Bang, Marin, other Native scholars in using "Western" in part, because calling this tradition just "science" can conflict with Indigenous scholars working in Native Science. I regret any wrongful homogenizing it perpetrates.

been largely neglected by science. Giraffes were fairly ubiquitous in their habitat, and they were not much of a target for poachers. They are an iconic animal, but they were taken for granted” (Woolston 2016). Though I would not frame this in terms of discovering truer species divisions, I do take it to be the case that closer attention to and resistant histories of giraffe intelligibility, including how various definitions of species were used and deployed, could only have been helpful. Would they have singlehandedly stayed the executioner’s hand or shifted entire frameworks of conservation away from certain genetic species conceptions? Admittedly, probably not. Nor do I think this critical retelling of mosquito intelligibility will stop the sale of deadly mosquito traps or the next swatting hand, let alone industrial and multimillion-dollar gene-editing practices. But this retelling does, I hope, make a little space to begin conceiving of and relating to these teeny kin—and to many other lives—otherwise. And that, at least, is no small thing.

PART I: THE SETTLED SPECIES CONCEPT:

PROBLEMS WITH PURITY

CHAPTER II: THE ANATOMY OF THE SPECIES TURN

Introduction

By way of more fully introducing (and proving the existence of) the constellation of problems around the settled species concept, the goal of this chapter is to build out more broadly the philosophical architecture of the species turn in order to frame my interventions in the following chapters. Specifically, I critique the settled concept of species not only because I find it ethically problematic, but also in order to make space for some alternative and pluralist conceptions of species, which I ally myself with in later chapters. This entails offering characterizations of the anthropic and ecocentric critiques of the human (in Parts I and II, respectively), paying particular attention to the way each identifies the concept of the human as a product of essentialism, uniqueness, and unity, and demonstrating how each position then unwittingly reifies (albeit in various ways) human unity and privilege with its reliance on a settled species concept. To build up these critiques, I draw on a wide scholarly literature, pulling from philosophical subdisciplines that deploy these two critiques (from decolonial and native philosophy, to feminist and social and political theory, to twentieth-century French thought, to animal theory and environmental philosophy). There is thus a tremendous degree of variation, both within and across the anthropic and ecocentric critiques, yet my characterization will be focused on demonstrating that, even despite these differences, the species turn looks remarkably similar across different writers. Thus, this chapter focuses primarily on articulating a vocabulary with which to discuss the problems and paths forward, outlining generally shared but contingent features of the problem.

i. The Anthropic Critique

Both dimensions of the species turn, the anthropic and ecocentric, seek to undermine the ontological assumption that the world is made up of discrete, pure, and fixed categories, and problematize the epistemic practices of naming and categorizing through which these collectives are captured and fixed. In general, both positions have inherited a critique of what Derrida called metaphysics of presence and substance (Derrida 1982, 1988). In this

project, rather than calling these ontological tendencies “metaphysics of presence,” I instead refer more specifically to what I name Taxonomies of Purity (TOP). Referring to their taxonomic dimension specifically attunes us to the ways metaphysics of presence organize, systematize, and categorize identities, bodies, and states of being both within and outside the scientific context. Furthermore, although the problems with TOPs are slightly more focused than those of metaphysics of presence in general—which is to say that my critique of their taxonomic manifestation does not strive to comprehensively respond to other or all iterations of the metaphysics of presence—I generally take critiques of metaphysics of presence or purity to also speak to the problems in TOPs. In short, I take TOPs to be a specific species problem within the class of metaphysics of presence.

I claim that TOPs are characterized by concepts of essence, uniqueness, and unity. Treating multiplicity, process, and mutual inclusion as contamination and pollution, all three terms rely on purity such that things, states, and bodies be fully and cleanly this or that. In TOPs, fixed, hierarchical oppositions presuppose that states or beings are possessed of certain definitive and essential traits or natures. Beings and states are thus defined by what they essentially “are”—by what is believed to be fully present—rather than what they are related to or resemble. To borrow from Butler’s discussion of metaphysics of presence, these taxonomies assume that bodies and persons have internally coherent substances and natures which are the source and cause of external behaviors, actions, and traits, rather than vice versa (2006, 22). In this way, differences are understood as substantive, clear, fixed, permanent, mutually exclusive, and absolute, instead of relative or relational, ambiguous, flexible, permeable, shifting, amorphous, and contingent (Young 1990, 171; Waters 2004, 98-99). The possibility of an internal essence or nature also implies a sense of unity, or the belief that whatever is present has fully and completely excluded otherness, difference, that which is outside (Lugones 1994; Derrida 1988). To have an essence means to be unified, not fundamentally differentiated from other beings with this essence. Taxonomies of purity cannot permit un-unifiable multiplicity or plurality, but instead require homogeneity and purity or unity (Lugones 2003; Waters 2004, 99). Beings and states are understood as fundamentally and essentially distinct and separate forms and substances, each possessing an unmingled and consistent nature, while middle terms, paradoxes, or deviations from the essential and ideal forms are rendered monstrous, contaminated, blasphemous (Waters 2004, 101). In this way, the difference between presence and absence, and the privilege of the latter

(in the form of unity, essence, and uniqueness), is the condition for the intelligibility of bodies, identities, and categories in general within TOPs.

Almost without exception, the scholars who critique the concept of the human from the anthropic wing of the species turn begin by challenging metaphysics of presence in general, but also its classificatory functions and the binary structures they facilitate. This is in large part because, again, almost without exception, these scholars argue that “human” is wrongfully understood to refer to unified, self-same, essential collective, inherently in possession of specific, unique traits, only by setting this human identity in a binary relationship to the animal and the nonhuman (Jackson 2013). In short, bodies come to be understood as either possessing “all that is proper to man,” and therefore being human, or lacking what is proper to man, and thus being animal or nonhuman, through the human/nonhuman binary (Derrida 2008). Agamben called this ceaseless process of defining and producing the human over and through the animal the “anthropological machine,” and argued it functions to exclude (but also retain as excluded), by classifying, organizing, and making constantly visible not only a group called “animal,” but also animality (those traits not befitting humanity) and all who are associated with the nonhuman. The group designated “animal” is understood to exist in a zone of non-life, of lives that are mere life, apolitical and amoral, and can be killed, harmed, enslaved, or otherwise excluded and diminished without consequences. But importantly, for Agamben, and others like Derrida, neither “human” nor “animal necessarily” (and in their current form) refer to biologically real groups: instead, they are categories produced by and through power. In other words, there are no “animals” who are killed and then understood as non-life. Rather, it is through their killing, their existence in the domain of non-life, that bodies become “animal.” In Derrida’s words, the animal is just “a name [men] have given themselves the right and the authority to give to the living other” (2008, 23).

The scholars who advance the species turn from within the anthropic critique observe that the binary not only impacts animals (what they seem to think of as “real animals”), it also impacts other humans (those who really are *Homo sapiens*, despite being animalized). The anthropic critique’s primary problem with this binary seems to be that, by imagining that certain traits are definitive, unique, distinctive, and essential to the human (over and against the animal), and by defining the human through unity rather than diversity, the human actually functions to diminish and exclude other *Homo sapiens* who do not meet

set standards. Reason, language (or speech), subjectivity, and all manner of other traits associated with what Derrida calls *logocentrism* (and later *carnephallogocentrism*) have been criticized for serving as benchmarks of humanity, allowing for the dehumanization or animalization of those believed to lack these traits (2008, 2011). In other words, the norm of the human, when set in conjunction with its other, the animal, functions not only to humanize, but also to dehumanize or animalize.

In general, the species turn in the anthropic critique is characterized by two moves: first, a problematization of the inaccurate, general, and social constructions of the human over and against the animal in ways that facilitate the nonhuman or animal status of some humans; and second, an appeal (sometimes implicitly and sometimes explicitly) to the supposedly more accurate, specific, and seemingly more neutral biological category of species. As I hope to demonstrate, the latter appeal to a neutral and more accurate “real” biological collective is itself used as evidence of the inaccuracy and moral problems with the concept of the human (i.e., because “we” are all one species, it is a problem that only some are granted moral status as human). However, as I engage various scholars who deploy the anthropic critique, my goal is not to point out the way each falls short of some pure, post-essentialist and non-foundational zone of indeterminacy by holding onto even the thinnest categories of sense. Instead, my goal is to demonstrate that there are themes and patterns in the way the concept of species is being discussed, treated, deployed, and presupposed in much ethical and political literature. Those patterns reveal something troublesome, something taken for granted, that I want to explore and ultimately, move away from. In short, I seek to demonstrate that, by seemingly placing species and species difference in a domain prior to and at a distance from the conceptual negotiation and reconsideration of humanity, these habits of thought inscribe a problematic, settled concept of species as a real object or objective reality.

Agamben and Foucault’s work has been widely taken up as laying groundwork to critique the concept and identity of the human, the human/animal binary, and the process by which some humans land on the animal side (Jackson 2013, 670). But both scholars have also been criticized for ignoring or failing to sufficiently problematize both the cost of this concept of the human on so-called animal life, and the way the human functions explicitly as a “technology of slavery and colonialism” (Weheliye 2014; Jackson 2013, 670). While Foucault’s particular treatment (or lack thereof) of so-called nonhuman animals could make

him vulnerable to at least a few of my concerns with the anthropic critique, I instead take him up at length in the following chapters, where I will address several of the aforementioned concerns, as well as my own. Though Agamben could certainly fit into my characterization of the anthropic species turn, I want to instead focus on feminist, decolonial, Latinx, Native, and race scholars, who are writing precisely from the dehumanized and animalized position about which Agamben and others abstractly speak. I focus on these scholars not to demonstrate or argue that they, rather than white settler scholars, represent “the final frontier of speciesism” (Weheliye 2014, 10). I center them because my project strives to be an ally to and accountable to all communities (dehumanized and speciesed) who have been excluded from the human; their specific insights are, for me, authoritative and crucial (even if not infallible) for the project of dismantling the figure of the human and the discourse of species.

For some feminist, decolonial, and race scholars, the anthropic critique can take the shape of identifying the very particular identities and discourses—like gender, sex, race, coloniality, and disability—through which, to use Butler’s formulation, “one group of humans is recognized as human and another group of humans, ones who are human, is not recognized as human” (2015, 36). For example, Butler’s early work on performativity is so concerned with gender and sex in part because proper and intelligible performances of these categories are crucial to the process of humanization. She argues that “discrete gender identities are part of what humanizes individuals within contemporary culture,” and without them, one is subject to punitive consequences which she describes as linked to the domain of the animal and the inhuman (2008, 98). Not performing gender or sex properly dehumanizes and animalizes one and with dehumanization comes exclusion, violence, and increased precarity.

In this sense, Butler’s work has always been concerned with the category of the human, with its negative and positive effects on bodies, as well as the abject domain of animality that conditions what or who can be human. However, in more recent work, Butler has begun addressing this problem even more explicitly, arguing that “the norm of the human” (2015, 42), secures ethical and political intelligibility by developing specific criteria according to “which anyone who seems human can be judged to be so” (37). Butler remains critical of any project that attempts to use specific criteria to determine who is human, seemingly wanting to move away from the problematic production of the human through

particular discourses of intelligibility. To do this, she has also more explicitly articulated the role the animal, the nonhuman, plays in producing the human, noting that the discursive production of the human either attempts to distinguish between and hierarchically different humans based on their likeness to animals, or expands the field of the nonhuman (by adding some humans) at will.

Yet, even as she explores and problematizes the coconstitution of the categories of human and animal, undermining their distinction as a way to move toward justice, Butler nevertheless maintains consistent, if not thoroughly unpacked, distinctions among those she calls either human or human animals and other kinds of animals. On the one hand, she situates the human (as a group and identity) as always already human animal, claiming “there is no firm way to distinguish in absolute terms the *bios* of the animal from the *bios* of the human animal,” because the human is always already a human animal (2009, 19). She notes further that when humans suffer, they suffer as animals; that is, as relational beings with physical precarity. Animality is treated almost as a precondition for being human, something shared with others but also exceeded by aspects of the human animal that are not wholly reducible to the animal. Thus, on the other hand, Butler regularly and consistently differentiates the human animal or “human forms of life” (2015, 42) from “non-human forms of life” and “other animals” (2009, 75). Even sharing with animal rights activists their concern that “only human subjects are recognized and not nonhuman living beings” (2015, 35), and even in her problematization of what it means to be human as a social form of recognition, she consistently notes that human animals are not the same and are distinct and distinguishable from nonhuman animals. She claims—and, I think, genuinely seems to hope—that her work does not speak to or address “the type or species of animal the human is” (2009, 19). That is, she is not striving or intending to make claims about biological kinds or advance taxonomic distinctions. Yet, as I will argue shortly, by so regularly making very straightforward and clear, if significantly undeveloped, distinctions between those who really are human animal and those who are really nonhuman animal (who are *not* human), Butler seems to take for granted that there exists a clear group of biological beings (physically distinct and distinctly precarious) that we can call human animals outside of discourse.

In her work on non-distributive forms of justice, Iris Marion Young (1990) has likewise noted that the idea of a single, unified human or humanity functionally excludes people who do not meet the standards of the abstracted human norm, with their humanity

in question. Furthermore, the idea of a human nature (a universal species norm) allows privileged groups to ignore their own group specificity, since they look like the human ideal, even if they are only one of humanity's many iterations (165). Are these problems historical, such that the concept of the human could be otherwise? Young thinks not. In her words, "any definition of a human nature is dangerous because it threatens to devalue or exclude some acceptable individual desires, cultural characteristics, or ways of life" (1990, 36). For Young, the problem with the concept of the human (or with "human nature") is that in order to properly unify, removing the hierarchical ranking that turns natural differences and variation within the collective into justifications for ill treatment, the concept necessarily excludes and ignores the existence of irreconcilable, ununifiable differences which prevent so-called humans from forming a single group. She strives to advance "an image" rather than "an explicit theory of human nature" (1990, 36).

Butler and Young both critique the concept of the human for being a socially produced and punitively regulated category, a norm of intelligibility that has pretended to be but is in fact not a biological reality. They both argue that it is morally wrong to understand the human as a biological collective that possesses an identifiable essence and unique traits that differentiate them from nonhumans and critique the way the norm of the human has itself been biologized (that is, naturalized as fact through the development of supposedly scientific truths that support its social functions). However, it is wrong, it seems, not because the idea of essences, uniqueness, and unity distinguish and place humans over animals per se, but because this formulation has placed "fellow humans" on the wrong side of the human/animal divide. Their explicit concern with the concept of the human is that, when placed over and against the animal, not every body that *is* (actually, really) human (or, rather, a member of *Homo sapiens*) gets recognized as such.

Yet in their similar formulations of the problem, both Butler and Young seem to presuppose a natural, prediscursive, and unified species (the *Homo sapiens*) that a) lies beneath and is thus b) the condition for their critique of the concept of the human. Both Butler and Young draw an implicit distinction between an ethically problematic and discursively constituted group (the human), and a self-evidently real, actually biologically unified group beneath the human (perhaps the *Homo sapiens*). They appeal to, or presuppose, the existence of a naturally unified, clearly distinguishable group who discursively gets taken up into language and unjustly divided and hierarchicalized, with some of its proper members

excluded. In this way, the uncontested, prediscursive unity of the species seems to be the condition for the possibility of both tracking the ways the human subsequently divides and hierarchicalizes the species (i.e., it's only because we are all really one species that we can be ranked along a spectrum of advancement) and for diagnosing this problematic division as morally unjust (we really are one, unified species, so pretending we are ranked is ludicrous). Butler's very formulation of the problem evidences both her appeal to a natural collective and this collective's function in her ethical argument: in her words, the problem with the human concept is "that one group of humans is recognized as human, and another group of humans, *ones who are human*, is not recognized as human" (2015, 36). By this, Butler suggests that, as a category, the human permits some humans to be *misrepresented* as nonhuman or animal, when, *in reality*, they are not: they really are human.

Though neither Butler nor Young explicitly names this more real collective the *Homo sapiens*, as others in this section will (e.g., Wynter, Weheliye), I argue that their references to a biological reality that underlies or is wrongly (and unjustly) represented by the social category of the human could be understood to refer to the human as a species. In fact, read generously, the attempt to distinguish between the human and the *Homo sapiens* could be understood precisely as an effort to call attention to the way the concept of the human has naturalized and biologized problematic social hierarchies, pretending to name a natural collective, when it is in fact a discursive and socially constructed norm of intelligibility.

However, the question then is, does pointing to a "real" collective that has been misnamed by the norm of the human manage to escape the problem of biologization (and its essentializing, homogenizing effects), or does it repeat the problem by referring to a new, *really* natural group? After all, as I will demonstrate in the following chapters, it was this discourse of the human (over and against the animal) that helped produce the scientific natural category of species and the *Homo sapiens* in the first place (as simultaneously animal and above animals). That is, the discourse of the human creates the very concept of a natural species group to which it refers. Thus, does pointing out that the human "fails to refer to all humans" sufficiently problematize the human? Or does the formulation itself bely the continued belief in the existence of the biological group that is unified and distinct from other groups? In short, if the discourse of the human functions by creating a story about the biological naturalness, uniqueness, and unity of its members (and, I, following Wynter, argue that this is in part what species is: the biological story that the category of "the human" tells

about itself), then does appealing to a more biological species reality beneath the human sufficiently escape that story? Or is it in fact a sneaky way for the discourse of the human to survive?

These formulations of the problem with the concept of the human or human nature appeal to the real existence of a biological species that is, in fact, all the things the concept of the human pretended and tried to be—natural and neutral as a collective, in possession of unique and essential traits that identify the *Homo sapiens* as such and differentiate them from other species, unified beyond group differences, with their moral and political status intact. Furthermore, by suggesting that all these beings “are human,” even if some are not recognized to be so, Butler and Young imply that recognizing or apprehending one another as a species is not a matter of discourse, myth (to use Wynter’s language), or frameworks of intelligibility at all, but rather a matter of acknowledging a natural, apolitical biological reality. So even as Butler and Young identify and problematize the human as a norm of intelligibility rather than a natural, biological collective, they at the same time appear to (re)install the essence, uniqueness, unity, and naturalness of the *Homo sapiens* as a biological category recognizable outside of discourse.

The human is also a category of deep concern in decolonial and women of color scholarship, which has prompted a rapidly growing canon of work directly addressing the racial and colonial dimensions of the concept of the human. In particular, two important themes emerge in this literature. First, these literatures tend to focus extensively on the role that race played in constructing the colonial modern concept of the human as a biological reality. That is, these literatures are particularly attentive to the relationship between science and society, documenting the way the human has been biologized as a natural and neutral collective (in possession of specific unique and essential traits), unified over and against the nonhuman and animal, through processes of racialization or racialized mattering. Anticipating my arguments in forthcoming chapters, and though some of the following accounts will refer explicitly to species as an unproblematic category, I argue that these works once again remind us that the settled concept of species to which we might be tempted to turn is actually discursively inseparable from the concept of the human (perhaps even a result of it), rather than a less problematic, more specific alternative.

Second, in addition to criticizing the ways the category of the human has historically excluded (or made strategically ambiguous) the moral status of racialized and colonized

communities, decolonial, and women of color scholarship equally resist the impulse to unite the irreducibly and irreconcilably diverse communities under a unified idea of what the human is. Having traced the concept of the human to colonial biological concepts that unify all humans under the rubric of species only to then differentially classify and hierarchicalize them, one of the unifying concerns is that any concept of the human that unifies all members of the species will, by that very gesture, *erase definitive and important differences*.

In her seminal work in Black Studies, Caribbean Studies, and Decolonial Studies, Sylvia Wynter gives a lengthy account and critique of the production of the human. She notes that the designation “human” has historically not referred to the species, but to specific identity ideals she names “Man1” and “Man2.” Birthed in Europe, these ideas of what the human is not only disavowed alternative versions of humanness (such as those found in Africa or the Americas), but also essentially excluded racialized, gendered, sexed bodies that deviated from their normativizing visions. For Wynter, Man1—*Homo politicus*—emerged from the sciences and arts of the European Renaissance in response to various European encounters with the already inhabited lands of the Americas (2003). This subject was first and foremost a rational, political being. Wynter identifies another version of what the human is emerging centuries later. Man2—*Homo economicus*—is yet another European vision of the human, formulated within the colonial episteme of Darwinian biology (2003). Wynter describes at length the way these versions (Man1 and Man2) have been codified in and through science (which I will also turn to in my second chapter), and plays with Latin taxonomic naming to mark the arbitrariness by which *Homo sapiens* was gathered and named. Wynter thus draws a distinction between Man and the human, where the former designates the secular, modern, Western, colonial *version* of the human that differentiates and classifies full humans from not-quite-humans and nonhumans on the basis of biology, race, and economics.

According to Wynter, these versions of what “the human” is and what it means to be human are not *mere* stories, in that they have genuinely created both actual collectives and ways of being in the world, but they are stories. In her words, the human as a species is not just *bios*, but neither is it mere story. It’s both “bios and mythoi,” or what she calls “*Homo narrans*” (McKittrick 2015, 16, 25). The problem for Wynter is that by conflating the European, colonial story about the human with the human species as such—naturalizing their stories and excluding all other versions of being human—Man1 and Man2 forget they

are creations, just two ways among many to be what our species is (McKittrick 2015, 11). For Wynter, there is no human, there are only humans; one species but different possible iterations. Thus, for better alternatives to the Enlightenment Man of humanism, Wynter hints that perhaps the “post” of posthumanism might not be futural in nature, but geographical, where alternative conceptions of what it means to be human come from outside the West.

Wynter observes and critiques the way the European Man was biologized, coming to stand in for the human species as a whole through colonial science. Yet Wynter’s own relationship to the concept of species is somewhat unclear or fuzzy, in both positive and fraught ways. On the one hand, she is critical of the Darwinian origin story of the human, in which the human is first and foremost a neutral, natural biological collective rather than a socially gathered and agentially chosen one—what she calls human as praxis, rather than human as noun (McKittrick 2015, 23). She also resists claims that humans—whomever she understands them to be—are gatherable into a single coherent unity, biological or otherwise. But on the other hand, Wynter identifies that the irreducible plurality and multiplicity of the human wrongly identified with Man is due in part to certain unique and isolated species traits that, she notes, are “unlike . . . all the other primates” (25). She even speaks of certain features that are unique to the human brain (25). Of course, I would not deny that brains and material traits have indeed developed differently across various bodies. But that is not the same as claiming that particular essential capacities are the sole or characteristic preview of one genetic collective (and she does refer to humans as a genetic collective) (25). Wynter has a complex position on category of the human as both genetic and produced, as *praxis*, but also, maybe despite herself, as a noun, as though being human as praxis is contingent on being the kind of biological being Darwin (mis)named.

Wynter is one of many Black or Black feminist scholars rethinking the role racialization plays in the colonial production of a unified and simultaneously hierarchalized human (see Fanon 1961; Spillers 1988; Mbembe 2019). For example, Alexander Weheliye’s *Habeus Viscus* (2014), which draws heavily on both Spillers and Wynter, is a treatise focused entirely on the relationship between race and the concept of the human. Weheliye claims that race lends a “suprahuman explanatory ground” (i.e., biological) to the problematic and non-natural hierarchalization between members of the human species, even as race is neither a biological nor cultural phenomenon, but an assemblage of biopolitical forces that

must continually articulate non-white subjects as not quite human. He argues that “racialization is . . . a conglomerate of sociopolitical relations” that hierarchically order and discipline various members of the “*Homo sapiens* species into humans, not-quite-humans, and nonhumans” (8).

Both Wynters and Weheliye speak about the human as a moral and political category, constructed with and through a biological story about its naturalness that colonize what it means to be human. Their shared concern is that, because the category of the human is tied to race, there is no thinking the human outside of the racialization that hierarchicalizes otherwise equal, non-hierarchically ranked members of the same species. In other words, while the human is contested as a production, a biological fiction that relies on false ideas of unity and sameness *at the particular expense* of those who fall outside its normativizing moral domain, their arguments nevertheless likewise appeal to a unified, non-hierarchically ordered species that has been misnamed and strategically hierarchicalized. Thus, despite their critiques of the biologization of the category of the human, the arguments rely on differentiating the human as a social construction and the *Homo sapiens* as a natural, unified (if diverse), and separable collective that is distinct from other species.

Similar concerns about the colonial production of category of the human and its ties to science can be found in Latinx feminisms. For Maria Lugones, the concept of the human is produced over and against the nonhuman in what she calls the colonial/modern gender system. This system names the discursive and material, ontological, and epistemic power relations through which a group that comes to be known as human are variously scientifically collected (from across the globe, and out of their ecological relations) and then hierarchically divided (according to colonial frameworks such as gender, sex, race, and so on). In particular, Lugones argues that the human is a problematic concept, because it advances a colonial ontology of unity and purity that erases irreducible multiplicity and differences, even as this very attempt to unify simultaneously justifies processes of discrimination and hierarchicalization by presenting a species norm or unity from which various populations deviate.

Looking historically at the emergence of the human as a category, and centering this emergence in the contact of colonization, Lugones claims “the dichotomous hierarchy between the human and the nonhuman [is] the central dichotomy of colonial modernity” (2010, 743). The human/animal dichotomy was generated by Europe through their contact

with the colonized, on whom they then imposed this dichotomy by extracting Native populations from their ecological relations, ontologically and materially. The normative practices which connect gender to coloniality—or what she names the colonial/modern gender system—depend not only upon the erasure of actual creaturely embeddedness, as well as local, ecological knowledges and relations (i.e., collecting, separating, and distinguishing bodies from their sustaining relations), but also on the creation particular and troubled concepts of species (2010, 745). That is, Lugones suggests that the colonial production of human/animal, human/nature binaries, and the primitive/civilized distinction were dependent on certain concepts of species: on a concept of the human as a biologically evolving, internally coherent and essentially distinct, sexually reproducing collective. Only after beings were collected and unified under the framework of species could the colonial/modern gender system turn people on the “dark side” part of the now human population spectrum into animals, creating a division within the human (2010, 202). In other words, it was through ecological extraction and the production of the biologically natural and neutral categories of the human/animal that the European man became the human par excellence and the European woman became the human inversion of man, while colonized populations became not-human-as-not-men and not-human-as-not-woman, respectively (2010, 744). In other words, Lugones makes the unique argument that rather than blackness being rendered animal, it is through the discourse of animality that bodies become intelligible as black or brown. In this way, the anthropocentrism of colonialism works by classifying what is human by disrupting Indigenous relations to land, the spirit worlds, and banishing their ecological, social, and cosmological organizations of the world.

For Lugones, the “human” is a result of what she calls the logic of purity and unity, which are her names for the “categorical, dichotomous, hierarchical logic” that “organiz(es) the world ontologically in terms of atomic, homogenous, separable categories” that are ultimately visible as unified if seen from the proper (read: objective, neutral) viewpoint (2010, 742). This critique of attempts to unify multiplicity admonishes any humanism that sees “humanity” as a coherent collective, connected by essential traits or an essence (though it is often unclear what those traits or essences are), from which great diversity springs: as though the human is an essential, natural collective, and all other forms of difference (race, gender, class, sex, language, culture) are merely incidental. Instead, Lugones is critical of ontologies that present the categories, objects, and bodies in the world as fundamentally

discrete and separable (excluding the paradoxical, multiple, coexistent, and both-and). She instead advances alternative, or what she calls “non-modern,” ways of organizing the world’s categories and objects (“from the ecological to the economic” 743). Ontologically, Lugones does not believe that “the world of people and things is unified” but treats the world as composed of always already multiplicitous, impure, irreducible categories and entities without firm boundaries. Lugones critiques the concepts of unity and purity that persist behind many concepts of multiplicity (1994).

Lugones’s attention to the way the category of the human participates in logics of purity and essentialism recalls larger debates in Latinx and decolonial studies about the relationship between human nature, subaltern or Indigenous knowledge, and coloniality. For example, Nelson Maldonado-Torres and Julia Suarez-Krabbe both trouble the role the human plays in erasing diversity. For example, Maldonado-Torres claims that the concept of the human upheld in human rights is thoroughly colonial and calls for a decolonization (but not abandonment) of the concept of the human. Maldonado-Torres agrees with Fanon that rather than taking up either the colonial concepts of humanity as substantiated by Eurocentric ontologies or turning solely to definitions of the human from local cultures, decolonizing the human means attempting “the more basic task of [affirming the] collective humanity of the dehumanized in decolonization struggles” (2017, 124). Maldonado-Torres shares with Lugones a concern that the human that lies behind hegemonic concepts of human rights is a problem because it determines both how beings need to look, act, and exist in order to deserve rights, as well as the nature of the rights they deserve and thus the kind of life dehumanized, colonized subjects ought to live. In other words, the human identity behind the diverse versions of the human would still need to be characterized by specific and essential traits.

Julia Suarez-Krabbe also argues for a plurality of concepts of the human. Like Lugones and Maldonado-Torres, she claims that the human is a colonial construct insofar as it pretends to be biologically neutral, but is in fact “formulated on the basis of historically constituted hierarchies of race, gender, and living beings” (2013, 2). She calls this a globalized localism, since the production of this version of the human happens/happened locally (in specific locations, by specific populations, through specific techniques and discourses), but both constructed itself as telling a global story and then transported itself across the globe (2013, 336). Thus, she argues concepts like human rights and development

are actually tools of coloniality, functioning within a colonial ontological framework to achieve outcomes within that colonial framework.

Despite her critique of the production of the human category in Western, colonial ontologies, she does not attempt to get rid of the concept of the human altogether. In her words, “the category ‘human’ must be re-invented. This re-invention must take into account other grammars of human dignity such as those that take place in the continuous development of the decolonial, autonomous political” (2013, 366). From this vantage point, ignoring Indigenous and decolonial ideas of the human in pursuit of a pure, anti-essentialist effort to get rid of the human is an equally colonial and problematic move. She cautions that the radical anti-essentialist move in philosophy is intimately connected to the very essentializing efforts it hopes to dismantle. While anthropologists essentialized Indigenous and subaltern populations, and therefore were unable to see the genuine difference or let those populations speak for themselves, extreme anti-essentialists who are responding to those anthropological gestures nevertheless also tend to cover over or ignore Indigenous or non-colonial knowledges when they do not fit with anti-essentialist criteria (170-171). Rather than choosing either the colonial project of an essentialized, universal human identity, or the anti-essentialist project which attempts to deny the existence of a human collective or nature, Suarez-Krabbe argues for an attention to the plurality of concepts of the human (and therefore also this human’s relations to nature, spirit, earth) as found in different Native and Indigenous peoples.

I take seriously Suarez-Krabbe’s challenge to not dismiss the category of human (or species) simply for anti-essentialism’s sake and at the expense of Native and other subjugated knowledges. At the same time, Suarez-Krabbe is a particularly interesting example of my concern with the continued use of the discourse of species as an unproblematic, natural category that underlies the human. My concern becomes most clear in the moment Suarez-Krabbe interprets an Indigenous ontological distinction (between human as culture and identity) *through* a distinction between the cultural identity of the human and the biological reality of species (a distinction they do not themselves make). Specifically, Suarez-Krabbe recounts how the Mamos (the religious leaders of the Kankuamo, an Indigenous Colombian people) described the human as being capable of changing itself culturally (taking on different beliefs about themselves and temporary identities) only if they forget their identity as bound up, in harmony with, responsible to, and tied to specific lands and other animal

peoples (2016, 142). The ontological starting place of the Kankuamo is the equality of all life, along with the recognition of the specific identities and functions of those lives in conjunction with one another. Only those who forget their equality with all other lives and who fail to function within the common-unity of those lives (focusing instead on themselves) can change who they are.

Suarez-Krabbe interprets the Kankuamo distinction between the culture and identity of the human as reflecting “a differentiation between the question of the difference between a human being *anthropocentrically*, and being a human being *biologically*” (143). She claims this distinction affirms that “humans remain humans in terms of biological uniqueness as humans” in a way that recalls the reality of species despite or underneath cultural differences. She admits to “purposely read[ing] the biological into [the] distinction between culture and identity” in order to highlight the Kankuamo attention to the sustaining physical and material interrelations that species and biology recall (143). But why turn to species to make these material realities and relations clear? Not only, as I shall argue below, has the discourse of species been intimately wed to the very problematic concept of the human she contests, but it has also functioned mostly to differentiate, categorize, and individualize, rather than embed, situate, and connect. For these very reasons I will argue that species—this settled and dominant concept of species in particular—has struggled to affirm and make visible exactly the relations Suarez-Krabbe hopes it to in her reading of the Kankuamo.

Ultimately, I do not intend to critique Suarez-Krabbe’s affirmation of some shared material conditions and capacities. I would, as she challenges me, prefer to look to the way the Kankuamo and other Indigenous communities affirm those shared conditions. My concern, rather, is with the way Indigenous ontologies (as in Suarez-Krabbe’s work), as well as simply unscrutinized claims of prediscursive unity (as in Butler’s case, for example), get routed *through* the problematic, settled discourse of species. In this sense, Suarez-Krabbe demonstrates the danger in allowing the Western, colonial discourse of species (with its continued claims to unity, essence, and uniqueness), to stand in for the singular, Indigenous and other subjugated knowledges and models of relationality. In this way, I want to repeat and extend Suarez-Krabbe’s concern, that we attempt to let Indigenous and decolonial ontologies and epistemologies take precedence and resist the impulse to turn to settled concepts of species at their expense.

In drawing this characterization of the anthropic critique to a close, I want to highlight one more trend that characterizes this critique. To do this, I need to make a distinction between the formal and performative maintenance of the category of the human. Many of the arguments above have formally relied on the existence of a distinct natural collective whose members are unique (if not the sole) subjects of moral concern. By “formally relied,” I refer to the fact that the call to recognize the moral wrong and harm done to racialized and colonized populations structurally relies on a recognition of the *Homo sapiens* as the real, biologically natural group, characterized by underlying equality, unity, and distinct traits distinguishable from other species and wrongly misrepresented as less-than-human or nonhuman. As I hope to have briefly demonstrated, rather than contesting the human/animal binary as such, this formal presentation seems to articulate its biological inaccuracy and moral depravity while striving to pull *Homo sapiens*, who previously fell on the animal side onto the side of moral inclusion (sometimes by turning to the *Homo sapiens* as the real moral category, and sometimes by reimagining decolonial forms the human). Thus, formally, the language of species comes to be the “real” category of moral concern in many of the above texts, even as the existence of category of the animal, or any species who is not *Homo sapiens*, is not widely or deeply contested in any detail. In this sense, the binary at issue might shift in terminology, from human/nonhuman to *Homo sapiens*/Non-*Homo sapiens*, but the line between those who are speciesed human and those who are not remains. This is what I am calling a formal maintenance of the human in the species turn.

At the same time, the species turn in the anthropic critique also preserves the category of the human performatively. By excluding almost all discussion of the moral value of any species but the human, by failing to significantly address the way the human/animal binary negatively impacts non-*Homo sapiens*, and by only speaking about or describing and decrying violence against other *Homo sapiens*, many but not all of the aforementioned scholars preserve the moral exceptionalism of the category of the human and continue to treat it as though its members had more moral weight than members of other groups. In short, in this attention, many scholars performatively preserve the integrity, unity, and moral value of the human as distinct from other lives by never (or insufficiently) addressing and including those lives.

This critique of the performative maintenance of the human identity and nature must be circumscribed. I cannot say that, for example, the above thinkers exclude animals from

their conversations or care and they should or should not do that. To make that kind of claim, in that language, is to espouse the existence of a group called animals who then get excluded on the basis of, for example, their species. But in fact, the logic of the entire anthropic critique of the human category rests on the shared claim that the animal (just like the human) is not a biological category; it is a social category, a colonially authorized, and punitively regulated norm of intelligibility used to generate the privilege and unity of the human by diminishing the moral worth of other lives. Being understood as less than or essentially different from the human is what makes someone an animal. Thus, instead of saying that the above scholars exclude animals and they should or should not, I formulate the problem this way: by critiquing the category of the human for hierarchically organizing certain lives over nonhuman life, while only ever referring to or caring about the effect of this problem on *Homo sapiens*, many but not all of the above scholars reperform the very human/nonhuman binary they seek to contest.

Butler is a primary example of this. She does not explicitly and verbally exclude animals from her writings, and she has not argued against conferring onto nonhumans significant moral status. Nevertheless, by critiquing the category of the human while only ever discussing and seemingly caring about *Homo sapiens* bodies, Butler reconstructs certain bodies as human and others as animal. Lugones falls prey to this too: she avoids clear formal reliance on species more than almost any of the other figures I mentioned. However, there is a performative dimension of her work that can be said to preserve or enact this species turn. For on the one hand, she critiques the widespread belief that “human” refers to a biologically, evolutionarily real, and unified collective. She suggests, instead, that this collective is produced and secured as natural and unified through the simultaneous extraction of some bodies from their ecosystems and the exclusion of other bodies, those who become “animal.” Yet on the other hand, Lugones seems content to continue talking only about those bodies the colonial construct has identified as “human.” And as both she and Wynter note, this construct occurred precisely through the language of species. In other words, Lugones seems to exclude the very population whose exclusion, she argues, wrongly constitutes the human as a biologically unified collective. Thus, despite her desire to speak of irreducible multiplicity, Lugones appears to treat the human as if it *is* sufficiently unified and as though it does, in fact, refer to a specific biological collective that can be isolated, separated, and distinguished from other lives or groups. This performance, preserving

concern only, primarily, or firstly for those who seem to be *really* human, could be said to characterize, even if it is not a necessary feature of, the species turn within the anthropic critique of the human.

ii. The Ecocentric Critique

Scholars who characterize the ecocentric wing of the species turn have likewise taken the concept of the human to task for the problems of essentialism, uniqueness, and unity and share the concerns with metaphysics of presence and with taxonomies of purity, as outlined at the beginning of the previous section. But while the anthropic critique focused more on the problems of essentialism and unity, the problem of uniqueness gains more prominence in the ecocentric critique. Most of the scholars forwarding this form of critique reject claims that humans are a biological group that shares a specific essence (across and despite differences) and possess specific unique traits (like language, reason) that both differentiate them from and place them above (rather than likening them to and situating them alongside) animals. Yet the ecocentric critique is characterized by the belief that the *Homo sapiens* is not the only or primary species that deserves moral consideration, and they critique the concept of the human for constituting itself as the pinnacle of moral considerability only over and against the animal (or animals).

Similar to the arguments of decolonial scholars who call for pluralizing the concept of *the* human (of the human/animal binary) in order to undermine its regulatory and punitive effects, the ecocentric critique within the species turn is characterized by calls to pluralize the “animal” side of the binary. This line of reasoning suggests that there is no monolithic group called “the animal,” whose members (from “ants to zebras”) are the same and stand equidistant from the human (Oliver 2009, 47). As Derrida put it,

There is no Animal in the general singular, separated from man by a single, indivisible limit. We have to envisage the existence of “living creatures,” whose plurality cannot be assembled within the single figure of an animality that is simply opposed to humanity . . . : among nonhumans, and separate from nonhumans, there is an immense multiplicity of other living things that cannot in any way be homogenized, except by means of violence and willful ignorance, within the category of what is called the animal or animality in general” (2008, 16).

Following Derrida's formulation, the category of the animal is widely understood to erase "vastly diverse differences among individual animals and subgroups between species and between species themselves" and to "herd countless species into one category and then denigrate them" (Oliver 2009, 34). Furthermore, these other species are understood to be variously related to one another and to the *Homo sapiens*, with some species having more in common with humans than they do with one another. Furthermore, in the ecocentric critique, the human is understood as a social category that is the starting point for moral and political inclusion, with bodies understood as more or less worthy of inclusion based on their proximity or distance from the "norm" of the human. Meanwhile, the *Homo sapiens*, in this line of reasoning, is just another biological animal among many who does not necessarily possess any special status. Thus, the concepts of the human and animal are once again (as in the anthropic critique) recognized as problematic and inaccurate social and discursive productions of otherwise natural and unproblematic speciesed collectives.

From this starting point, the ecocentric wing of the species turn attempts to simultaneously solve the problem of human uniqueness and exceptionalism, and the homogeneity and categorical denigration of "the animal" with a hyper-specific focus on species: on differences and similarities, on all that is shared and not shared between and across species. Because of this focus, the ecocentric critique of the human/animal binary very explicitly affirms species as a natural biological category and a crucial counter to the generalized, inaccurate, social, and problematic production of the human over and against the generalized animal. But if the anthropic critique problematized the various capacities used to define and delimit the human in order to promote a wider diversity of ways of being human, the ecocentric critique remains focused on capacities precisely because they are understood to be morally relevant (even if they do not themselves confer moral status), and because they are shared across species (language, intelligence, reasoning, problem-solving, lying, experiences of pain, laughter, anticipation of death, cooperation, and the list goes on).

But I argue that the focus on traits has wrongly relied on the troubling discourse and settled concept of species: it is taken for granted that the world is composed of discrete (if evolutionarily related) groups with distinct natures, the trick then being to notice how those "natures" are similar to or different from one another. This argument frequently takes one of the following two forms, which I will call the identity and difference approaches, respectively: either other species also possesses the traits traditionally understood as morally

relevant, such as subjectivity, experiences of pain and pleasure, language, reason) (Singer 1975; Nussbaum 2006; Korsgaard 2018; Willett 2014; Oliver 2009; Donaldson and Kymlicka 2011), or other species are inherently deserving of ethical consideration, even when they do not share traits with *Homo sapiens* (Calarco 2008, 2015; Derrida 2008, 2011; Massumi 2014; Wolfe 2003, 2012). Though traits-focused approaches are used widely, from conversations on species management and preservation, to environmental science, to land management, such literatures more rarely consider the philosophical implications of the category of species and its relation to social concepts of human and animal. Furthermore, they also often use more particular, case-specific scientific definitions of species. Thus, my characterization of the ecocentric critique focuses on those philosophical arguments that explicitly critique the human/animal binary and attempt to remedy it through turns toward species.

My characterization of the ecocentric critique affords me the chance to more thoroughly address three concerns I have with the species turn in general, and which, though characteristic of the anthropic critique as well, are best worked out here in dialogue with the traits-based focus of the ecocentric critique. First, literature in this vein often refers to biological, naturally distinct species groups (attributing moral weight to species similarities and differences) all while ignoring the complexity, messiness, and plurality of ways species actually strives to name very different kinds of collectives in biology. Second, in the absence of dialogue with the sciences, or with Native and other knowledge communities that might prompt acknowledging the non-mutually exclusive and multiplicitous ways bodies gather themselves into groups, many of the scholars in the ecocentric species turn end up redeploying and reinforcing very simplistic, monolithic, everyday, and essentialist notions of species that follow, rather than contest, Western settler ontologies. In this way, their use of species biologizes and naturalizes troubled discursive productions. Third, by treating species as natural collectives who then can be understood to possess or not possess various (morally relevant) traits, the species turn mistakes the cause for the effect (to use Butler's formulation of Foucault) (Butler 1990, 21-24). We do not look into the world and see a species—like *Aedes albopictus* (Asian tiger mosquito) or *Canis familiaris* (domesticated dog) and only afterward try to discern their traits. Rather, bodies become intelligible as speciesed groups (and species itself emerges as a taxonomic reality) only through the calculation, proliferation, distribution, and withholding of traits along authorized lines of appearance. Bodies do not exist and then have their traits discerned: bodies become intelligible, organized, and

categorized through the distribution and organization of traits. Thus, it is troubling that the ecocentric approach attempts to solve the problems generated by the human/animal binary by relying on the very same distributive mechanisms and essentializing concepts of group belonging that produce and police that binary in the first place.

A first approach to the ecocentric species focuses on shared capacities. Following Matthew Calarco (2015), I call this the identity approach, and it can take many forms, but two of its most prominent include the position that humans are not unique in their possession of specific morally relevant capacities (Cavalieri 2001; Korsgaard 2018; Rachels 1990; Regan 1981, 2003; Singer 1975), and the position that humans are not the only agents with the capacity for flourishing, since flourishing is a trans-species moral barometer that shifts based on species specific traits (Donaldson and Kymlicka 2011; Nussbaum 2006). Though I will focus on Singer and Nussbaum, the identity approach has a very, very long list of proponents, including Paola Cavalieri (2001), Sue Donaldson, and Will Kymlicka (2011), Christine Korsgaard (2018), Kelly Oliver (2009), James Rachels (1990), Tom Regan (2005), Cynthia Willett (2014), and many others. This position understands the extension or expansion of the ethical sphere to be related to, though not necessarily derived from, the specific capacities of a species. In general, species capacities (or capabilities, as Nussbaum will call them) are morally relevant, while mere species membership is not. I will argue, however, that because they use the settled concept of species that relies on unity and essence in order to trouble human uniqueness, this version of the species turn preserves the privilege of the human.

In his framing of the problem of speciesism, Peter Singer was one of the first to articulate the distinction between morally relevant traits (that cut across species), and the moral irrelevance of species belonging. He claims that any traits have moral significance. In his case, working from within the Utilitarian tradition, the morally relevant trait is sentience, or particularly, the ability to experience of suffering or pleasure. But since he is working from within the Darwinian premises that *Homo sapiens* are evolutionarily coterminous with rather than wholly distinct from other lives, Singer also assumes sentience and other morally relevant traits are shared throughout the animal kingdom. Based on the belief that capacities are morally relevant material, rather than mere species belonging, Singer makes the following distinction between equal consideration and equal treatment. He claims that all species are equal, insofar as they deserve absolutely equal consideration; the interests of one species

ought never automatically outweigh those of another simply because of a difference in species. However, even though they are all equal, deserving equal consideration, they are not the same, and each should be morally treated based on their respective and species-specific capacities (like the capacity to suffer, feel pain, experience pleasure) (2009, 1-2). Each species gets considered equally, even if their varying capacities to experience pain and pleasure end up situating them at different places practically.

Singer argues that morally prioritizing members of one's own species simply because of their species is "speciesist." According to Singer, speciesism is both linguistically and formally akin to racism. In his words, "the racist violates the principle of equality by giving greater weight to the interests of members of his own race, when there is a clash between their interests and the interests of those of another race. Similarly, the speciesist allows the interests of his own species to override the greater interests of members of other species. The pattern is the same in each case (Singer 1975, 108).

Since in Singer's account, species has no *moral* status, it may seem he is not performing the species turn. But in fact, he is an example of this move par excellence, because in his view, species remains the primary, taken-for-granted discursive framework by which one biologically collected and naturalized group, humans (or the *Homo sapiens* species), comes to understand morally relevant capacities of other species. In short, the settled discourse of species, as I lay it out in the following chapters, is the guiding metric of Singer's discussion, since it is only through discourses about which species have which traits that a group's moral relevance comes into view. The prominence of species becomes especially clear in Singer's numerous discussions of the line between which class, order, family, genus, or species has the morally relevant traits and which do not. For example, according to Singer, bivalves (a class of mollusks) are not sentient, feel no pain, and thus lack the necessary traits for moral considerability. So even though the fact of species per se is not morally relevant for Singer, the fact that morally relevant traits run along species lines means that the concept and category of species remains key to tracking moral considerability. Finally, while Singer takes the traits of different species to be a matter of scientific discovery and debate, he treats species as referring to obviously, self-evidently, clearly enclosed, unified, and bounded groups. In short, he continues to rely on a concept of species inflected (or infected) by a taxonomy of purity.

Writing from a neo-Aristotelian position instead of a Utilitarian one, Martha Nussbaum's capabilities approach argues that each animal species is morally considerable simply in virtue of existing, but that moral obligations depend on species-specific traits and capabilities (2006). Modifying her account of the capabilities approach to humans, Nussbaum's stance on the moral considerability of nonhuman animals includes the mandate to respect and promote every species' basic, species-specific capacities: life, bodily health, bodily integrity, play, sense/imagination/thought, emotion, practical reason, affiliation, and control over one's environment. Advancing an Aristotelian perspective that flourishing is the primary moral good, Nussbaum argues that nonhuman animals can only flourish and live a dignified life if these capacities are fulfilled above some minimum threshold. Nussbaum rejects the view that humans are obligated to extend benevolence or compassion and focuses, instead, on our responsibility to not be unjust by harming or diminishing the flourishing to which nonhumans are as entitled as humans.

In many ways, Nussbaum offers an important corrective to Singer in that the capabilities about which she is concerned are nevertheless not the things which directly confer the dignity that establishes moral status. In her words, "dignity does not rest on some actual property of persons, such as the possession of reason or other specific traits" (2006, 7). Instead, dignity is an inherent possession by virtue of belonging to your species and is determined according to the norms of your species. That is, following an Aristotelian essentialism, Nussbaum posits that each distinct species has a characteristic form of functioning that more or less defines what it is to be a member of that species, and each form is both inherently valuable (conferring dignity) and ought to evoke respect. For Nussbaum, this leads to the idea that it is good for a creature to flourish as the kind of thing that it is and wrong when its flourishing is blocked. One need not reach or actualize the fullest capacity (or teleology, in Aristotelian terms) of one's species *in order* to possess your species dignity; instead, the claim is that one can only lead a dignified life in species-specific terms and as a member of your species community. This makes it possible for Nussbaum to claim that we ought not attempt to confer human dignity onto other species, or their dignity on humanity. For Nussbaum, the concept of a "species norm" thus replaces the possession of specific capacities by individuals in Singer's account. Nussbaum argues that one cannot confer dignity on the basis of specific traits. For even though those traits are variously distributed throughout the species, and not all members of the species have access to the

same capacities to the same degrees, specific decisions about them will depend on species norms. The species norm then tracks general capabilities that are available across a specific species and to which members of the species might have access either individually or by proxy through connection to other members of their species.

As with humans, the first step in advancing justice for animals (as she calls them) is knowing and understanding the “innate capacities” and “powers” of each species (2006, 366). Nussbaum admits that while this is more difficult to do in the case of animals, given the gap in linguistic communication, this gap is different only in degree, and not in kind, from that gap that humans face when trying to understand the experiences of other members of the *Homo sapiens* species (354). Thus, to do this work of discerning the important traits of other species that are relevant to their flourishing, she suggests we pay attention to the things they prioritize, and that we exercise what she calls, following J.M. Coetzee, a “sympathetic imagination” (355). This imagination is a cultivated willingness to understand animal agents as actors who make choices that are interpretable (even if it requires some imagination) as preferences that can have moral weight. Though it might be an act of projection, the same projection is required for discerning intra-human acts. In her words, “all of our ethical life involves, in this sense, an element of projection, a going beyond the facts as they are given” (354). She simply pushes this willing use of the imagination to “cross the species barrier” (355).

Though their positions are quite different, Singer and Nussbaum manifest the species turn in similar ways and reveal a shared set of problems. First, they both remain logocentric (though Nussbaum decidedly less so) and demonstrate that to preserve the unity and nature of the *Homo sapiens* is to preserve both essentialism of the human category and its moral problems (as discussed in the previous section). Singer’s logocentrism is more straightforward: though functioning within a Darwinian framework that supposedly non-hierarchically situates humans as one among many species whose shared traits cut to-and-fro across the tree of life, the only relevant calculation of sentience begins with the concept of the human (as the “normal” reasoning, experiencing, subject), and then extends both to other species and other members of the human species who might not be neurotypical (or those whom Singer calls “impaired”). In other words, the norm of the human is preserved, in the guise of natural, biological species norms, by centering traits that belong to the logocentric, human subject.

Nussbaum's account of the species norm strives to accept diversity *within* species. But she nevertheless relies on a very straightforward Aristotelian essentialist view of species, whereby certain traits are understood to be essential to a being, and thus essential to the being's flourishing by virtue of their relation to the creature's "nature." Furthermore, despite her critique of Singer's anthropocentric understanding of sentience (in the Utilitarian sense, as specifically the capacity to experience pleasure or pain), Nussbaum's own position on sentience is modeled after the human, experiencing subject. Individual experiencers, or sentient entities with the capacity to experience, are moral subjects, and the capabilities essential to their natures are primarily facilitated by equally essential cognitive capacities that run along the lines of species (2006, 363). Non-sentient others—ecosystems, plants, or animal insects, like mosquitoes—are not agents and are not violable in the same sense as "higher" animals (2006, 369). This is true even though Nussbaum does want to claim that "harmless insects" should not be unnecessarily killed (362). Nussbaum does not intend the category of the human (which she uses to designate the human as a species, the *Homo sapiens*) to be the paradigm of moral status. But by prioritizing logocentric, largely cognitive (or cognitive-based) capacities as the ground for ethics, she reaffirms Wynter's Man.

Second, though both Singer and Nussbaum rely on the concept and category of species and species capacities, neither defines precisely what a species is (how it works, how it gathers or collects its members, what relation these members have to one another, how that fact relates to ethics). Neither, for that matter, does Cavalieri (2001), Donaldson, or Kymlicka (2011), Korsgaard (2018), or most others who characterize this approach. Is it the case that the respective structures of their normative ethics are designed to be flexible enough to accommodate species, no matter how it is defined? That hardly seems plausible. For, how could the strict biological definition of species (species as genetic biological individual) possibly yield the complex, trait-based ethical systems both Singer and Nussbaum advance? By not defining species, they seem to instead take for granted the facticity of the problematic, everyday, settled use of species I am concerned with. They end up treating species as a monolithic and obviously real category that needs no description or explanation because it straightforwardly names discrete, obvious groups with collective internal essences or natures. While the species to which one belongs "has moral relevance in describing what capabilities societies should extend" (2006, 363), neither of them interrogates how those species become legible or the ways a plurality of species definitions might impact this. Thus,

these concepts of species rely on and reproduce a TOP, drawing on particular metaphysical preferences for presence, substance, essence, and internal unity.

To be sure, defining species in purely biological terms might also be a problem for a number of reasons, especially if a specific definition were put forward as the only definition of species useful for moral thought (when in fact, as I will argue, a great many species definitions are morally relevant). But failing to put forward such a definition while still claiming to speak to species as a biological reality performs exactly the gesture Wynter, Weheliye, Lugones, and others from the anthropic critique seek to admonish: it naturalizes or biologizes a particular, essentialist, settled conception of what a species is. This is no surprise, given that the Western settler version of species was generated and continues to function precisely to preserve the category of the human in its sovereignty and priority as biological facts. Both the concept of the human *and* that of the *Homo sapiens* are discursive productions.

This brings us to the third problem facing the ecocentric critique: mistaking the cause for effect. Both Singer and Nussbaum treat species as real groups who can then have specific traits or natures identified. But the species-trait relation works the other way around: frameworks of trait recognition, distribution, and calculation produce species as a matrix of intelligibility that constructs individuals and collectives as always already speciesed. In this formulation, I follow Foucault's suggestion (and, I believe, demonstration) in *The Will to Knowledge* (i.e., *History of Sexuality*, 1990), that power is both repressive and productive, in that it both obscures and occludes and generates and produces. Rather than suggesting there exists a "prior to species" or a prediscursive state where actually, really unified individuals or collectives exist as non-speciesed, my claim that Singer and Nussbaum reverse the cause and effect highlights the way they mistake the products of species discourse—the naturalized species identity—as the cause of species groups. To clarify what I mean by mistaking the cause and the effect, consider Singer's comparison of racism and speciesism. Singer frames racism as functioning through the privileging of members of one's own race over members of another race for no reason other than their race. However, countless scholars have argued that racism is not a prioritization of whiteness over blackness because of some quality or reality of blackness; rather, blackness is constituted through its association with particular traits (violence, sexual depravity, gendered performance, lack of reason, criminality, drug use) against which whiteness can both define and defend itself. Similar arguments are made with

respect to sexism, as Butler has noted. Through constructions of weakness and frailty, emotions and lack of reason, rapeability and violability, domesticity rather than work or action in the public sphere, certain bodies have come to be understood as “woman” and thus excluded by these associations (1992, 17-20). In short, Singer misidentifies race as a prediscursive reality according to which members of different races exclude one another. But the causality actually runs the other direction: material and discursive processes of exclusion, trait distribution and association, and policing constitute certain populations as racialized or as sexed.

I agree that speciesism shares at least some similarities with racism and sexism. But I disagree with Singer about what, exactly, they share and the implications of the shared structure on how we move forward. As I will set forth in the following chapters, I believe that, similar to race and sex, species intelligibility is produced through the calculation of traits. Speciesed bodies are not excluded *because* of their species. Rather, bodies and collectives become speciesed, get grouped together in family and genus, only through complex calculations that neglect the multiplicity of ways bodies gather themselves into groups (like the multitude tracked by the many definitions of species). In other words, the version of species espoused here does not track the processes by which species get produced as such, but takes for granted that species are out there in the world, with collected traits or groups of traits, and that excluding them based on their species is the problem; the identity approach does not take the production and calculation of species belonging through trait distribution itself to be an issue.

While the identity approach to the ecocentric species turn relies on sameness, continuity, and similarity to build its case about including nonhuman species in moral and political communities, the difference approach instead focuses on differences between and among the *Homo sapiens* and other species. Scholars who characterize this approach are inheritors of a broader philosophical tradition (including thinkers like Nietzsche, Beauvoir, and Heidegger) that questions characterizations of the human as possessing a transhistorical nature, with an inner core of subjectivity that is its own foundation. These critics of humanism make various arguments about the way humans are instead “irreducibly enmeshed in a series of sociohistorical processes and cultural relations that constitute [humans] from the ground up” (Calarco 2015, 30). Humans are deeply historical beings generated by cultural, institutional, economic, and material conditions. From this perspective, any idea of a

universal and fixed nature is not only inaccurate, in the sense that it does fail to name the ways humans constitute and are constituted by various external sources. It is also very problematic, since any fixed human nature must cover over the forces of its production to naturalize itself as transhistorical.

From within the difference tradition, Derrida has had one of the most sustained engagements with what he calls “the question of the animal” (2008, 32). Because Derrida could also be characterized as influencing the shape the difference approach takes to animals in general (Calarco 2008, 2015; Massumi 2014; Oliver 2009; Wolfe 2003, 2013), he will receive somewhat lengthier treatment than some of the others in this section. In particular, Derrida follows Heidegger and Levinas, who variously argue for a relational ontology of humanity and the category of the human, where ethics emerge from the situation of relation to irreducibly other beings. However, Derrida problematizes both Heidegger and Levinas for continuing to treat the human as a collective whose capacities are unique and exceptional in a way that excludes nonhuman animals, who, they claim, lack the relevant capacities. Derrida demonstrates that these attempts to exclude nonhuman animals from ethical relations end up sustaining the essentializing and naturalizing effects both Heidegger and Levinas otherwise resisted.

Even beyond Heidegger and Levinas, Derrida claims that many of the metaphysics within the West are characterized by particular traits (like logocentrism, metaphysics of presence, phonocentrism) that are tied to the “self-interested misrecognition of what is called “the animal in general” (Roudinesco 2004, 63). Because of its structuring and conditioning binary relation to the concept of the human in both philosophical and cultural discourse, the animal “represents the limit upon which all the great questions are formed and determined, as well as the concepts that attempt to delimit what is proper to man, the essence and future of humanity, ethics politics, law, ‘human writings,’ crimes against humanity, ‘genocide”” (2004, 63). In this sense, the animal has never been truly outside or other than the human, but has instead been produced as a generalized category against which the unity and integrity of norm of the human can be secured.

As a corrective to this, Derrida sets deconstruction to three specific projects. One of these focuses on deconstructing the claim that humans are in absolute and sole possession of specific traits, or what he calls “propers”—the hand, spirit, nudity, speech, reason, language, self-consciousness, self-presence, responsibility, politics. To achieve this, Derrida

deconstructs the intelligibility or essence of the trait itself, showing that each trait is the result of a binary (e.g., response/reaction). The privileged term is created only through its artificial separation and prioritization over the other term, even as the trait is nevertheless reliant on that which it excludes (e.g., animality, the creaturely, reaction, the written, the biological). This deconstruction has two effects. First, it prompts Derrida to claim that other animals can be said to have a particular capacity (such as the capacity for response), since the privileged and unprivileged terms can no longer be understood as fundamentally separate traits or capacities. Second, by recognizing that the traits which define so-called humans are in fact traits fundamentally shared with and conditioned by other animal lives and creaturely life, this deconstruction questions whether there is such a thing as a unified, natural “human” category first place. Derrida demonstrates that humans cannot be said to possess those traits in any definitive way, and especially in a way that allows them to understand other bodies as *lacking* said trait. In short, humans can no longer be constructed as unified or singular over and against the animal *vis-à-vis* the unique possession of certain traits. For Derrida (and others like Leonard Lawlor 2007, and David Wood 2002, 2004), the moral community and moral calculus will also be reshaped in the wake of the deconstruction of the concept of the human and the human/animal binary.

As already noted, the second task of deconstruction with regard to the animal is to pluralize it. Derrida critiques the animal as a singular category, suggesting that Western philosophy has profited from homogenizing the multiplicity of animals into a unity—what he calls “the animal in general”—when in fact many of these so-called animals “do not fall within what this grand discourse on the Animal claims to attribute to them or recognize in them” (Roudinesco 2004, 63). But even as he is critical of homogenizing the animal in general, he is also critical of the identity approach (or what he calls the biological continuum approach), which he characterizes as flattening ontology by erasing differences between species rather than maintaining the irreducible differences so crucial to the difference tradition (2008). This is somewhat at odds with my own interpretation of the identity approach, which I have argued gestures toward the similarities and sameness Derrida rightly criticizes, even as it also preserves and resecures the unity and priority of the human, as well as essential differences between species. But in any case, in an effort to preserve differences between various animals, Derrida suggests that the category of species can serve as a midway point between a flat ontology and the animal in general he argues that species allows one to

pluralize the category of the animal and refer to the infinite differences between and among different species or animals (*animot*). Derrida frames this approach as one that strives to maintain (borrowing Heidegger's language of the abyss) the abyssal gaps between humans and animals, and between different human groups, and between all the different species of animal (2004).

Against sameness, Derrida explicitly enacts the species turn in order to make space for various groups and bodies to maintain radical and irreducible difference. But in so doing, Derrida preserves the human as a species, a unified, distinct group that has an abyssal gap between themselves and other species. He argues in some places that it would be "stupid" to give up the identity and category of the human and to pretend there are no differences between the human and other species (Roudinesco 2004). He insists he "won't take it upon [himself] for a single moment to contest the thesis [that there is a fundamental rupture between humans and animals], nor the rupture or abyss between this 'I-we' and what we *call* animals" (2008, 29-30). So not only does Derrida affirm species in general, he does so with the intent of keeping an unspecified but fully unique humanness to the human. Comments like this and others lead careful readers like Matthew Calarco (2014) and Paula Cavalieri (2009) to argue that Derrida preserves both the unity and *the privilege* of the human identity, with Cavalieri even suggesting that Derrida seems to "reject any parallel between humans and nonhumans" (2009, 98). Though I disagree with the strength of Cavalieri's claim, and though both Calarco and Cavalieri themselves enact the species turn (albeit in ways that are beyond the scope of this chapter), I am clearly not alone in being unsatisfied with and critical of Derrida's particular maintenance of the human.

At the same time, Cary Wolfe, another central thinker of difference and animality, takes after and attempts to defend Derrida's maintenance of species against critics. According to Wolfe, Derrida affirms species, because we cannot simply have vulnerability, life, or singularity as the total setting of ethics (2013, 84-85). These must be followed by something that can provide the "who" or "to whom" this ethics matters (2013, 84). For Wolfe, we need a framework to recognize and understand the different needs, desires, and effects of other (or other kinds) of bodies. He argues that species serves this role, as it names (or helps name) the "material processes—some organic, some not—that give rise to different ways of responding to the world" (2013, 74). Thus, for Wolfe, the ethics of difference or singularity espoused by Derrida and others have nothing to do with bodies

escaping their biology, or no longer being understood through species; rather, species is crucial for coming to understand what matters to other bodies, even though ethics remains irreducible to this “facticity of biological existence” (Wolfe 2013, 74). Speciesism for Wolfe refers to the way that bodies are excluded because of their species, because of the facticity of their embodiments.

While I do not take issue with Wolfe’s desire to affirm the differences between and specificity of different bodies and communities, I believe he follows Derrida and others in wrongly conflating troubled, overly simplistic, and problematically homogenous notions of species to the facticity of biological existence. In the absence of any substantial engagement with the question of what a species is, how they are organized, and what connection unites bodies such that they constitute abysally separate groups, species come to function in Wolfe (as in Derrida) as a stand in for traditional natural kinds. Even as Wolfe strives to be critical of the way species differences get produced and variously taken up into or excluded from ethical consideration (i.e., his definition of speciesism) he nevertheless takes for granted the existence of groups of individuals whose natures and traits are fundamentally shared and unified, discernible by science, and which can thus be understood as part of organic reality. In other words, he turns from the problematic social construction of the human to the biological collective of the *Homo sapiens*, as if the *Homo sapiens* were neutral facticity, an unquestioned unity, beneath the social production of the human. But this biological collective is still very much attached to and understood through the specific traits which have secured its special moral status (such as self-consciousness and language). For though Wolfe has done more than many animal scholars to move beyond the anthropocentric focus on human traits, he ultimately keeps his focus on humans and other “higher order” species with similar capacities, and is skeptical that ethics could extend past “animals” to plants, ecosystems, and other living systems or beings (2013). It seems the ethical project that emerges from this account of difference continues treating traditional taxonomies and discourses of species as unproblematic, admonishing them for their treatment or exclusion of species without problematizing how bodies are gathered into species or clarifying why a particular (though as yet unspecified) definition of species will help us organize the differences that do and must come to matter.

But I suggest that, at least in part, the problems Calarco, Cavalieri, and I have with Derrida (and, by extension, with Wolfe) emerge because of the particular way Derrida uses

species, or the particular concept of species that is thrown into relief in the absence of an explicit and clear definition, rather than with the idea of species as such. In other words, I do not take issue with the idea that bodies are constantly in the process of being organized and organizing themselves into various kinds of groups according to many different social, biological, and relational criteria. But, as I will demonstrate in later chapters, the means by which bodies do this, how fixed those borders are, what exactly a “species group” is, and what its members are supposed to share are all unsettled and contentious topics of much debate. In light of this, it is particularly odd that Derrida would situate species as the preferred way of preserving difference and advancing ethics toward other animals without clarifying how its individuals are related to one another and what those bodies share such that there are chasms between them and others. In particular, given Derrida’s deconstruction of the unity of the human and the supposedly unique traits shared among them, how could this new collection of the human (or any other species, for that matter) be defined? On what grounds? By critiquing the human as a construct that wrongly gathers certain bodies under the assumption that they alone possess certain traits, but then upholding that same collective as a species, infinitely different from other species, Derrida appears to contest the *social* meaning of the human category while preserving (or assuming) some kind of incontestable *biological* or physical collectivity. When taken together, the lack of any clarifying remarks about what Derrida means by species, and his insistence that it is obvious “the human” is different from other species, Derrida’s use of species ends up looking quite similar to the version of species I’ve outlined above.

Yet Derrida himself provides some compelling reasons to not accept this treatment of species. In particular, he is critical of what he names the taxonomic logic by which living beings are understood to be grouped as natural kinds and the processes of power through which bodies are named and collected into these kinds. For example, he claims that even the collectives we perceive to be fixed, mere biological facticities, are in fact produced by “stabilizing apparatuses” that are “never natural” and “never given in nature” (2011, 8). These apparatuses are “codes of traces being designed, among all living beings, to construct a unity” (2011, 8). With this, Derrida invites the reader to become suspicious of claims about the naturalness (or natural-kind-ness) of certain divisions between collectives (perhaps species?) and to wonder if stabilizing apparatuses are discursive, or organic, or both? He also invites readers to understand collectives as in process, rather than fixed, and his use of the

plural “apparatuses” perhaps points to the multiple ways groups are gathered or gather themselves. Furthermore, Derrida softens the stronger, stricter statements about species he makes elsewhere and suggests we engage ethics and singular others “along the lines of what are called species and communities” which he defines as “beings-with-one-another proper to each species . . . and between species” (2011, 198). While these few remarks do not negate the far greater number of problematic uses of species, they seem to make openings to understand species far more pluralistically, less essentially.

In the difference approach, but especially in the work of Derrida, we find an ambivalence about species: an insistence that we use species instead of the animal in general, even as he is critical of the taxonomic processes through which species become visible, and even as this discourse violates the radical singularity *différance* implies and contests the animal in general. So, while I do argue Derrida performs the species turn by attuning his readers to species without sufficiently distancing himself from the problematic deployment I discuss above, I also take him a resource for challenging that use of species. My own project is compelled by the desire to preserve irreducible and radical differences against both the homogenizing impulses of the human/animal binary and the sameness models that extend moral considerability to other species based on their proximity and similarity to the human or *Homo sapiens*. As I present the problematic history of this version of species, outline its conceptual limits and problems, and propose we pluralize not just the animal (by turning to species), but the concept of species itself, I see myself as keeping with and furthering key elements of Derrida’s own project.

Conclusion

I close this characterization of the species turn by pointing out some tensions and areas of convergence between the anthropic and ecocentric positions, then briefly mapping the way my project attempts to responsibly address these tensions. I recognize that this chapter is divided along somewhat fraught lines, with a selection of feminist, decolonial, and race scholars grouped together and characterized as focusing on the *Homo sapiens*, and a selection of animal and environmental scholars (most of whom are white) unified by their focus on the moral status of species other than *Homo sapiens*. Despite their shared investment in dismantling the universal human of humanism and its sovereignty over other lives, Latinx and Indigenous scholars, and other scholars of color on the one hand, and animal studies,

environmental philosophy, and posthumanism on the other, have sometimes found themselves at odds.

Undeniably, and despite their vast differences, scholars who represent the ecocentric critique are inheritors (like environmental and animal groups more broadly) of the racist and colonial history of the US environmental movement. Concern for what has been termed “the environment” and “animals” has largely focused on the preservation of “wild” (or more recently, selected domesticated) species and wild lands, at the exclusion of and often in direct conflict with the needs of Indigenous and other communities of color (Baumeister and Eichler 2018; Kim 2015; Jaquette Ray 2013). In the scholarly context, animal studies, environmental philosophy, and posthumanism have largely continued to neglect and exclude the concerns of Indigenous communities and scholars of color and have even gone so far as to treat their work as antithetical and resistant to animal-liberation projects, a “foil . . . for the emancipation of nonhuman beings” (Weheliye 2014, 10). As I noted, plenty of animal scholars advance entrance of “animals” into moral considerability by reaffirming the logocentric, cognitive centric biologized Man that Wynter and other decolonial scholars’ critique. But more than this, those working in animal studies or posthumanism occasionally even directly address what they see as the failures of, for example, Black scholarship with regard to the animal. In his observation of the way animal studies and posthumanism continue to defensively treat Black and decolonial projects as less important, as if their subjects have already been sufficiently assimilated into and recognized as morally valuable, Weheliye cites directly and at length from Wolfe’s seminal animal studies book, *Animal Rites* (2003). In the text in question, Wolfe is critical of Toni Morrison and others whom he argues are seeking a form of human liberation “that has, as its material condition of possibility absolute control over the lives of nonhuman others” (Wolfe 2003, 7). Weheliye wonders why Wolfe and others so regularly treat Black, Latinx, and other potential allied scholars as “the last frontier of speciesism,” explicitly taking these groups to task for failing to sufficiently and eagerly forsake the concept, category, and identity of the human when in fact, he argues, they *are* trying to resist, deconstruct, and transform it, making its universalizing and exclusionary operations untenable (Weheliye 2014, 10). Perhaps, as Lewis Gordon has observed, “it is easy for the dominant group to ‘give up’ humanism because of the simple fact that their humanity is presumed” and secured (1998, 39).

The differences and conflicts between the anthropic and ecocentric positions are further complicated by their differing positions on Western scientific discourse and knowledge. The anthropic critique is characterized by deep suspicion of the way biology in particular (though not exclusively) has gathered, divided, and distributed traits both within and across species in an effort to naturalize differences. In particular, their critique tracks the way racialized and sexualized differences have far more frequently been enshrined through biology than contested through it. Authors who deploy the anthropic critique are critical of the Darwinian, evolutionary turn for facilitating the biologization of racial hierarchies and justifying colonization, among other things (Weheliye 2010, 25-26). For this reason, scholars whom I argue characterize the anthropic species turn can present distinct, if fairly reticent and subtle, reliance on the truth of biological categories (like the *Homo sapiens*).

On the other hand, the ecocentric critique draws openly on biology, both in its clear and straightforward affirmation of the existence of natural species groups and in its attention to scientific studies that confirm similarities and differences across species (Willett 2014, 42; Oliver 2009; Wolfe 2003). While still critical of Darwinism in many regards, scholars who characterize the ecocentric critique are nevertheless inheritors in the lineage of Darwin that links all species through evolution and process, situating the *Homo sapiens* as one animal species among many. Yet the ecocentric critique does not value scientific knowledge as such. Instead, I suggest the increased value placed on scientific knowledge comes from the fact that, even despite the centuries of violence inflicted on speciesed others in the name of scientific progress, the sciences have nevertheless been one of the few places where species-specific traits were explored, animal minds and intelligence tested, and species capacities discovered (that is, at least within the Western colonial context) (Calarco 2015, 52).

In the following chapters, I strive to respond to these tensions in several ways. First, my critique of the discourse of species and the species turn demonstrates that even those on the ecocentric side, who critique others for preserving the universal human over and against the animal, nonetheless themselves reinstall its unity and privilege when they turn to problematic, essentialist, settled concepts of species. By taking species to refer to natural, unified, discrete categories of beings, rather than understanding the settled discourse of species as a product of power, they not only undermine their own goals, but also perpetuate and obscure the way species continues to function along colonial and racialized deployments of power.

Second, though I am concerned about the way species is deployed or taken for granted in the anthropic critique, I choose to address this problem by centering the voices of scholars like Lugones, whom I argue do provide key tools (e.g., critiques of biologism, unity, and species norms) to address the taken-for-granted discourse of species that characterizes the species turn (and maintains human unity and privilege) from both the anthropic and ecocentric standpoints. In other words, my project recognizes that the pluralized versions of the human espoused by those in the anthropic critique (and particularly decolonial scholars) do explicitly resist the Enlightenment human and actively undermine Man's universalizing effect over and against the animal. Following Weheliye and Jackson, I argue that we ought not call out scholars of color for seeking entrance into a problematic human of humanism *at the expense* of those called animals. To my mind, that can only undermine the shared goals of dismantling the human essence and its privilege.

Third and finally, I place Lugones and a few others in contact with science and philosophy of science in several ways. In Chapters III and IV, I draw tools from their work to more thoroughly critique the settled concept of species, its conceptual architecture (Chapter III) and its relation to power. Then, in Chapter IV, I also explore the way affirmations of plurality over purity can draw forth the ethical implications and import of species pluralism at work in philosophy of biology. Even though Wynter suggests that we find the "post" of posthumanism in geographical alternatives outside the West, she also uniquely engages specific sciences (for example, cognitive science and neurobiology), to disrupt them from within and explore alternative ways to instrumentalize revised knowledge they generate. I make a similar move by placing anti-colonial scholars into conversation with the irreducible (epistemic and ontological) multiplicity of species definitions within philosophy of biology *for the purpose* of drawing out the ethical implications of these subjugated species concepts and contesting the essentializing uses of species that continue naturalizing both racialized and speciesed categories.

CHAPTER III: PROBLEMATIZING TAXONOMIES OF PURITY AND THE SETTLED SPECIES CONCEPT

Introduction

You have probably heard the one about the butcher, the knife, and nature having joints.⁵ In Plato's articulation of this well-known metaphor, the character of Socrates suggests that we ought to be able to "cut up each kind according to its species along its natural joints, and not try to break any part into pieces, like an inexpert butcher" (Phaedrus 265e). While Plato used the idea of nature having joints to explain his view about the reality of ideal forms, it is more commonly deployed today to articulate the ability of science—or of knowledge enterprises, more generally—to successfully identify *kinds* of things.

The figure of the butcher and his jointed nature loom large in discussions of taxonomy and classification and larger still in the classification of species. The metaphor is ubiquitous in scientific discussions of species in part because, as Slater et al. demonstrate in *Carving Nature at its Joints: Natural Kinds in Science and Metaphysics*, it helps establish the manner of questions on the proverbial table (or butcher's block, if you will) with regard to species: namely, questions about ontology and epistemology (Slater and Borghini 2011). Are species ontologically real independent of observation, and if so, what makes them distinct? Or is species an epistemic tool that aids in the categorization and organization of the world for specific purposes (e.g., for explanation and prediction), without necessarily naming mind-independent natural kinds? Are our species taxonomies discoveries or inventions (or something in between) (2011, 2)? Is the species problem a difficulty with doing good science or just a problem at the level of definition and explanation? Are there really joints, or things around which our theories can cut? To use Ian Hacking's formulation of this "gentle metaphysical question": "are there natural kinds—real or true kinds found in or made by nature?" (1990, 135).

If we look at this ubiquitous metaphor more closely, we see it does not so much raise questions about ontology and epistemology as posit a very particular ontology of the world,

⁵ Though it is often attributed to Plato, the metaphor comes from a far older Taoist allegory, in which a King notices and comments on his butcher's remarkable knife work. The butcher responds, "Because ordinary butchers will hack their way through the animal, their knife always needs sharpening. But my father taught me the Taoist way. I merely lay the knife by the natural openings and let it find its own way through. Thus, my knife never needs sharpening" (Kahn 1995, vii; see also Watson 2003, 46).

as well as both a specific kind of knower and specific criteria for judging the quality or accuracy of knowledge. In short, the metaphor is not value-neutral but belies several normative commitments. Ontologically, the metaphor implies the existence of a world independent of and before the knife (language, mind, or knowledge). It posits that kinds really do exist in nature and are thus discovered, not made or invented. But it also posits that the world is composed a specific way. Resembling a body, nature's different kinds, or in this case, species, are interconnected, woven together as bodies are with sinew, fascia, muscle, bone, and other biological threads. But the body can nevertheless be broken down or split into distinct, separable parts: from arms, legs, and feet, to the more specific bones, muscles, and organs, and then still further separated into cells, microbes, and DNA. Likewise, species can be understood as separable and discrete kinds, as unified groups with clean edges and clear, internal essences that are unique and distinctive. In this analogy, the world, species, and the body arrive at the chopping block ready to be segmented—in fact, *already* segmented, already pre-divided into separable kinds of things. Furthermore, these pre-divided species kinds are simply waiting for the right tool, or the right kind of knower and knowing subject whose job is to use their epistemological capacities to feel for and carve around these existing kinds. Seeing the world as made of separable, distinct parts, epistemological tools are put in the service of properly identifying existing kinds. Ideally then, our best theories will be those which “carve nature at its joints,” and the accuracy of these theories will be evaluated primarily by the self-evident purity and discreteness of the body parts or kinds that get laid on the table.

The version of species that emerges from the butcher analogy strongly resembles those produced by the Taxonomy of Purity (TOP) and the settled species concept (SSC). Ontologically, TOPs posit a world fundamentally made up of discrete, separable, mutually exclusive kinds of bodies, categories, and substances. From an epistemic position that assumes purity of category is a defining feature or principle of the universe, species are, proverbially speaking, straight off the butcher's block. From within the SSC, affirming multiple perspectives on or definitions of species (especially contradictory ones), and multiple ways in which beings *are* species (multiple ways in which groups organize themselves)—which is what I propose in Chapter IV—is quite literally beyond the realm of possibility and would even contaminate the structuring principles of reality and knowledge.

So why not move right to the less-essentialist, pluralist approach to species, which defies the SSC and the species-as-joints model? After all, within biology and philosophy of biology,⁶ and outside of ethico-politically motivated philosophical and popular literatures, no single definition or understanding of species seems sufficient and there appears to be no single position or criteria from which all the “joints” are visible (Chakravartty 2017). In fact, in many contemporary discussions about the species problem, as in Slater (2013), the butcher seems more a jester, a trickster, than a mascot: he highlights the discrepancy between what science has always *striven* to do and the criteria by which we evaluate its truth claims—namely, the ability to find mind-independent, universal, self-identical kinds, laws, and organizational structures in nature—and what discussions of species constantly *fail* to do—provide a single, generalizable way of speaking about species sufficient for all times, places, and needs.

I believe jumping straight to species pluralism is insufficient for two reasons. First, while the plurality and contingency of species concepts in science is helpful for exposing the monolithic and reductionist tendencies of the SSC, it does not help us explain *why* this species concept remains so widely used and taken for granted or why there is so much resistance to letting it go. Nor is it sufficient to help undermine and disrupt it. This is in part because the SSC appears to operate independent of and even as a substitute (in certain moral and political contexts) for technical scientific and biological definitions. As noted in Chapter II, deployments of the SSC are rarely accompanied by even a cursory biological definition, despite supposedly treating species as biological facts. Instead, the species concept is used rhetorically, as though it needed no explanation. If there is already very little attention to biological explanation, then simply turning to “better” scientific explanations is unlikely to be sufficient. We need to investigate the conceptual arrangements, discourses, and values that sustain and mobilize the SSC and which permit the species concept to function monolithically and relatively independent of scientific explanation.

⁶ I link biology and philosophy of biology because, while most (though not all) of the contemporary debates about the species problem happen within philosophy of biology, this is, first of all, a relatively recent division and development. Some principal thinkers in these debates (such as Ernst Mayr) were doing both biology and philosophy of biology. Furthermore, there are plenty of practicing biologists who weigh in on debates within philosophy of biology, such as geneticist John Brookfield (2002) and others mentioned in Chapter IV. So even though I dedicate a chapter to contemporary philosophy of biology, it does not seem appropriate to make so stark a division.

Second, if all we did was update the species concept to the latest version, treating contemporary definitions as if they were the *really* biologically real and accurate descriptions of species, we would perpetuate the tendency to understand taxonomy in general, and the species concept in particular, as mere products of scientific butchery, now with more accurate carving. This would continue to treat taxonomy and species as settled: value-neutral, normatively unburdened, and socially and culturally uninfluenced concepts and projects. Indeed, that is exactly how species is understood in most ethico-political literature *and* in much biology and philosophy of biology. This is why the plurality of definitions from philosophy of biology, while helpful, is not sufficient to get at or solve the underlying problem.

Thus, to make space for the heuristic of ethical species pluralism I propose, this chapter challenges the underlying values and assumptions of the ontological and epistemic dimensions of the SSC: the way it organizes bodies, which differences come to matter or what counts as a relevant difference, and whether groups are pure and separable in the way the settled species discourse imagines.⁷ To do this, I take a middle path between suspicions of science (found in so much ethical and political scholarship) and suspicions of the role of values in knowledge (found in so much scientific literature), and argue that the settled, butcher's block species concept is both scientifically and normatively dangerous. Though my project hopes to open space for better species concepts, the alternatives I explore in later chapters will not be identified as preferable because they are somehow and finally beyond power. Rather, I will argue they are preferable because, as things currently stand, they are less dangerous and more helpful.⁸ In order to critique and deconstruct the settled species concept, and in order to open space for alternatives, we need to analyze, expose, and challenge the value-laden conceptual and material frameworks that support and sustain it.

⁷ I have been referring to the settled species concept as, alternatively, the everyday concept of species. With this moniker, I intend to conjure the way this particular idea of species has become discursively dominant and taken for granted as self-evident and lacking, or perhaps even necessitating the absence of, any specific or scientific definition or explanation. But by "everyday," I do not intend to situate this problem only or primarily outside of science or the philosophy of thereof, as in fact hope to show that this plagues those across disciplinary boundaries.

⁸ By, "as things currently stand," I mean to suggest the concepts that are less dangerous and more helpful is not a transcendental or abstract feature of the concepts themselves. Rather, a concept's ability to be helpful and less dangerous depends on the kind of networks of power, discourses, and contexts in which it is embedded. I will explore what I mean by the designations more and less dangerous in the introduction and in Chapter IV.

In Section I, I define and problematize the relations between the various normative ideals and organizing principles I argue mobilize the settled species concept. Thus far, I have singled out unity, essence, and uniqueness as primary culprits. However, because ideals such as unity or essence have many iterations, in different contexts, serving different ends, I focus here on the way they relate to and serve the categorizing goals of TOPs in particular. In other words, my concern is not with, for example, something like “unity as such” (whatever that might mean), but with specific contingent iterations of this concept as they pertain to the ontological and epistemic practices of placing beings in naturalized categories and groups. I argue ideals like unity or essence take a particular shape when they are deployed by and brought into alignment with the defining features (or first principles) of TOPs—namely, purity and separability (or split-separation, to use Maria Lugones’s phrasing)—and clarify what I mean by those terms. I demonstrate that the conceptual constellation that composes a TOP represents a particular normativizing and hierarchicalizing ontology of difference that regulates the legibility of bodies.

Section II demonstrates how these ideals generate and mobilize the settled species concept. I show how applying these concepts to the idea of species not only generates a monolithic and overly simplistic idea of what it means to be a species; it also sneakily preserves the *Homo sapiens* as a naturalized pure, unified, essential, unique, and distinctly split-separable group. This facilitates the treatment of the *Homo sapiens* as distinct from and above other species and nature. Anticipating Chapter IV’s attention to the specific values, contexts, and norms that generate each species concept or definition, Section III considers the relation between epistemology and power in Lugones’s critique of *monophilia* or love of purity, Sections II and III begin the task of bringing ethical and political literatures together with perspectives from biology and philosophy of biology. By challenging the naturalness and value-neutrality of the species concept, and by showing how the settled species concept can get deployed strategically to preserve human essence and superiority *even* in contexts when it seems scientifically inconsistent to do so, I show that the SSC is a problem that bridges the concerns of science, philosophy of science, environmental scholarship, and ethics.

**i. The Problem with Taxonomies of Purity:
From Butcher Blocks to Mestiza Kitchens**

Let me begin here by articulating how the form of categorization I call a Taxonomy of Purity (TOP) is shaped by purity and a specific kind of separation or separability. To do this, I am going to keep the culinary metaphors going, but will not be drawing “lessons from the scientific butchery” (à la Slater and Borghini 2011). Instead, I start with lessons from a *mestiza* kitchen.⁹ Just as the butcher has been used to raise ontological and epistemic questions about the nature of categories and the project of taxonomy, I draw on Lugones’s culinary metaphors about mayonnaise making as a starting point from which to build my concerns with TOPs. Specifically, I consider three lessons about 1) how purity and split-separation function to control difference; 2) the ethical, political, and normative dimensions of this kind of taxonomy; and 3) alternative ways of understanding multiplicity.

Lugones’s metaphors first appear in “Purity, Impurity, and Separation” (1994), where she explores the way that even well-intentioned people impose unity and order onto the irreducibly multiple and heterogeneous. Lugones recalls the activities required to make mayonnaise and the various senses (*sentidos*) or kinds of separation that occur during this process, the first of which I address here, and the second of which I consider at this section’s conclusion. The first *sentido* of separation, which she calls “split-separation,” is recalled by the act of separating the egg yolk from the egg white (1994, 458). Lugones notes that separating an egg white from a yolk is quite difficult, and since this rarely happens very cleanly or perfectly, she often ends up trying to lift all the pieces of the yolk from the white with a spoon in a process that is both tedious and rarely completely successful. Though I have not baked or cooked with eggs in quite some years, I recall watching my mother separate eggs in the kitchen and noticing that some of the egg white almost always remained encasing the yolk, like a protective skin. She could never get between this final membranous layer to the purity of the yolk. While this slimy intimacy between yolk and white is in fact very helpful and necessary for those beings who grow in fertilized ova, when one chooses to use eggs to make mayonnaise, “the intention is to separate, first cleanly and then, in case of

⁹ For Lugones, following Gloria Anzaldúa, *mestizaje* is an attention to lived experience that acknowledges and affirms multiplicity and in-betweenness both ontologically and epistemologically. Rather than allowing multiplicity to be purged and purified, *mestizaje* is a commitment of Latinx feminists to use the contradictions and plurality of their identity in the “borderlands” of nationality, intelligibility, and language to resist the normativizing and homogenizing impulses of Western ontologies.

failure, a bit messily, the white from the yoke, to split the egg into two parts as cleanly as one can” (1994, 458). This act of differentiating through split-separation is, for Lugones, an “exercise in purity,” because it focuses on achieving a purity of connected substances by splitting them from one another (1994, 458).

This metaphor has much in common with that of the butcher. Like in Plato’s account, Lugones’s kitchen analogy begins by supposing a world populated by a multiplicity and plurality of connected bodies, substances, categories, and relations. And in both ways of thinking about categorization or taxonomy, bodies and parts of bodies are intended to signify the simultaneity of connection and difference, both relation and distinction, while also commenting on the nature of that relation and the role of the knower (the butcher, the baker, the mayonnaise maker). Lugones even states explicitly that her analogy is wrestling with the way separability and categorization, or what she calls “the categorical eye,” come together to organize difference in theories of multiplicity (and multiplicitous realities) (1994, 460). Also like the Platonic metaphor, both the imagery Lugones uses and the way she recounts the activity of collecting yolks have specific ontological and epistemic implications for categorization and the role of the knower or taxonomist.

But this is perhaps where their similarities end. The act of struggling to split-separate egg yolk from egg white into pure substances is indicative of the effort and intentionality required to disconnect intermeshed, if differentiable, substances as though they were always already separable or separated. In contrast to the description of a butcher who easily deciphers ready-made categories if he is expert or skilled enough, Lugones foregrounds the concentration, aims, power, and force split-separation requires from of the knower. In the ontology implicit in Lugones’s metaphor, which we will explore toward the end of this section, the world does not arrive already cleanly divided into natural kinds and differences; bodies, differences, and categories are intermeshed and intersecting (even if not identical or indistinguishable) in such a way that separating cleanly into kinds requires a butcher or mayonnaise maker to create and impose a specific version of ordering and detachment that does not exist in any pure way before. As the Platonic metaphor supposes the existence of unpolluted, mind-independent categories neutrally apprehended by a viewer, Lugones supposes slightly messier categories that viewers must will to separate or will to divide into pure categories or substances. In short, for Lugones, split-separation is characterized by the supposition, in advance, that the world is composed of discrete, split-separable, purely

distinct kinds of things. While the goal of the mayonnaise maker is similar to the expert butcher, desiring to separate these ready-made, uncontaminated groups and differences along their natural and mind-independent divisions, Lugones highlights that these divisions have to be desired, wanted, or, as she will also suggest, loved in advance. Thus, in addition to the ontological and epistemic assumptions and questions implicit in both Platonic and Lugonesian metaphors, the latter also draws attention to the normative, ethical, and political dimensions of taxonomic projects.

If the problem of species is too complex, filled with too many contradictions and too much plurality to find adequate representation in Plato's idealized metaphor of taxonomy, surely the pure separation of egg yolks from their whites fares no better. Both metaphors afford the opportunity to critically evaluate precisely how TOPs work, the kind of knowers they require and engender, the kind of power they deploy, and the way they use unity, essence, and uniqueness to establish the conceptual framework for the settled species concept. But what I find in Lugones is the clear articulation and explicit problematization of two concepts that I argue are central features of TOPs: purity and split-separation (or what she also calls "fragmentation"). While Lugones uses the terms interchangeably, such that they might even be the same thing in her account (i.e., the logic of purity is the logic of split-separation), I distinguish between purity and split-separation for the purposes of our discussion in the following way. I propose that we think of purity as a supposedly value-neutral ontological feature and truth of the world, while split-separation will describe the epistemological activity involved in apprehending the world in this way. In other words, purity is adjectival, a descriptive feature of reality, while split-separation is a verb, the activity of separating according to these pure divisions. Let us consider each of these features of TOPs features.

My concerns with the principle of purity begin with this concept's relation to the supposed logical necessity of self-identity and sameness. Self-identity is usually thought to name the first principle that every object, person, and so forth is necessarily unified, consistent, and stable, with an internally coherent substance or nature that is the same as or identical only to itself. The ongoing project of Western metaphysics has been to understand and define bodies (like human or spider), characteristics or capacities (speech, response, language), states (order and disorder), and categories (true and false, mind and body) by what they "are," by all that is believed to be fully present, and through the absolute and total

exclusion of not just otherness and difference, but also ambiguity, complexity, and opacity. This process of establishing the self-identity of an entity, group, or trait through the absolute exclusion of otherness, ambiguity, and so on is a form of purity. Thus, purity has served as an ontological feature of a world and reality rendered in fundamentally binary terms; as either this or that, either A or not A, but never in the middle, never both. In this sense, purity relies on what Anne Waters calls an “exclusive” and “discrete binary” structure, since to identify and define an object as purely present is to set up a strict, stable, and impermeable binary between what an object is and all it is not (2004, 107).¹⁰ In Jacques Derrida’s words, purity is “not just one metaphysical gesture among others, it is the metaphysical exigency, that which has been the most constant, most profound and most potent” (1988, 236).

In this ontological structure, purity is set into a binary relation to the impure, with the former standing in for order (and natural order, in particular), and the latter, for disorder. Thus, this is not a neutral binary, with two equal terms. Instead, the binary between purity and impurity has a hierarchical structure such that the former is seen as ontologically prior (the original, the standard), and the latter is understood through derivation, accident, and even deterioration. Through what Derrida calls a “hierarchical axiology,” these distinctions set up binary oppositions around an ideal (like purity) and “subordinate these values or norms or kinds to each other (normal/abnormal, standard/parasite, ideal/non-ideal, pure/impure . . .)” (1988, 93).¹¹

In this way, purity becomes more than a preference or a strategic tool for contingently conceptualizing various individuals or groups. Purity is inserted as an internal feature of reality, a first principle, as it were. This is why Lugones refers to purity as a logic: a defining characteristic of the world and of reason, or what it means to think rationally (1994, 465). When I refer to purity (or essence, uniqueness, and unity), I will deviate slightly from thinking about them in logical terms—although I find that a productive framework and

¹⁰ Because there are philosophical systems in which binaries are not necessarily based on purity and self-identity, I follow Waters in referring to this particular purity-based ontological binary as “exclusive” and “discrete.”

¹¹ Derrida suggests that Western metaphysicians “from Plato to Rousseau, Descartes to Husserl, have proceeded in this way, conceiving good to be before evil, the positive before the negative, the pure before the impure, the simple before the complex, the essential before the accidental . . .” (1988, 93). For Derrida, then, the Western project of ontology installs hierarchies and orders of subordination onto all binaries or dualisms (1998, 195).

engage it elsewhere—and instead refer to these concepts as *principles, assumptions, and ideals*. By referring to them as principles and ideals, I intend to elicit these terms’ dual status: not simply ontological (first principles), and not just ethical and normative (moral principles) but ethical-ontological (Derrida 1988, 93). As principles, these concepts serve as fundamental, unquestionable truths and laws, but they also serve as a right and even virtuous principle to which one habitually devotes oneself. As something like a fundamental truth, these terms are assumed at the outset, rather than demonstrated or deduced. They are thus ideals in the dual sense of the term: they are thought to be perfect or “ideal,” even as they also serve as guiding standards or goals to which one must conform (or make other bodies conform).

This is in part why, for Derrida, Lugones, Waters, and many others I draw upon, the metaphysical exigency of purity, and the supposed logical necessity of monism and mutual exclusion to which it is tied, are the philosophical, cultural, and ethical inheritance of the specific societies and systems of thought often collectively referred to as “the West.” These principles are neither global nor outside of time but upheld in very particular systems, at particular times, in specific places, and in precise ways. Ontologies and epistemologies which espouse purity and self-identity set themselves over and against those (both within and outside of the West) that do not take these principles as necessary, rendering Indigenous, Latinx, and other non-purity-based ways of thinking illegible and in need of ordering, just as they have likewise ordered the bodies and racial identities of Black, Indigenous, and other people of color (Wynter 2003; Weheliye 2014), just as they will likewise order and purify species groups and identities.

When I refer to purity as a feature of TOPs, I understand it to name both the ontological relation between self-identity, sameness, and absolute presence and the ongoing conflation (and prioritization) of that constellation with natural order over and against impurity. In their wielding of this principle, TOPs bury the concept of purity so deeply it comes to be seen as both natural and necessary *for understanding groups and multiplicity* (not just an individual unit or a binary), and serves as both a starting point—taken for granted at the outset—and a goal for the taxonomist.¹² My concern is that in our everyday concepts of species, which are governed by TOPs, purity presents itself as the only way to properly understand multiplicity. But the form plurality takes in everyday species discourse does not

¹² As Derrida puts it, “the more confident, implicit, buried the metaphysical decision is, the more its order, and calm, reigns over methodological technicity (1988, 93).

permit or even recognize, let alone affirm, any overlapping, coexistent, or contradictory multiplicity. Rather, in this framework, plurality is a mere compilation of related but nevertheless internally separable, discrete, and pure unities. Thus, as we will see, purity is not strictly the opposite of plurality, but one dominant way (indeed, *the* dominant way) of rendering the multiple and the plural legible. Because of this, TOPs are accounts of plurality that are governed by the principle of purity in hierarchicalizing and normativizing ways. TOPs serve not only to identify and collect but also to gather according punitive criteria and situate particular collectives beneath others. Any indeterminacy in taxonomy and categorization is thought to be ultimately resolvable by discovering the single correct answer, while impurity and ambiguity become aberrations and violations of natural order that must be corrected. If something is unclear or multiple, it is evidence that you have not thought hard enough or established the correct category.

This is precisely what we see in the longstanding debates around key problems in science, such as the difficulties with defining the organism (Dupré and O'Malley 2009; Pradeu 2016), the biological individual (Bordenstein and Theis 2015; Clarke 2010; Kovaka 2015), and species (Chakravartty 2011; Hull 1986; Slater 2013; Slater and Borghini 2011), to take just a few examples. In each instance, the seeming necessity of a plurality of conflicting definitions is often understood as a failure to adequately apprehend the true nature of an individual, organism, species, and so on (Dupré 1981, 1993; Kitcher 1984a, 1984b). In our case, the seeming impossibility of determining a single, agreed-upon definition of what a species is (a natural kind or an individual) or what makes them a species (how they are divided) has prompted the question, “are species even real” (Slater 2013)? For even though science and biology (and the philosophy thereof) are almost definitionally characterized by the constant competition and revision of various theories (instead of singular preference for one, absolute answer), the nearly innumerable and mutually exclusive ways one can define and understand species ontologically is taken to be a problem that throws the possibility of species existence into question (Brookfield 2002, 107-108). In order to solve this so-called problem, theories often try to outdo one another, each striving to become a definitive account that unifies the plurality by finding the singular underlying framework which each alternative theory has only grasped in part. It is only relatively recently (the late 1980s) that philosophers of biology have begun considering multiplicity an acceptable rather than problematic approach to the problem of species. Yet, even then it requires some intellectual

acrobatics to ensure multiplicity is understood only as pragmatic or epistemological, rather than ontological (Chakravartty 2011; Slater 2013). In a way, this still represents a kind of ontological monism, where reality and natural order are rendered through purity and unity.

When thinking about the everyday, settled concept of species—which is not reducible to discussions in science or philosophy of science, despite its seepage into those domains—TOPs deploy a vast constellation of concepts, including those of essence, uniqueness, and unity. When purity functions at the level of category to organize multiplicity—both by gathering the many into a single group (i.e., gathering all humans together), and by placing the many into different groups (e.g., humans, dogs, cheetahs, and so forth)—it aligns with particular purity-based conceptions of *essence*, *uniqueness*, and *unity*. Let us consider each of these one by one, starting with essentialism.

There are certainly many forms and degrees of essentialism, not all of which function in service of the ontological purity I am outlining. But in taxonomies governed by purity, essentialism typically takes the form of understanding groups as individuated by underlying and hidden but logically necessitated structures that cause them to be the kind of being they are (Slater 2013, 39). In other words, beings and states are defined by what they essentially “are”—by what is believed to be fully present—rather than what they are related to or resemble. The possibility of an internal essence or nature also implies that what is present has fully and completely excluded otherness, difference, that which is outside (Lugones 1994; Derrida 1988). In this way, the differences between bodies or species groups are understood as substantive, clear, fixed, mutually exclusive, and absolute instead of relative or relational, ambiguous, flexible, permeable, shifting, amorphous, and contingent (Young 1990, 171; Waters 2004, 98-99).

In its taxonomic activity, this essentialism is intimately tied with the principle of uniqueness. Purity functions through uniqueness to gather beings according to sameness or similarity, such that their traits—shared only amongst themselves—evidence a pure, discrete group. TOPs propose a particular relationship between an entity’s traits and its singular, unreplaceable, unique nature. Recent debates about homeostatic property clusters (HPC)—one way of conceptualizing how we ought to define and understand what a species is—captures a bit of this intuition (Boyd 1999a, 1999b; Ereshefsky 2010). In HPC theory in general, beings are grouped together not by single traits or essences but a bunch of traits that cohere in a stable way across a variety of bodies, rendering them the same or similar. But

even in the philosophy of biology debates, there is dissatisfaction with this position, since it still requires a kind of underlying but hidden fundamental mechanism that stabilizes or unifies these traits (Ereshefsky 2010; Slater 2013). Ereshefsky calls the HPC approach “similarity fetishism,” because it prioritizes similarity or sameness over, for example, evolutionary history (2010, 62-3).¹³ Sometimes these traits are thought to be so essential and definitive of one unified group that when others exhibit similar traits, it is thought to blur the boundaries of the group itself. In short, when uniqueness becomes less unique, it can threaten not only pure ontological definitions but the moral and political systems built on the purity of those definitions and groups (as we will see in our final section).

Finally, with both essentialism and uniqueness, the goal is to establish a stable unity, or better said, a collective of pure unities amongst the multiplicity; to understand the heterogenous and varied many as fundamentally unified and gathered beneath their diversity in ways that differentiate them essentially from other unities. But this is not an easy task, since in almost all cases of categorization (with perhaps the exception of things on the periodic table), the objects gathered together to be unified will actually differ fairly substantially and thus bringing under a single category requires making decisions about which traits will be thought essential and which accidental. Consider the category of the “human.” Within this group, there are tall and short bodies; infinite skin, hair, and eye colors; various sexual traits and presentations; different cognitive and physical abilities; bodies with no arms, short arms, long arms, or more than two arms, with or without hair, and so on. That is only a preliminary list of possible physical variation, which does not even begin considering the significance of different languages, food habits, cultural norms, ecosystem relations, worldviews, histories, geographies, and so forth. In order to count this diversity as a unity, in order to see unity beneath the multiplicity, some traits need to become definitive and essential, while others become superficial. This is what unity requires: the ranking and sublimation of various differences and degrees of difference as more or less essential, even as it also requires that certain traits be present in a particular body or group in order for them to gain group membership. In order to be considered a single group, all of this diversity has to be brought into a unity, such that there is some fundamental unifying

¹³ This is, for example, exactly the debate now occurring around both white rhinoceroses and orcas. In each case, evolutionary history points toward confirming a single species, while the HPC approach points toward multiple species.

feature, essence, or trait that simultaneously preserves the monolithic group while allowing degrees of diversity. The ranking of different traits as more significant than others is not, as such, a problem, but becomes one when tied to concepts of essence—i.e., when those traits are not considered contingently chosen or only part of the story, but begin to define a nature. More specifically, this prompts further questions about which bodies, similarities, and differences get constituted or made legible in language and how; which traits regulate sameness and unity while others become superficial differences; and which discourses, techniques of power, and subjectivities get to decide?

This affirmation of unity beneath multiplicity is why, for Lugones, the logic of purity is also a logic of unity, when unity persists behind and domesticates multiplicity (1994, 463). There are certainly conceptions of unity that allow contingency and process, but when deployed by TOPs to classify and order, unity takes the form of securing and protecting purity amidst or against plurality. In the case of the category of the human, this has historically happened through the creation of a group that is both unified by particular traits despite its incalculable diversity (although which traits are taken up varies widely depending on the historical period and the context, including everything from the possession of souls, to consciousness, to genetic sameness), and unified against other beings with whom this group nevertheless also shares almost all of its definitive traits. Taxonomies of Purity cannot permit un-unifiable multiplicity or plurality but instead require an essential, fundamental homogeneity (Lugones 1994; Waters 2004, 99). In this way, the privilege of purity and sameness over ambiguity and difference (in the form of unity, essence, and uniqueness), is the condition for the intelligibility of bodies, identities, and categories in general within TOPs.

Yet the version of multiplicity put forward by TOPs—a multiplicity managed by purity—is not actually referring to an irreducible and irreconcilable multiplicity. Instead, continuing to espouse a kind of ontological and epistemic monism, purity and unity prompt us to see multiplicity as mere *fragmentation*, where the many are conceived as unified but nevertheless internally separable (Lugones 1994, 464).¹⁴ The egg is fragmented into two, pure parts. The human is unified but still fragmented into groups according to supposedly pure

¹⁴ José Medina aptly summarizes it thus: “A discrete view of oppression—such as racism, (hetero)sexism, classism, and so-on—as operating autonomously and independently of each other goes hand in hand with the discrete view of differences as self-contained and fragmented” (2012, 262).

categories like race, nationality, gender, and so forth. Relying as it does on essentialism, uniqueness, and unity for the self-identity of groups, this form of taxonomizing difference can only allow a single criteria or category for separation—it can either be race, or gender, or class, but not all of them—and the groups must be considered fairly stable and discrete, rather than collectible for these purposes in this moment and part of different collectives in another. In this version of so-called multiplicity, what we instead find are many groups that become fixed and naturalized as pure, monolithic, and essential. In this way, unity and purity become one way of organizing or undermining multiplicity. For Lugones, this way of addressing multiplicity “requires a fragmented and hierarchical ordering” and is another guise of purity and unity (463).

The assumption of unity beneath multiplicity is an act of what Lugones call split-separation, and is, I argue, the second feature of Taxonomies of Purity (464). As Lugones’s messy, effortful, and imperfect attempt to extract the egg yolk clarifies, the *separation* that we find between supposedly purely distinct groups is more likely and more often the result of processes of *separating*. By situating purity—and essence, uniqueness, and unity—as necessary features of all kinds and categories, TOPs naturalize the products of their labor. The achieved “ahistoricity of the logic of purity” attempts to “hide the construction of unity” (1994, 465). What are thought to be natural, pure, or essential are in fact the result of processes of naturalization, purification, and essentialization. Thus, taxonomies that operate on purity are characterized not only by the principles they presuppose, but by the *activity* of dividing and split-separating the world according to such principles. It is in that sense that split-separation reduces paradoxical, co-existent, and intermeshed differences and serves to a coherent, harmonious singularity within a set of parts. This is an insight about claims to naturalness we could also draw from Butler, Foucault, and Derrida, the latter of whom likewise considers purity always already the result of a process of purification which his method, deconstruction, aims to both uncover and relaunch or destabilize. Part of Derrida’s project is precisely to demonstrate that any two oppositional terms (law and justice, human and animal, speech and writing) are never pure, but are the result of movement and impurity, discrete categories that already generated from a plurality. Eggs and bodies do not arrive already divided. While alive, the latter can be divided any number of ways—by systems (microbial, endocrine, reproductive, muscular), by function, by energies—and even these ways of dividing the body do not represent purely distinct or discrete sections, but

cooperative, intermeshing, and coalescing forces divided for the purposes of knowledge, improvement, management, control, and so forth.

But the activity of split-separation is not the only way to attend to or understand multiplicity. There are ontologies and epistemologies of difference that avoid “similarity fetishism” and do not take purity and monism for granted (Ereshefsky 2010, 862-3). I could address here any number of different accounts from Indigenous scholars, like Anne Waters (2004), Kyle Whyte (2013, 2017), Gregory Cajete (2004), and others, and will indeed turn to them in the next chapter. But since we began with Lugones, let me conclude this section by turning to a second culinary metaphor, a second model for thinking about separation and multiplicity, drawn from the mayonnaise-making process. Lugones turns our attention to the moment when the yoke, oil, and water she has mixed to become mayonnaise begin to curdle, or partially separate from each other (1994, 458). Yet, she says, “that is not altogether an accurate description” of the way these forces comingle (1994, 459). As a water-in-oil emulsion, mayonnaise is never completely stable to begin with (as one can see when opening a jar and finding some water atop the smoother cream). So, when the substances begin curdling, they do not so much separate as “coalesce toward oil or toward water, most of the water becomes separate from most of the oil” in “different degrees of coalescence” (1948, 459). When mayonnaise curdles, one is left with yolky oil and oily yolk, but there is never a purity in either again, and they begin to sit in the middle of either/or, of ambiguity (459).

This alternative metaphor for multiplicity seems a much better companion to discussions about species than either of the earlier two. The ontology and epistemology at work in this metaphor do not require that categories, bodies, social groups, or species be pure, unified, discrete, and self-identical. Instead, this account allows groups to be defined simultaneously by multiple criteria, variously congealing into one kind of collective then another, coalescing and coagulating contingently, rather than once and for all along a single line. But this does not mean the cessation of all intelligibility or sense, the erasure of all possible political efficacy, or the inability to make claims about contingent particular groups. Instead, as I understand this alternative approach, it strives to generate ways of seeing and knowing that are simultaneously capable of resisting essentialism while permitting and supporting alternative knowledges about complexity, transgression, contradiction, and

duplicity.¹⁵ If this way of thinking about multiplicity and difference is excluded from our conversations about species, one is left wondering why and for whose benefit.

ii. Securing *Homo Sapiens* Sovereignty: The Settled Species Concept

Thus far, I have articulated the ontological, epistemic, and normative commitments of taxonomic projects which are governed by purity. In this section I more fully explore how TOPs organize the discourse or concept of species through purity-inflected forms of unity, essence, and uniqueness, and through the activity of split-separation. In Chapter II, I claimed that these taxonomies have been governing the species turn, which I define as the displacement of the binary relation between the human and animal—and even the movement away from such generalized terms—in favor of recognizing a multiplicity of species. Cameroonian political theorist and philosopher Achille Mbembe captures the spirit of this turn in the early pages of *Necropolitics*, where he suggests that just as the world has left behind particular kinds of technology or ancient practices,

so it is with the belief that humans possess an alleged ‘specificity,’ a ‘genericity’ separating them from the animal or the vegetal world, or again, that the Earth that humans inhabit and exploit is a mere passive object of humankind’s interventions. So it is also with the idea according to which, of all living species, humans are the only ones to have in part freed themselves from their animality. Having broken the chain of biological necessity, humanity had allegedly almost raised itself to the level of the divine. Yet, contrary to these articles of faith and many others, it is now admitted that humankind is only part of a greater set of the universe’s living subjects, which also include animals, vegetanimals, plants, and other species (2019, 13).

I agree that turning away from such notions about human nature would mark, if not progress, at least the opportunity to form alternative and more responsible knowledges, institutions, and relations. However, in many domains of thought both humanistically and ecologically inclined, the act of situating the *Homo sapiens* as a biological group alongside others instead serves as one key strategy for adapting and preserving the very problematic and dangerous concepts of the human they intend to disrupt. In so doing, such formulations

¹⁵ In other words, I want to avoid situating my analysis in a pure ontological priority or firstness of irreducible multiplicity, which would return us to the problem of some pure reality which unity disrupts. I do not want to propose or align myself with any ontological priority of any kind. Quite the opposite. I am in agreement with Lugones, rather than claiming “ontological originality for multiplicity,” suggests that the unified and the multiplicitous are in “contestation and in significant logical tension” (1994, 63).

of species further naturalize and biologize human unity and priority over other lives. In short, whether this move to and recognition of species plurality successfully dislodges “articles of faith” about human priority depends on how one understands the nature of the multiplicity in which humans are imbedded. In short, it depends on how one understands species.

The concept of species most prominent within the species turn is what I have called the settled species concept (SSC). Building off the conceptual framework articulated in Section I, I now will show how this concept is a purity-based version of multiplicity in which species are understood as discrete, mutually exclusive groups in possession of unique traits and essences which make them internally unified but divisible from one another along a single line (rather than many). I suggest that the SSC thus preserves a version of the *Homo sapiens* that is a near-exact replica of the concept of the human, with all the latter’s accompanying punitive force and ecological sovereignty.

In its treatment of species, the SSC implicitly affirms a version of multiplicity that simultaneously maintains the unity of and boundaries around a natural biological *Homo sapiens* (understood as unified beneath the less essential differences of race, sex, ability, and so on) in order to avoid stripping this group of the moral weight previously held by “the human,” while also situating this collection in relation to and as part of a plurality of other beings. This is, as demonstrated in Chapter II, the explicit goal of the species turn. It thus makes sense that the version of species espoused by those in this turn would need to be one that facilitates the successful achievement of this dual goal. But to do this, SSC relies upon ontological and epistemic principles deployed in TOPs; unity, purity, essence, and so on are treated as necessary descriptive features of species identity, rather than as regulative ontological and epistemic ideals that one must assume, at the outset, in order to arrive at cleanly defined groups. Furthermore, species multiplicity is rendered through the logic of split-separation as a collection of unified and boundaried groups. Through TOPs, species become legible through purity’s discrete binary relation with impurity, where the former is the natural state, and impurity demonstrates need for greater categorization. In other words, species are rendered through the logic of mutual exclusion, which enables a single, unified, stable group with sufficiently coherent and defining traits to be marked off and divided from other collectives (Massumi 2014, 49). But in order to be visible and intelligible as part of the

so-called multiplicity, all zones of indiscernibility and hybridization need to be either co-opted and purified by being brought into an existing unity, or else erased.

In order to achieve pure and clean species groups, the activity of taxonomizing and split-separating must divide according to a single criterion. It has difficulty managing overlapping or conflicting criteria that blur categories.¹⁶ The single criterion used by the SSC is, rather tautologically, a shared essence or nature, which is posited as the thing which explains, precedes, and causes a particular species' unique and distinctive traits. This is to say that essentialism of species is tied to claims about the uniqueness of the group. These distinctive traits which evidence the purity and unity of a group are often taken to be self-evidently more significant than other traits (as in the first example below) but can also be argued for (in the case of the second example, or in the cases of Nussbaum and Singer from Chapter II). In any case, the positing of an essence which unifies beneath difference and which causes these traits forbids any other form of differentiation. Even when and to the extent alternative differentiations are possible, they are largely understood as derivative or secondary (i.e., this species has an essence, but there are superficial traits that permit subgroups, or the sharing “across species” lines, and so on). Rather than allowing multiple criteria, mixed groups, or bodies that variously belong to different groups for a multitude of reasons and relations, applying concepts of essence, purity, and unity to the idea of species generates a monolithic and overly simplistic idea of what it means to be a species. The version of multiplicity at work in the SSC does not admit to the varying degrees of sameness and difference which intersect and overlap across groups who are at once unified and disunified as they are thoroughly enmeshed in the world, in communities, in ecosystems, and in many forms and kinds of relations (including power relations) in various impure and unextractable ways. Species are thus understood through *fragmentation*, where multiplicity is a matter of adding together many unities.

Along with these other problems, the SSC understands the species category and the particular groups it picks out and names as natural, value-neutral, beyond and before

¹⁶ Now, to be fair, this is true of all species definitions, each of which must articulate and carve out from the multiplicity of relations singular aspects of the world it wishes to track—genetics, ecological niches, sexual reproduction, etc. And these activities are themselves tied up with other discourses, definitions, and values. In each case, which bodies emerge as part of which species are the result of the frameworks and definitions one brings to bear. This is why I will articulate the importance of not relying or settling on just one species definition in our social and political work.

discourse, power, and so on. By separating the definition and identification of species from the moral and ethico-political treatment of these various species, the latter concerns are conceived as simply laid atop an uncontested and unnegotiable ontological reality. This maintains the idea that ethical and political consideration are split-separable from the way that our categories, definitions, and ontologies organize the world. But this has very specific consequence on the relation between these the two categories of the human (i.e., the *Homo sapiens* as biological and the human as a social group). Namely, because the SSC accepts (and, in fact, requires) a clear and singular divide between *Homo sapiens* and non-*Homo sapiens*, and because this divide runs along the lines of shared essences and unique traits that also run along species lines, the same principles of purity and mutual exclusion at work in the human/animal binary are recoded by the SSC in the naturalized language of species. In short, while the SSC is treated as though it could turn us away from the hierarchical human/animal binary and toward an even ground of multiplicity, the *Homo sapiens* conceived through a logic of purity reproduces this binary and does at least much to secure and privilege certain bodies (and particular traits) over and against others under the guise of natural order as it does to situate *Homo sapiens* among a community of beings.

Because the literature review of Chapter II did quite a bit of work to demonstrate that and how the SSC functions across a wide variety of scholarship, I here build on and deepen my concerns by considering only two more examples of the SSC at work, each of which highlights different aspects of this problem. First, I will first consider Cynthia Willett's project in social and political philosophy, *Interspecies Ethics* (2014). I will then turn to Maria Kronfeldner's project in philosophy of biology, *What's Left of Human Nature* (2019). These texts exhibit the SSC in distinct but overlapping ways and will help show how this everyday, butcher's-block treatment of species is not isolated to a naïve public or to "the popular mind," but shows up even in texts that critique essentialism and in areas of biology or philosophy of biology otherwise in tune with the challenges of species definitions.

Willett calls for an ethical turn that acknowledges effects and traits shared by different species across the tree of life. She critiques and strives to move away from traditional ethical models that foreground unidirectional relations: the human treatment of animals. Instead, Willett focuses on the capacities that humans (a biological species group taken for granted at the outset) "share with animals" or "other animals," such as the capacities for laughter, play, grief, loss, intelligence, and memory as the basis for shared

sociality and ethics. Willett argues that ethics need to be jointly constructed by and between humans and other species using multidirectional relations and building on these affects and traits. She wants to replace the humans as a purely social category exclusive of particular *Homo sapiens* with discussions of humans as a species, and to do this must both include humans in the natural world while also treating them as a pure, split-separable, and unified collective within that world (2014, 23).

I agree with Willett that interspecies ethics—whatever species means—needs to be a joint effort rather than conceived as unidirectional benevolence. But I believe Willett’s project is undermined by her use of a rather settled species concept. Firstly, the concepts of species and “species boundaries” are at the center of Willett’s project, but neither receives any definition or analysis, nor does she clarify what boundaries consist in, why they matter, what is “inside” those boundaries, so to speak, and so on (2014, 19).¹⁷ Instead, the category of species functions to name what appear to be (and what are treated as) self-evidently discrete groups who are unified by their unique natures but who sometimes share specific traits or capacities (or share compatible and cooperative traits and capacities) across the boundary of their fundamental differences. These boundaries (what she also calls “lines” and “divisions”) which separate and distinguish them from other groups, are also understood as self-evident and singular (2014, 25).

In Willett’s text, species functions to name unified groups in possession of specific traits that are part of and result from their natures (rather than contingent or temporary features), and which unify them and exclude other beings. She begins with the assumed ethical status of the biological group, *Homo sapiens*, who are fundamentally unified within nature and with their own specific nature. Because of this treatment of species, Willett’s account focuses on specific species unities who are widely considered (through the SSC) to have more and deeper similarities with the human (and who have traits which turn out to correspond strongly with intelligence, on her account). Her ethics attend almost exclusively to so-called higher-order animals and charismatic megafauna, including horses, elephants, chimpanzees, baboons, ravens, and dogs, though she does admit that humans share some traits with a “handful of other ultrasocial species” like “wasps, ants, bees, termites, naked

¹⁷ The phrase “species boundaries” or some variation thereof (“the boundaries between species” (75)) appears twenty-three times in the text, and each time the concept of a clear and self-evident but non-specified boundary is taken for granted.

mole rats (2014, 2).” But this makes perfect sense from the SSC point of view: if species are natural groups divided by their natures and unique traits, then the key to making connections is to use this taxonomy of traits to identify anything that might be shared with the only undisputedly ethical collective, the human. On the SSC model, these shared traits are the only thing that defies otherwise clear species separation. But even the narrative that *Homo sapiens* share so much with these species is itself achieved by hierarchicalizing and prioritizing some similarities as more significant to one’s nature and more relevant for ethical proximity with the human than others. For example, the supposedly higher-order capacities for play and mourning (which Willett associates with intelligence) can only be more indicative of closer proximity or similarity to the human than are other traits (like sociality), because the former are understood to be unique traits that inform human essences.

Furthermore, Willett’s use of the species term highlights just how focused on essences or natures the SSC really is, and just how much multiplicity it can successfully unify without suspicion. In Willett’s book, the term species is not always or even primarily tied to a specific species. Only sometimes does the term refer to what we might call *a* species (like a house cat, *Felis catus*). But it is as if not more likely to name collections of species at the level of order or family (like elephant(s), dolphin(s), octopus(es), bee(s)) and even subspecies (domesticated dogs or goats, *Canis lupus familiaris* and *Apra aegagrus hircus*). When Willett offers the aside that humans also share much with a “handful of other ultrasocial species” like “wasps, ants, bees, termites, naked mole rats,” she mixes all kinds of classificatory levels as though they were the same (2014, 2). The only group on that list widely considered “a species” is naked mole rats. The non-mammals are not named by species at all, but by order, family, or suborder. Ants and bees are families of species, and termites are an infraorder (a subcategory of an order) that contains many different families which each themselves contain many different species. The designation “wasps” probably refers to “the Vespidae,” a family with more than 5,000 different species, many of which are in fact asocial.¹⁸

¹⁸ She could be also be referring even more widely to all wasp-waisted (or narrow-waisted) *Apocrita*, excluding ants and bees. If this were the case, “wasp” would name hundreds of thousands of species. This ambiguity of which group she speaks is particularly interesting, since it further highlights how much work the reader’s assumptions need to do in order to fill in what is meant by “species.”

The sheer number of species grouped in the categories she mentions makes her note about the mere “handful” of other ultrasocial species seem significantly understated. But more importantly, this inconsistent use of the term “species” to name all manner of collectives clarifies that the SSC is not focused on species as biological groups at all—or rather, to the extent that it tries and wants to be, it is out of touch with debates about what it means to be a biological species group and simply picks out whatever groups it perceives to be naturally unified. Instead, the SSC functionally unifies multiplicities into categories of sameness based on perceived essences and traits. Sometimes, perhaps when we are more familiar with a group, those essences strive to name a single species—the human, the mole rat. But sometimes the SSC names a family or class whose multiplicity lies imperceptibly beneath their supposedly shared or indistinguishable essence or nature. In short, with the SSC, bodies are grouped under the designation “species” at whatever level their internal differences and multiplicities cease to appear significant, substantial, or essential enough to merit further differentiation and consideration.

To be clear, I do not fault Willett for failing to grasp the finer points of insect classification, as if the danger in her approach would disappear if she only referred to each bee species by name. I also recognize that by “bees” or “elephants,” she could have well intended to refer to all the different bee species and all the different elephant species. I acknowledge that Willett is simply following common, everyday parlance regarding species, used all over the settled species discourses in which “elephant,” “octopus,” or, as we will see in the final chapter, “mosquito” are regularly and mistakenly used as species monikers. But, to my mind, all of this reinforces my concern that the SSC names a perceived ontological unity that gathers different bodies under the rubric of sameness, essence, and uniqueness at the expense of any attention to multiplicitous divisions and coagulations in any particular group. This is not a feature unique to Willett but a frequent slippage that reveals the SSC’s internal operation. This concept of species has much difficulty recognizing that at the level of biological community we are calling “species,” groups coalesce and come together in all manner of ways, most of which have nothing to do with the traits she suggests, let alone the ethical import of those traits.

Yet at the same time, in this tendency to gather into “a species” all manner of groups is also a productive slippage. It acknowledges that definitive relations cut across various groups (different bee or wasp or octopus communities) in different ways and at

various levels. The SSC just has no idea what to do with these various kinds of relations or how to articulate their significance. And because many of these relations violate the terms of group purity, the SSC simply erases or ignores them by gathering them into a more fundamental unity.

In contrast to Willett's project, Kronfeldner strives to account for a plurality of species concepts, and to differentiate between, rather than collapse or replace, the moral and social category of the human (which she calls humanity) and the biological group (humankind or *Homo sapiens*) (2018, 216). If Willett takes a version of what I have called the ecocentric approach to the species turn, Kronfeldner is primarily moved by androcentric concerns: namely, how, given all that we know about species pluralism and the species problem (which is also, in her mind, the death of species essentialism), can there still be some defensible concept of the human? What would be the relation between the biological group and the social and moral category of the human? Kronfeldner undertakes a massive survey of key literature in philosophy of biology since Hull's seminal paper questioning the possibility that a nature corresponding to species identity (1986). She argues that post-essentialist species positions have nevertheless often remained monistic—continuing to require a single criterion, even if it was one they perceived to be less essentialist. Building on this, Kronfeldner begins by tackling the species pluralism problem: in what terms and by what definition does humankind count as a unified biologically real group? She settles on genealogy—humankind is the group begat from other humans (2018, 98-100).¹⁹ But, à la Boyd and others, this group has relatively stable species typical traits (such as language and self-consciousness) that she believes can be said to justifiably characterize our species, even while not counting as part of our “nature.”²⁰ She suggests that this genealogical group has been “historically correlated with” (and will likely continue to be) the social and moral group: humanity. She claims both of these definitions of the human map something real—thus there are two ways in which humans can be human, biological, or social—and they ought not be reduced by one another. Collapsing them, she argues, has historically led to the

¹⁹ This represents a combination approach in which she takes key aspects from stricter definitions (like genetic lineage and reproduction) without binding herself to their limits. For example, she borrows the importance of genetic inheritance but tries to avoid the side effect of that definition, which is that the species instead constitutes a biological individual.

²⁰ This is, she admits, a version of one possible alternative to Boyd's homeostatic property concept, which he also hoped would be an alternative to species essentialism (2019, 95).

racialized and ableist removal of all non-normatively speciesed individuals from the social category as well (2018, 217). But neither can we completely divorce them, she argues, lest we end up in a situation in which two kinds of moral categories—since the biological group is *for the most part* the same group the moral category emerged from and strives to valorize and protect—or in which some members of the biological group do not count as members of the ethical group. Thus, while she ultimately suggests that “we should stop using the term *human nature* whenever possible,” she recommends that we begin thinking about participation in moral standing as satisfied by membership in either humankind or humanity (2018, 242).

Kronfeldner’s project tries to avoid several key pitfalls widely connected to the SCC. For example, she offers a concrete and specific definition of species, rather than relying on the term’s correlation with a taken-for-granted reality, and she recognizes pluralist species concepts and strives to resist essentialism by eschewing monism and affirming pluralism. She also directly addresses the problem with treating some perceived, underlying biological unity of species as a new moral group—something many scholars in the species turn ignore. But I suggest that rather than turning away from essentialism and monism, her account espouses subtler versions of both ontological and epistemic species monism. If the settled species concept is characterized by the fragmenting of the multiple—multiple groups related through multiple means at multiple levels—into a unity according to a single criterion of separation, Kronfeldner’s account does precisely this. For example, while she acknowledges plural species definitions, she does not herself advance this kind of plurality (either ontologically or epistemologically), a move she recognizes would pick out different and conflicting physical collectives or relations. Instead, she advances a single concept of species that focuses on biologically inherited resources that create a unified and clearly bounded genealogical group, *Homo sapiens*. Pluralism only emerges when she articulates that the nature of this existing, unified group can be considered at three different epistemic registers (classificatory, descriptive, and explanatory).²¹ Yet each of the epistemic registers tracks

²¹ For clarity: the classificatory nature refers to the genealogical nexus or, “the relational property of being genealogical related to (being a descendent of) other humans” and is “necessary and sufficient to belong to the species *H. Sapiens*” (100). The descriptive account suggests that a trait can be considered typical and part of human nature “if the developmental resources that make a difference for the (abstracted) trait are conserved over evolutionary time by biological, rather than cultural inheritance” (164-165). In other words, many of the things we name as “traits” (e.g., intelligence, language, and so on) are abstracted concepts that refer to complex biological activities and interactions that would not on their own be considered part of a nature. The explanatory human nature is an account of all the causal factors (developmental resources) that are typical and are due to biological inheritance” (180). Put differently, this explanation of nature refers to the “statistical

different aspects of the exact same basic features (genealogically inherited resources from parents) which belong to the same, already-established and unquestioned collective.

I call this move epistemic pluralism light: it maintains ontological monism (there is one, real unified group), and it maintains a version of epistemic monism, insofar as the different species collectives that would otherwise become clear through epistemic pluralism are instead unified by singular, non-contradictory criteria. The version of epistemic pluralism she does advance requires monism at other levels by assuming the collapse of pluralism in the discussion of biological species groups and continues to take for granted (and maintain) a group unified and characterized by singularly unique traits (or, rather, the genetic resources that enable those traits). Thus, Kronfeldner espouses a version of the SSC that understands the human species according to singular criteria and which picks out a particular group who can be set alongside a plurality of other species but which maintains essential unity and purity.

Kronfeldner demonstrates that the settled species concept is often deployed strategically in order to preserve the purity and integrity of the *Homo sapiens* as a morally, essentially superior group, even in contexts where concepts and definitions of species are otherwise contested and multiplicitous. Precisely in her effort to situate the *Homo sapiens* as a natural, neutral, biological group, she instead naturalizes a traditional, humanist concept of the human under the guise of natural order. Specifically, her construction of the biological group already assumes the social category of the human as a goal or end point with which it must meet up (if not directly result in). The concept of species Kronfeldner espouses seems to be a result of her prioritizing the moral group (both beginning with it, in the first chapters, and ending with it), which she takes to be a unity. Indeed, she admits to taking the existence and importance of this group for granted from the beginning (1-5, 216-218) and even acknowledges that she in part identifies the biological group by what she claims to be the “the special moral status” of human “parent-offspring relations” (2018, 218). She seems to weed out multiple senses of species in order to arrive at a singular account of humankind that can correlate and correspond to the important moral category of humanity. It is no wonder that these groups—humankind and humanity—come to have such a close relation in her project: the latter in part conditions her account of the former.

cluster of biologically inherited developmental resources that happen to be prevalent and stable over a considerable time in the evolutionary history of the human species” (185).

Yet, it is more than a close relation: she suggests that these two categories must do “more than overlap” but instead come to form “some kind of strict unity” (2018, 217). Not only does humanity condition who can be part of humankind, the reverse is also true: the biological group she calls humankind comes to condition who can be part of the moral category, humanity. While she rejects the idea that only *Homo sapiens* can be part of the moral group, the only nonhuman beings she can imagine occupying this category are biologically enhanced apes and advanced AIs.²² Any effort toward pluralism and movement beyond a human essence (however tentative and abstract) seems to collapse as the humankind/humanity unity resembles a very essentialist and reductive account of species as clearly and cleanly divided by traits and capacities. This is clear when she notes that her project supports “traditional humanist accounts” that demand equal moral status ought to be conferred onto all humankind (all members of the species) (2018, 218). But this is also why her account cannot adequately protect against the dehumanization of *Homo sapiens* who do not meet the higher-order criteria (the very limited “relevant traits”) for the social group (2018, 219). The unity and purity of the group that emerges as both biologically natural and the sole, guaranteed subject of human rights precisely maintains the human/animal divide that the supposedly more accurate and value-neutral species concept ostensibly dispensed with.

Looking at the operations of the SSC in the above examples, it is clear that the *Homo sapiens* is not, and does not function as, a value-neutral, prediscursive biological category, as so many hope. The particular sense of species that emerges from these otherwise strikingly different accounts shows us how the SSC manages to preserve an exclusionary and purity-based concept of the human. Yet to say that it “manages to preserve” is somewhat misleading, as if this preservation were accidental or incidental. Rather, the SSC functions as an integral part of the project of preserving the integrity (conceptual intelligibility) and normative force (punitive efficacy) of the category of the human. This is to say that despite the supposed prediscursive reality of the *Homo sapiens* group and their supposed unity before, beyond, or underneath racial, sexual, ableist discourses, only a very particular kind of *Homo sapiens* comes to be the natural and neutral (rather than outlying) form, and this is still, even in Kronfeldner’s account, based on specific hierarchically organized and valued traits and

²² This is a move very similar to Kant, who limited moral capacities to the rational, not just the human. It was apparently only accidental or incidental the only known beings who could be rational agents were also human.

capacities. This ideal not only fails to address or attend to the more multiplicitous, impure, fraught relations articulatable by different approaches; it preserves the *Homo sapiens* as a version of the concept of human, complete with the latter's normativizing, hierarchicalizing, exclusionary force.

These accounts help remind us why it is not sufficient to turn to better, more accurate species definitions to replace the settled, problematic ones. If we only replaced the concepts of the human/animal with more biologically neutral and "accurate" categories, we would not be able to understand why the settled species discourse is so easy it is to slip into when shifting from the biological claims to the moral status claims. Kronfeldner's account remains concerned with human privilege coded in the biologized language of species natures and distinctions. In a sense, the binary between the human and the nonhuman reasserts itself and comes to govern understandings of species.

iii: Monophilia and Power

In closing this chapter and looking toward the next, I return to Lugones and the metaphors about the bodies and eggs, to consider the way the SSC is situated at the intersection of knowledge and power. Recall that Lugones defines the logic of purity as "reducing multiplicity to unity through abstraction, categorization, *from a particular vantage point*"; she names this epistemic position a "love of purity," or "*monophilia*," and calls the knower or knife-wielder a "lover of purity" (1994, 468, 464). In order for purity (or some facsimile of it) to obtain taxonomies, one needs to both *begin* from an epistemic position that takes split-separation for granted and deploy various kinds of power and control in order to divide the complexly multiple into a collection of unities. Allow me to take these in turn, starting with the lover of purity, then moving to power.

Taxonomies which operate based on purity are only achieved through a "complex series of fictions," including the production of 1) an abstract capacity for pure reason, where reason is ahistorical and separable from other compartments and effects, uninfluenced by power or contingency; and 2) an independent, observing subject outside the system, from whose vantage point unity and multiplicity are perceivable (1994, 464).²³ In Lugones's words,

²³ And of course, this epistemic position described as the lover of unity bears much similarity to the ideal abstracted and neutral observer. Plato's assumption of a neutral, objective butcher has been mirrored in scientific goals and methods, which purport that knowledge comes from eliminating bias and explicitly try to

“while we are supposed to understand the unity of multiplicity as perceivable by the rational subject occupying the vantage point of reason, we can see that the logic of the matter goes the other way around” (1994, 464). Only by assuming that “the world of people and things is unified” deep down can we then conceive of a vantage point from which this unity can be viewed. We must first assume and grant the existence of unity in order to generate an “outside,” privileged subject position from which this unity is perceptible (465). Thus, the unified observer is logically necessitated only once you begin treating unity as an *a priori* principle. In many ways, the love and lover of purity Lugones identifies also describe the scientific impulse toward objectivity which so many identify in Plato’s objective butcher and which, in the case of the species problem, continues to drive the discussion toward the need for a single, monolithic position. Just as the lover of purity does not see themselves as imbricated in or influencing what is known and ordered, so too do many sciences assume that knowledge comes from eliminating bias and explicitly separating the observer from the observed; the zero-point of subjectivity is often considered the basic requirement for scientific or objective knowledge (Burkhart 2004, 100). But this is not the case for Indigenous science, nor for Lugones, Derrida, Foucault, nor even a host of scientists and philosophers of science who recognize, thematize, and, sometimes, build on the inextricability of the knower from the known, as I explore further in the next chapter. The love of purity thus names why it is so difficult, if at all possible, for many to accept the plurality of species definitions that are generated precisely from different perspectives in different contexts based on different needs without trying to seek an even more fundamental unity.

But Lugones also characterizes monophilia, this desire to apply purity from a supposedly neutral and objective position, as an “urge to control the multiplicity of people and things” (1994, 463).²⁴ Lugones speaks of this urge to control as something that is both

separate the observer from the observed. The zero-point of subjectivity is understood as the basic requirement for scientific or objective knowledge (Burkhart, 100). This is not the case for Indigenous science, or for Lugones, Derrida, Foucault, or even a host of scientists and philosophers of science who recognize, thematize and in some cases, build on the inextricability of the knower from the known. But in many ways, the love and lover of purity Lugones describes is precisely the scientific impulse toward objectivity, which, in the case of problem of species, continues to drive the discussion toward the need for a single, monolithic position. This is the very impulse that makes it difficult, if not impossible, to accept the plurality of species definitions that are generated precisely from different perspectives in different contexts based on different needs without trying to seek an even more fundamental unity.

²⁴ While in earlier work like “Purity, Impurity, and Separation,” Lugones uses power to refer to that more congealed form that can be wielded by some subjects over others. In some of her later work, power instead

diffused in systems of thought that condition what can be known, said, and what can be true by controlling the terms of reason but also as sometimes more pointed deployed by individuals involved with those systems (like those defending the human against chimeric species blurring). The lover of purity determines which statements about multiplicity can be seen and how.²⁵ In short: the act of assuming the existence of pure, ahistorical reason generates the necessity of a subject who can see this purity.

We can perhaps see the relation between epistemology and power in Lugones's striking use of the term "monophilia." Especially in our present conversation about species, the homonymic relation between the term's two different meanings and etymological histories is a source for play and insight. First, if the Greek *philia* (φιλία) connotes fondness or love, then the monophilia refers to the love (φιλία) of singularity, uniqueness, oneness (μόνο). But monophilia is also a technical taxonomic term, in which *philia* instead comes from *phylon* (φῦλον), meaning species, genus, or type, and shares its root with phylogeny (the study of evolutionary history). Working under the evolutionary concept of common descent, this latter definition names a relationship of shared genealogy and ancestry between different organisms. A monophyletic group is one in which all bodies descended from a common, unique ancestor are grouped together with that ancestor and understood to share an evolutionary history that produced common, derived characteristics distinguishing them from other organisms.²⁶ Monophilia is also one variation of the genetic species definition (Mishler and Theriot 2000). Yet, even this phylogenetic designation is not exempt from complexity and multiplicity, as the term is used to track several different kinds of relations in different fields or taxonomic subfields, like cladistics versus phylogeny, at the level of clade versus species, and so on, which try to account for the various ways ancestry and shared traits align and diverge across groups (think reptiles and birds). Furthermore, the "mono" of

appears diffused in the relation between knowledge and control, specifically in the production and proliferation of the scientific truths about the nature of gender, race, and the human.

²⁵ Derrida does not refer to purity as something one loves, but he is likewise attentive to the affective attachment purity elicits, suggesting that, where there ought to be an uncertainty, nervousness, and "anxiety before 'a matter of great moment' or before 'a source of deep metaphysical difficulties,'" he instead often finds an unreflective attachment to or desire for purity (1988, 93).

²⁶ Monophyletic groups are often called "clades." Picture an old model of an evolutionary tree of life, where a particular branch leaves the trunk to produce smaller branches, which in turn produce still smaller branches: a monophyletic group contains species supposedly descending from a single originary branch or ancestor (like mammals or birds, *Mammalia* and *Aves*).

monophilia has become increasingly suspect, as both the technologies for tracking genetic transfer and the models of genetic transference have begun positing far messier (or shall we call them impure) collections of bodies and genetic materials, inheriting both vertically (coming from parents and other progenitors) and horizontally.²⁷ The trouble is that monophyletic groups are understood to be also essentially unified (despite their multiplicity) by shared traits that result from their nature, and by genes that are increasingly understood to be the carrier of that nature. Reptiles are often considered an exception to the general rule amongst the so-called “higher animals,” but things get even messier for monophyletic groups with insects or protozoa, never mind microbes and plants. In other words, like definitions of species, and most other taxonomic and phylogenetic categories, *monophilia* is an example of the way the ideal purity of our classification systems and categories are “always imbricated with the forever-failing attempt to delineate material purity” and to find pure groups (Shotwell 2016, 4).

Monophilia, in the phylogenetic sense, is not just an abstract conceptualization. The varied understandings of evolutionary lineage at work in monophyletic research are situated alongside specific species definitions (particularly the genetic, morphological, and ecological definitions) and together constitute a central axis of the material practices of modern wildlife management, conservation techniques, rewilding strategies, the introduction of species to ecosystems where they are not “native,” medical testing, animal and plant domestication and agriculture, and so on. To consider one example of how the various definitions monophilia play out in concrete practices, we could consider the impact of these debates on the conservation of different elephant communities. Asian and African elephants are not considered a monophyletic group (though Asian elephants and Mammoths are), and whether African savannah and African forest elephants are a monophyletic group is currently a matter of much debate. This debate in part depends on how one tracks monophilia (through genes, genes plus morphology, genes plus ecological role, and so on) (Yang et al. 1996; Eggert et al. 2002; Mondol et al. 2015). It is a debate that inflects numerous population-management practices geared toward extremely vulnerable populations, practices that

²⁷ Interestingly, the concept itself actually has two different definitions or senses and is used (without clarification) to mean different things in traditional evolutionary theory and contemporary phylogenetic and cladistic theory. Yet even as this fact exceeds the bounds of the project and would require even more explanation, I find this additional multiplicity within the term itself is an interesting further irony that I will save and add if it is useful in the future.

include the highly selective active breeding of specific bodies to one another and the larger control and manipulation of genetic pools (through breeding as well as killing). In the case of tigers, settling the question of monophilia is the condition for reintroducing Sumatran tigers into habitat once populated by their now-extinct relatives, the Javan and Bali tigers (who went extinct as recently as 1940 and 1980, respectively) (Xue et al. 2015).

Thus, in the term “monophilia,” we find not only an epistemic attunement but also a correlating attention to the deployment of various kinds of power and control.²⁸ After all, the splitting of the egg yolk from the egg white requires not only a belief in the purity of substance one splits but the exercise of power as well. For Lugones, the love of purity is intimately tied up with “attempts to split everything impure, breaking it down into pure elements for the purposes of control” (460). Regarding species, even Slater and Borghini note that, “in addition to aiding conceptualization and communication, grouping particular things on the basis of shared properties, regularities, dispositions, natural laws, and so forth enables understanding *and control*” (4, emphasis mine). Now, the kind of control they mention probably refers to the more generally predictive but still tentative and fallible sort often found in scientific discussions; it would be exceedingly ungenerous to assume they mean something more straightforwardly dubious. However, these are not split-separate aspects of control; the general and predictive are nevertheless value-laden, such that they serve normative and punitively regulative functions. This is another version of the concern first introduced in this chapter’s introduction: the settled species concept is not strictly a problem with accuracy but with naturalizing monistic, normative, essentialist realities of species behind and before discourse, power, and value.

iv: Conclusion

The goal of this chapter has been to 1) articulate what I take the settled species concept or discourse to be and 2) the underlying logics I believe help prompt this conception of species. Rather than trying to develop a new critique of essentialism or monism, I tried instead to articulate how even attempts to represent and affirm multiplicity can, when governed by the

²⁸ “In Purity, Impurity, and Separation” power and control function fairly synonymously, though she begins providing a slightly more robust account of “power” in later work. Nevertheless, power remains for her tied to control, where control seems to mean some combination of managing, controlling knowledge about, and holding power over various bodies. This is different than Foucault’s understanding of power, as functioning to discipline (as in disciplinary power) and sometimes to control (as in biopower).

logic of purity, find themselves trapped by a love and pursuit of unity. I thus hope to draw attention to and problematize the way certain turns toward multiplicity or plurality can, nevertheless and if we are not careful, end up collapsing back into essentializing, monolithic, and reductive tendencies in ways that undermine efforts to move away from essentialism. In other words, I hope to have shown how the moves to affirm a plurality of species *as an alternative to the human/animal or human/nature binary* can end up repeating particular harms when they are governed by the logic of purity.

In the next chapter, I will ask the following questions: what would a truly pluralized and post-essentialist approach to species look like? Is there a way of understanding multiplicity or plurality—particularly plurality of species—that is useful biologically as well as morally and politically? What kind of approach might avoid some of these pitfalls and provide helpful paths forward? What might it look like to affirm a turn toward the concept of species without split-separating and unifying the irreducibly many and heterogeneous groups into stagnant, unified, monolithic groups? What resources are necessary for that? To begin answering these questions, and to begin conceptualizing ways to resist and take responsibility for our uses of species, I will continue the conversation between philosophy of biology and Latinx scholarship to develop a heuristic I call *ethical species pluralism*.

CHAPTER IV: ETHICAL SPECIES PLURALISM

Introduction

In this chapter, I seek to develop a heuristic or method that I call *ethical species pluralism*. I see this as a way to interact with a multitude of speciesed organisms and groups who are not, at the end of the day, governed by the logic of purity. I advance ethical species pluralism as one strategy for combating monophyletic and reductive conceptualizations of species, as well as their normative and harmful consequences. But I will also advance this framework as a key tool for recognizing the very real responsibility, significance, and costs of how we think about species groups. My hope is that an approach like this would not only move us past species essentialism in the ethical and political, but also make the framework of species pluralism from philosophy of biology concretely useful for moral and political theorists who take up or use the species category. I also hope ethical species pluralism will be helpful for those working in the field, office, or lab, who are moved to consider the implications and weight of particular species concepts and decisions on other lives. Yet even as the language of this heuristic clarifies that ethical species pluralism is a conceptual tool, my goal is not to imagine a theory that might then be applied to all cases irrespective of their particularities. Rather, I believe it is precisely the particularities of species pluralism in practice that make demands upon us. To take species pluralism seriously requires, I think, that we take an interest in the processes and practices of knowledge, power, values, and institutions by which certain definitions, concepts, or frameworks get deployed over others. In other words, I take ethical species pluralism to be more than a conceptually interesting response to a problem; I take it as a starting point for a way of reorienting ourselves that can be practically and morally efficacious.

For these reasons, this chapter will build the case for ethical species pluralism as a conceptual tool, while Chapter V will investigate species genealogically to arrive at a more grounded case for ethical species pluralism. There, I show how a suspicion about or vigilance regarding the way species and species groups are categorized and made legible can help aid in the responsibility and resistance I describe here. But first, I begin this chapter in Section I by outlining the species problem. Here, I hope to give the reader some sense of the biological complexity to which species pluralism is one response: the fact that many conflicting and irresolvably distinct species concepts and definitions appear to be equally

true, accurate, and useful. This section briefly summarizes the problem and some of its implications, as well as the reason I take this problem to be more than a limit to theory.

In Section II, I begin building the framework of *ethical species pluralism* by articulating the significance of frameworks of species pluralism within philosophy of biology. I identify two versions of species pluralism (one epistemic and one ontological) as the basis for ethical species pluralism. These versions of species pluralism affirm 1) the complexity and diversity of ways that biological groups organize themselves and 2) the complexity and diversity of explanatory mechanisms and epistemic positions involved in ascertaining these many ways of being a species group. But this section also argues that because accounts of species pluralism are thought to be purely descriptive, and the reasons to choose one species definition or framework over another are likewise understood to be matters of value-free science, existing formulations of species pluralism are not yet sufficient for reorienting the species turn toward more ethical options. Without attention to the ethics, values, power, society, and politics of species pluralism, we risk perpetuating the belief already present in the species turn that the species category or concept is prediscursive, and thus merely points us to more complicated yet still mind-independent biological facts. The questions species pluralism raises, and which ethical species pluralism hopes to highlight and begin answering, include the following: if there is a glut of concepts and ways of being a species, then what criteria ought we deploy to prioritize certain species concepts or relations over others? In moments when species concepts conflict in their effort to name an organism or group (as they do, quite regularly), what metrics ought we use to decide? What kinds of responsibility are inherent in that decision and whose responsibility is this? Does it rest entirely upon the shoulders of the scientists and biologists implementing these various definitions? Can other moral or political values be applied? Can species pluralism be a tool for helping us uncover the ways particular species definitions have become institutionalized and gained priority at the expense of both equally valid species concepts and moral and political goals, like conservation? How can species pluralism impact our ability to take responsibility now for the ways we use the concept of species? Because regardless of whether one takes species groups to be real, the organisms that compose those groups or populations are real, and their suffering, thriving, evolving, interacting, and vanishing are at stake in these discussions.

In Sections III, IV, and V, I build from these versions of species pluralism by placing them in productive tension with Indigenous and Latinx positions on pluralism to more

explicitly articulate the heuristic I call *ethical species pluralism*. Here, I work to show that species pluralism can be more than just a way to solve an interesting intellectual problem. I present this heuristic in three distinct ways or as functioning in three different ways: it is 1) a lens for interpreting species pluralism morally by evidencing the existence and function of values (Section III); 2) a strategy for turning species pluralism from a mere outcome of observation into a tool for better ethical relations (Section IV); and 3) a call to accept the responsibility of choosing rightly (between equally valid definitions and concepts), even as we also take responsibility for the outcomes and costs of these difficult choices on the lives of others (Section V). In unpacking each of these issues, I will look to conversations about biodiversity, conservation, animal rights, and species management, all instances or contexts in which ethical species pluralism can have direct impact. I will argue whichever way we carve up the world really does matter, and there are ethical and political implications, and that philosophers of biology would benefit from engaging in traditions who take pluralism to be a strategy or tool for both knowledge and morality.

Finally, before diving in, I want to clarify why I would characterize ethical species pluralism as decolonial. First, following Latin American decolonial theorists, Sandra Harding insists that scientific pluralisms should go “all the way down,” beyond the seemingly objective explanatory mechanisms at work, and should include the valuation of “multiple ontologies and epistemologies” outside those of Western science (2016, 1070). I take this challenge seriously and strive to show one way in which centering pluralist Indigenous and Latinx ontologies and epistemologies can productively challenge the value-neutrality and universality of philosophy of science. Second, following Megan Bang and Ananda Marin, I believe ethical species pluralism is a way of unsettling or “desettling” dominant nature-culture relations by taking “a decolonizing orientation” toward our scientific and ecological categories in that ethical species pluralism stops cleanly dividing fact from value (2015, 531). This decolonizing orientation can take many forms, but here it takes the shape of centering of Indigenous and anti-colonial nature-culture relations and scientific concepts.

i. Species Problems

Having spent other chapters articulating the problems with the settled species concept from the perspective of moral and social theory, this section begins by considering what sets of epistemic conditions and practical, empirical dilemmas have led to the rise of species

pluralism and what, exactly, this pluralism entails. This problem can generally be understood as a longstanding and seemingly irresolvable disagreement about which species concepts (what kind of thing a species is) and species definitions (the operational criteria we should use to identify, define, delimit, and count them) are most real and accurate.²⁹ For example, one form of this debate concerns whether species are genetic individuals or population systems or, on the other hand, more similar to a kind or collective in which individuals participate (Mahner 1993, 110).³⁰

Differences in operational criteria have led to species being identified and categorized based on morphological traits, ecological location, genetic lineage, or sexual isolation, and so on.³¹ To get a sense of this vastness, consider the following different accounts of the number of operational ideas of species actively in use by the sciences. In 1997, Richard Mayden described at least twenty-two different species concepts in use and then, just two years later, twenty-four distinct concepts (Mayden 1999). John Wilkins (2011) claims this could be abridged to seven, provided we emphasize basic patterns of organization (thus grouping several definitions) or alternatively increased to twenty-seven, if definitions focused on semantic differences between existing concepts. Samir Okasha (2002) argues all species concepts and definitions can be reduced to four basic concept categories, regardless of the number of definitions while Kevin de Queiroz (2007) argues for the prominence of only one.³²

²⁹ Ereshefsky differs slightly by noting that “the motivation for species pluralism does not derive from the fact that biologists offer different species concepts. It stems from the suggestion that more than one of those concepts is worthy of acceptance” (1998, 105).

³⁰ Technically, the former would be formulated something like this: “species are spatio-temporally restricted individuals with organisms for parts.”

³¹ Even the frequent categorization of these ideas into either concepts or definitions is not so clear, since whether or not, for example, the phylogenetic or ecological explanation of species counts as a concept or definition is itself very inconsistent throughout the literature. Many of the people I cite will use the terms differently or interchangeably. While this itself is a fascinating debate, it is a bit into the proverbial weeds for my purposes. Still, this debate is representative of just how difficult it is to come to a single, stable idea of species which can sufficiently unify and satisfy the numerically vast ways the species category is successfully and meaningfully deployed in science.

³² De Queiroz claims that only property which might be shared by all contemporary species concepts and definitions should be viewed as a necessary property of the species category (2007, 1264).

It is generally agreed that these difficulties arose as a result of evolutionary theory. Prior to evolutionary theory, monistic and essentialist accounts of species were the norm within Western scientific theory and philosophy (Wilkins 2011). In the wake of evolutionary theory, what were thought to be natural kinds or types with essences (strict necessary and sufficient conditions) stopped having very clear boundaries and instead became something more akin to populations or processes (Wilkins 1942, x-xi; Mayr 1942, 1996).³³ Instead of clear species groups, evolution offers up a labyrinth of deep, cross-pollinating, and entangling relations and transitions. In fact, as Stamos argues, if categories like species were not blurred and multiplied after this knowledge, that would likely be a real blow to theories of evolution (Stamos 2003).

The problem—if one concedes there is one—is that each species concept or definition divides biodiversity in different ways, with different consequences such that whether a group of organisms counts as one, two, or more species depends on the particular species concept or definition used. Consider just a few of the ways various concepts and definitions might be categorized based on the kinds of relations or things they track: there are those which prioritize similar characteristics or traits, those that focus on evolutionary theory or genealogy/history, and those most attentive to genetics. It is significant that traits, genealogy, and genes do not always line up or clearly overlap to pick out the same species group, and that those different variables can diverge sufficiently to create three different species groups. Definitions which emphasize similar characteristics include the morphological species concept and the genotypic cluster concept; those that consider evolutionary theory include the biological species concept, ecological species concept, and evolutionary species concept; and those in the genetics camp include the phylogenetic, genetic, and cladistic species concepts. A few of the most prominent options are the morphological, biological, ecological, and phylogenetic species concepts, yet even these have several incompatible variations within them and conflict rather dramatically with one another. Consider, for example, that the broadest version of the biological species concept—that “species are groups of interbreeding natural populations that are reproductively isolated from other such groups” (Mayr 1996, 264)—does not account for the numerical bulk of the

³³ Debates about species pluralism (as opposed to species monism) often intersect with debates on realism and anti-realism (Zachos 2016; Ereshefsky 1998), but I am going to leave that to the side, since I am not so much taking a position on the reality of species as looking at the way the discourse around it functions.

world's organisms, including most bacteria and archaea, or many plants, and fungi, and some invertebrates, which are asexual or produce both asexually and sexually. Thus, if the concept of species is to be used for those beings (and there are those, like Ford Doolittle (2014) who argue that for these reasons it should not be), at least one other concept of species is required.

Whether this is a problem, what kind of problem, and how to solve it depends upon ontological predispositions, epistemic commitments, views about science, beliefs about empiricism and pragmatism, concepts of truth, and even social and moral values. The existence of multiple, conflicting, and seemingly ununifiable species definitions and concepts does not necessarily constitute a problem, *except* from philosophical positions in which, for example, scientific explanation and truth are required to be unified and provide a single, coherent, and consistent account of the biological world.³⁴ For this reason, some of the attempts to solve this problem are, unsurprisingly, the result of a kind of scientific monophilia and logic of unity that strives to reassert a monism or unity, even a kind of essence, beneath the multiplicity of species concepts and definitions.³⁵

There are also those from all across the solution spectrum who strive not so much to solve the problem as quarantine it at the level of the philosophical or theoretical (such as John Brookfield 2002 and Massimo Pigliucci 2003).³⁶ In these accounts, the problem is thought to be primarily with the limits of conceptual frameworks which simply have not yet found an underlying unity. This assumes that definitional or conceptual incompatibility is not necessarily an issue in the daily practice of biologists. I will not be considering these positions here, which I believe tend toward a logic of purity and love of unity, and what I have also called a taxonomy of purity.³⁷

³⁴ I use the language of species problem to refer to the debates surrounding this topic, even though I do not hold the position that a multiplicity of definitions or unresolvable debates necessarily constitute a problem or shortcoming, epistemic or otherwise.

³⁵ De Queiroz (2007), for example, strives for a monistic account by taking positions that are incompatible on the whole and removing the bits that are incompatible so that all that remains is what is shared or common, which he takes to be the single way we ought to understand species.

³⁶ In "Species as family resemblance concepts: The (dis-)solution of the species problem?" (2003), Pigliucci even states: "the species problem is not primarily an empirical one, but it is rather fraught with philosophical questions that require—but cannot be settled by—empirical evidence" (596).

³⁷ First, confining the problem to the philosophical or theoretical fails to address or take seriously what having multiple accounts means about knowledge, the world, the constitutive role of the knower or scientists in

What I focus on here are the shortcomings of the move to confine the problem to the theoretical or philosophical. First, I believe that it is empirically false to suggest the problem only arises except at the theoretical level. There are plenty of instances in which biologists, taxonomists, conservationists, and so on run into challenges with species identification because of these many definitions. One only needs to return to Marius the giraffe. If one takes a collection of beings, which might count as two species, using the ecological concept, and three species using the phylogenetic version, and both are equally valid ways of carving the world, then the contradiction is in no way resolved. Even if it were true that these instances of conflict were rare—and they are not—that fact neither necessarily nor sufficiently entails that the species problem is purely theoretical rather than practical. An absence of conflict in species definitions in conservation literature, for example, does not necessarily justify the belief that therefore only one definition is useful or best. Instead—and this is my second concern—an absence of conflict among species definitions might instead indicate that each science, or method, or working group is sufficiently comfortable with their own definitions, that specific accounts have gained such priority and are so thoroughly imbricated with other practices, and techniques that they do not encounter these problems. That is, not happening to run into this problem could be a result of the institutionalization of specific knowledges and definitions in certain sectors, rather than an indication that there is no problem, or that everything is working fantastically. Addressing this institutionalization of definitions and concepts is, in fact, a key reason ethical species pluralism is useful, as I will explore in Section III and Chapter IV. In short, I do not take the absence of evidence of conflict at the pragmatic level to be evidence that therefore only one species definition is truly best or ideal for a given situation. Instead, I believe the complexity and contradiction arise not at the theoretical level but precisely from the way these definitions and concepts have vied for prominence among biologists and others doing the practical work, as I will explore more fully in the final section of this chapter.

choosing which species definition to use and the consequences of those decisions. Secondly, to claim that the multiplicity of overlapping and conflicting species definitions is mostly a theoretical problem, and not a practical one, implies that it is possible and unproblematic to purely separate each employed species concept or definition in practice, as though it were truly isolatable and self-contained. Yet even a cursory genealogy of species concepts shows this to be false (Wilkins 2011). Definitions emerge from one another in the field, as prior definitions no longer work. The definitions themselves are not so cleanly divided.

ii. Species Pluralisms

The family of positions known as species pluralism first emerged in philosophy of the 1980s and 1990s (Dupré 1981, 1993; Ereshefsky 1992; Kitcher 1984; Mishler and Brandon 1987; Ruse 1987). Those who name themselves species pluralists have many different ways of understanding pluralism, including whether it is epistemic or ontological, what this says about the reality of the species category, and which features, exactly, are pluralized (explanations, theories, causes, concepts, descriptions). But, in general, pluralists disagree with monists that biologists should use (or that there even exists) one single species concept or way of being a species. Instead, species pluralism argues that there are multiple, equally true and legitimate species concepts and definitions (Chakravartty 2011; Rosenberg 1994; Stanford 1995) based on the diverse ways biodiversity unfolds and bodies organize themselves (Dupré 1993 and 1999; Ereshefsky 1998). Because pluralism is an increasingly significant feature of philosophy of science and philosophy of biology, there is a vast literature on this position and many ways of organizing the diversity of views contained therein.³⁸

In this section, I focus on outlining the views of those who take pluralism to be primarily epistemic and those who take it to be primarily ontological. I focus on this distinction not only because it is one of the most significant and contentious in the literature, but also because this will allow me to emphasize how pluralism is thought to be a value-neutral, prediscursive function of knowledge of the world. However, because my heuristic of ethical species pluralism builds only on certain versions of epistemic and ontological species pluralism, it is worth distinguishing which versions of these two positions I take to be most useful. I will thus map two versions, each of epistemic and ontological pluralism, beginning with the former. Then, I will clarify why I take the versions I do as the basis for ethical species pluralism moving forward.

At its most general, epistemic pluralism is the position that, in Mishler and Donoghue's words, "a variety of species concepts are necessary to adequately capture the complexity of variation patterns in nature. To subsume this variation under the rubric of any one concept leads to confusion and tends to obscure important evolutionary questions" (1982, 500). Epistemic pluralism is often advanced by those who argue the following: if we

³⁸ Two particularly helpful accounts for those new to this debate can be found in Marco Nathan's "Pluralism is the answer! What is the question?" (2018) and Slater's *Are Species Real?* (2013).

cannot find and agree on just one right concept of species, then to avoid dismissing particularly useful definitions and missing important scientific insights, we must accept that different definitions capture something important for constructing either a fuller picture of the world or for meeting the many goals for which we require and use the concept.

There are at least two camps or ways of understanding what exactly is pluralized, how this relates to mind-independent phenomena of species. In this chapter, for sake of space, I engage the position I take to be the most compelling account of epistemic pluralism, which is also the one that offers the best tools for my purposes. The other camp understands the multiplicity of species concepts through variations on the logic of pluralism. That is, just as Lugones argued that there were different ways of understanding multiplicity and plurality, some of which still understood multiplicity in terms of unity and purity, some versions of species pluralism understand species through the logic of split-separation, where the many categories, groups, and explanations are understood as though they could be gathered into an underlying unity or as though they had relatively clear, clean divisions.

In the first camp are the epistemic pluralists who explicitly hope that this plurality of concepts might one day be brought together by some newly uncovered underlying unity (De Queiroz 1999, 2005; Mayden 1997). This version of epistemic pluralism is often simply functionalist in the sense that it serves more as an explanatory strategy geared toward making sense of scientific disagreement or contradictions than a genuine interest in describing a plurality of ways of being a species (Nathan 2018). Matthew Slater (2013) and Marc Ereshefsky (1998) suggest that many epistemic pluralist positions are ultimately consistent with a fairly strong ontological (if not epistemic) monism, specifically, a certainty that the world can only be one way, even if we are not able to grasp or make that manifest in an equally unified knowledge. Epistemic pluralists in camp one can sometimes tend toward a begrudging monism that is afraid to throw the proverbial baby out with the bathwater. I take this form of pluralism to be very similar to what José Medina calls a melioristic pluralism (2011), which is eager for unity and the coming together of different epistemic positions, rather than treating different positions as challenging one another.

While both of these versions of epistemic pluralism work out fairly well when considering isolated definitions and scientific pursuits that need not ever conflict in

practice,³⁹ they do less well with instances in which the same organism or group of organisms appear to belong in several different, equally valid species groups at the same time. For example, consider the challenges the biological species concept has with syngameons, taxa who interbreed and hybridize, and thus share genetic lineage, but which may or may not have much morphological similarity and which may or may not prefer different ecological ranges.⁴⁰ A whopping 25% of all plant species are syngameons, as are 10% of animal species. Corals and birds are two groups of animals who regularly find themselves in syngameons, with one of the more famous examples including Darwin's finches (Lamichhane et al., 2015). Neither the biological species concept nor the broader syngameon framework is wrong in terms of species identification; instead, the organisms in question seem to belong both to species based on phylogenetic or interbreeding accounts of species.

A second camp of epistemic pluralism—the version in which I am most interested—focuses on epistemic pluralism as the result of social, cultural, and scientific conditions in which science happens. This is the position that I, following Marco Nathan (2018), will call theory-dependence pluralism, and what is sometimes also called pragmatic pluralism (Slater 2013). This version suggests that there are many different and sometimes conflicting accounts of species taxa, because each emerges from and is “relative to a theory, explanatory aim, or classificatory purpose” (Nathan 2018). In this version of species pluralism, different species taxa emerge based not only on the specific organisms and processes being tracked but primarily based on the particular explanatory method and target (Stanford 1995; Rosenberg 1985, 1994). In general, theory-dependence pluralism remains agnostic about the existence of a mind-independent reality composed of many different ways of being a species and instead focuses on the fact that—unified world or not—a plurality of explanatory accounts seems necessary. This view also espouses the belief that different concepts and definitions seem equally true or at least equally accurate in terms of various scientific goals

³⁹ Though, as a reminder to the reader, I am not convinced that isolated definitions ought to be understood as necessarily somehow the most ideal or best, simply because competing concepts seem absent or were erased. In fact, I think sociologists of science have done well showing that very rarely are these definitions isolated or purely separated or settled in the sense that certain epistemic pluralists hope (Wilkins 2011; Zachos 2016).

⁴⁰ Arnold et al. 2004, 145. “The definition of the biological species as the most inclusive breeding group does not hold up in cases of naturally hybridizing species and semispecies. Where limited gene exchange is taking place between otherwise isolated semispecies, the most inclusive unit of interbreeding is not a single biological species but an assemblage of semispecies. Such an assemblage is called a syngameon.”

held by different domains of biology (like counting, prediction, explanation). Yet this position, as held by Anjan Chakravartty, for example, is not nominalism, relativism, or monism in that it does not necessarily reject the likelihood that the flows of relations and biodiversity are legitimately and actually carvable at a plurality of equally valid and real joints. Instead, this version of epistemic pluralism follows the Kantian insight that epistemology (the ways of knowing and content of knowledge) is inextricably tied to ontology (what is “out there” in the world), such that there is a significant role played by the knower and the shared commitments across scientific knowledge in determining what is “mind-independent” and what is not (Chakravartty 2011). In this version of epistemic pluralism, rather than focusing on the limits of human perception as a reason for explanatory pluralism, the focus is on the fact that “an element of human convention is an inescapable feature of scientific classification,” and this includes attention to “the role of social practices and instructions in classification” (Chakravartty 2011, 5; Barnes, Bloor, and Henry 1996).

I believe this version of epistemic pluralism offers several key tools for an ethical species pluralism. First, epistemic pluralists in this camp are the least likely to return to a monistic, love of purity position with respect to species taxonomy. They affirm genuinely irreconcilable species concepts and definitions without needing to assume an eventual resolution into epistemic unity and without articulating their views in ways that require groups and organisms to only belong to one species (an ontological monism). I take them to affirm a more curdled form of taxonomic pluralism (Chakravartty 2011) rather than another version of taxonomic purity, in which definitions can bear similarities and differences without ever being either completely separate or requiring unification. At the same time, this position takes knowledge pluralism to be the result of culturally and socially situated frameworks (albeit primarily understood as scientific frameworks). However, even as this could open space to attend to the way various definitions might be tied up with specific forms of power, discourses, and values, theory-dependence pluralism on its own does not do that and still takes this plurality of definitions to be more or less the result of impartial science. So, we will need to add to this before it can be a full ethical species pluralism.

There are likewise different camps of ontological pluralists. For example, one prominent position understands ontological pluralism to refer to the belief that there might really be more than one way of being species, provided that every organism only belongs to one kind of species. An example of this version of species pluralism, which Nathan calls the

“heterogeneity” approach, comes from Brent Mishler and Robert Brandon (1987). On their view, different concepts of species are necessary, but to borrow Ereshefsky’s characterization, only on “different branches of the tree of life” (1998, 106). Mishler and Brandon argue that there is only ever one objectively correct species concept for a particular organism or group of organisms, but it might be the case that more than one concept is needed for the sciences in total based on the scientific field and the particular organisms. This kind of account is especially significant when bringing into focus the failure of the biological species concept to map onto asexual organisms or prokaryotes.

I do not pursue this version of ontological pluralism in my ethical species pluralism. For while it might work out well in studying certain groups, it does not really help with syngameons or other similar cases, whose members belong to different species depending upon how one understands species and groups them. In instances like these, where two equally valid species concepts and definitions divide the same group different ways, this first account of ontological pluralism is pretty unsatisfying. It seems, rather, that the same organisms can rightly be conceived of and divided through genetic lineages, reproductive isolation, or ecological relations, because they really do belong to those three different kinds of groups all at once.

The version of ontological species pluralism that I take up in ethical species pluralism instead builds from a second group of ontological species pluralists (Dupré 1981, 1999; Kitcher 1984, 1984; Ereshefsky 1998; Chakravartty 2011) for whom the implication of a problem like this is that “legitimate biological interests demand multiple species concepts and that this demand strongly legislates for the metaphysical interpretation of pluralism” (Slater 2013, 164). This group of pluralists tends to believe that a single organism can be equally and really a part of several different species at the same time, a position that is often thought to be a more radical version of species pluralism. Ontological pluralists argue that it is only because various different kinds of species groups are present in nature that “a plurality of species concepts may thus be required to reflect and account for this diversity” (Nathan 2000). Ontological pluralism sees the species category as broken open from within, as it were. This position admits that “the organic world is cross-classified by a number of species concepts” (Ereshefsky 1998, 107). Even if we only conceptualized species as evolutionary lineages (and there are those, like Philip Kitcher and John Dupré who advocate that there are other ways of thinking about what a species is), Ereshefsky and others affirm

that there are multiple kinds of lineages or ways of being within a lineage which crisscross the natural world and thus make a single organism able to be part of a number of species. For Ereshefsky, there is no single group in the world that is really unified over which we might lay different, partially correct definitions, each uniquely failing to capture the unity that exists. While there are “a multiplicity of classifications that cross-classify the organic world” (2003, 135), this is due to evolutionary impacts on diversity itself. In Ereshefsky’s words, “the forces of evolution segment the tree of life into varying and opposing classifications. Species pluralism is the result of a fecundity of biological forces rather than a paucity of scientific information” (2003, 140). Again, this is why in ontological pluralism, organisms might be a member of two or more different types of species at the same time.⁴¹

I argue the belief that organisms can be part of two categories, species, or sets of relations (like lineages) at the same time is significant for working through and tracking the concrete problems that emerge in taxonomy in the field. Without this recognition, we can miss the layers of power that help determine which set of relations are given priority, or which are taken for granted in moments when two or more options conflict. Additionally, this form of ontological pluralism offers a genuinely post-essentialist approach to species, recognizing that no single category or account is sufficient. Yet even as this version of ontological pluralism makes space to track the interaction between these two or more ways of being species and the various powers, discourses, or values that shape such interaction, those layers are neither admitted to nor explored in the literature itself.

So where does this leave us in terms of the settled species discourse and anti-essentialism? Instead of settled concepts of species used in many ethical and political

⁴¹ There is one important question that emerges from this account of species pluralism but which lies outside the bounds of my project and my expertise and about which I am going to remain strategically agnostic. This includes the question of species realism or anti-realism, and the question about how one determines which concepts are allowed to be included in this plurality and which are not. The first question goes something like this: if there are many different ways to be a species, and some organisms who might rightly be part of two or more different species, then what, really, can species even mean? Does this irreconcilable diversity mean there really is no such thing as species? Both ontological and epistemic pluralism raise the existence of species as a question. Ereshefsky (1998), Rosenberg (1985, 1994), and Stanford (1995) each suggest that the sheer magnitude of the differences and lack of unity among species definitions and concepts suggests we should be anti-realist about the category of species. Because “the various taxa we call ‘species’ lack a common unifying feature” but are equally efficacious and important for their respective fields, perhaps it is wise to stop believing that such a thing as species even really exists (Ereshefsky 1998, 103). Brooks and McLennan (1999) even argue that only populations are real biological units, while species are artifacts of human convention. Anti-realist species positions are based on the idea that, if one takes such very different and incommensurable things to all be named by the same word “species,” then one stops really having a sense that species are a thing at all. I am not especially convinced that my project needs to take a stance on realism or anti-realism.

conversations, we find ourselves first with a diverse array of concepts about what species are and how they are grouped. This array requires, at the very least, a pause if we want to use this category of species to make ethical claims. This multitude means it is not easy to use the concept of species in straightforward ways, as though everyone meant the same thing when using the language. In fact, the bulk of the concepts being used tend to reject the kind of classical essentialism that adheres in the settled species concept. I thus take the above specified version of epistemic pluralism and ontological pluralism to be the best tools for helping to disrupt the settled species discourse and use them as the basis for the framework of ethical species pluralism. Additionally, we can respond to this multiplicity of species concepts by going a bit further and recognizing the role human convention plays in developing the complexity and diversity of explanatory mechanisms and epistemic positions and affirm the many different ways of being a species group.

Yet even as we are already well on our way to disrupting the settled species concept and its uses, it is not enough to simply install large arrow signs pointing to the concepts of species pluralism. As it stands, species pluralism is not enough to reorient discussions ethically and politically or to help us explore and step into the responsibility I take to be inherent in choosing the definition or definitions that take priority in any given circumstance. If there is a glut of apparently true concepts and ways of being a species, there is a remarkable gap in philosophical resources discussing how species pluralism should be engaged practically, let alone ethically, or in exploring how this pluralism might play out in adjudicating or challenging the order in which species definitions get applied when several conflict.⁴² In fact, philosophical pluralism is often not understood to have much impact on the methodological monism within various practical sciences, and I could find no real philosophical resources that offer suggestions for how to generally adjudicate between different concepts at the practical level. In other words, as long as the pluralist concepts and definitions of species are viewed as value- and morally neutral, pure apprehensions of biological phenomena, we could end up with a version of species pluralism that is as “settled” as the settled species concept. That is, it would also be a result of what Bang and Marin call “settled nature-culture relations” and the “foundational ontological, epistemic,

⁴² One proposed solution is to formulate a hierarchy of species concepts, with certain general concepts functioning as primary and more specific and possibly conflicting iterations as secondary. Mayden (1999), de Queiroz (2007) each advance a version of this approach. However, their accounts of a hierarchy of species concepts focuses principally on solving the problem at the theoretical level, not the practical level.

and axiological assumptions” in “Western scientific ways of knowing” that nature is divided from culture, biology from ethics, matter from spirit, and fact from value.

On the one hand, this attempt to remain neutral with respect to application of species pluralism is consistent with the general trend in which philosophers and theoretical biologists wonder about species concepts and their implementation in biology but do not presume to intervene, and especially avoid creating criteria by which conflicts ought to be solved in the applied sciences. Yet, on the other hand, there is at least some willingness to very broadly mention the ethical consequences of this problem when it comes to human nature. Many species pluralist positions will admit (if not thoroughly explore) the very basic implications that the species problem in general and species pluralism in particular has no ethics in the human realm. Ereshefsky (1998, 2003), Michael Ghiselin (1987, 1997), Slater (2013), Wilkins (2011), and Frank Zachos (2016) have noted that, given what we now believe about the species category, there can be no such thing as human nature, since there can be no essential properties such that some beings can be discriminated against based on their participating less in this nature (Mahner 1993, 110). Maria Kronfeldner spent an entire book exploring the implications of both evolutionary theory and species pluralism on the concept of human nature and its accuracy and efficacy in the moral and political (2019). There are also very occasional arguments outside these debates that consider how post-essentialist views of species might challenge certain conservative moral arguments in bioethics. For example, Jason Robert and Francois Baylis (2003) argue that moral anxieties about human-nonhuman chimeras are based on essentialist and inaccurate views about what a species is. But that is the extent of the agreed-upon moral implications of the anti-essentialist and pluralist claims about species. Scholars widely understand the lack of a single clear species difference as either an ontological problem, an epistemic problem, or both (Ereshefsky 2003; Slater 2013; Zachos 2016). Since ontology and epistemology are taken to be morally and value-neutral, the ethical implications of species pluralism and the species problem beyond are not acknowledged, let alone given adequate treatment.

iii. Ethical Species Pluralism: Pluralism and Values

The heuristic of ethical species pluralism I develop excavates and explicates the ethical implications of scientific species pluralism in practical circumstances. This is to say that this heuristic takes as its starting point the claims that ontological species pluralism and epistemic

species pluralism are good, and the multiple, conflicting, related but un-unifiable concepts and definitions of species are indeed equally viable and important. But ethical species pluralism moves beyond this, to attune us to the moral and social, not just scientific, responsibility inherent in the different uses of various species concepts and definitions. By doing this, ESP can facilitate the possibility and responsibility of resistance.

To build this heuristic, I engage a form of what Medina calls, “*guerrilla* pluralism,” an approach in which different accounts of truth, knowledge, or history are situated in productive tension in order to open up new possibilities for thought and action (2011). Medina uses *guerrilla* pluralism to advocate for a critical Foucauldian method of writing different histories for the purposes of decolonial and anti-racist resistance, an application of *guerrilla* pluralism I also engage in the next chapter. But here, the plural accounts I bring into productive tension are none other than different treatments of pluralism itself (or themselves). Many of the key publications on scientific pluralism in general—and species pluralism in particular—treat knowledge pluralism as the purview of modern Western science (Galison and Stump 1996; Kellert, Longino, and Waters 2006). Yet there are many philosophical traditions in the world with much longer standing and richer histories with ontological and epistemic pluralism than Western science (for which pluralism is considered relatively new or at least recently resurgent), some of whom take pluralist to have inherent moral status and usefulness. Thus, to formulate ethical species pluralism, I look to expressions of pluralism from Latin American and Native American philosophies to generate an alternative account of species pluralism that can also open onto new thought and actions. To do so, I will describe the heuristic of ethical species pluralism in three different ways: in this section, I explore ethical species pluralism as a lens for interpreting species pluralism morally and as a way to reveal values within each species concept. Then, in the following two sections, I discuss it as a way to uncover and resist certain normative and institutionalized frameworks and that allows us to take responsibility for the motivations and consequences of the species definitions or concepts we deploy.

The first task for ethical species pluralism is to find a way to see and interpret the situation of species pluralism as a moral and social issue, both with regard to the definitions and concepts themselves, and their uses and implementation. For this, I center the voices of many Native American authors, scholars, and storytellers, for whom epistemic and ontological pluralism are the natural and obvious result of the way knowledges and worlds

emerge from different values, community needs, contexts, relationships, contradictions, histories, and possible futures.⁴³ For Thomas Norton-Smith, it is because many Native American philosophies treat ontology and epistemology as already morally, socially, and politically situated endeavors that the plurality of ontologies and epistemologies become givens, rather than a conclusion arrived at when looking at seemingly contradictory phenomena, or a pragmatic way to describe or resolve scientific conflicts (2010). In Robin Wall Kimmerer's discussion of the significance of many ways of knowing, pluralism is itself taken to be an epistemic and even moral virtue, a comportment that both frames knowledge and a reality toward which knowledge strives (2015). Pluralism is not a neutral outcome or result of observation but a starting premise given a particular view that knowledge comes to be only within specific contexts, for different reasons, as the result of different values.⁴⁴ In Brian Burkhardt's characterization of Cherokee philosophies, there are no bare facts the structures of our minds have unmitigated access to as the inherent, permanent, and discrete structures of the universe; instead, no set of beliefs or knowledge is ever value-neutral (Burkhardt 2004).

I take this to be a form of epistemic pluralism similar to that espoused by the theory-dependent camp of epistemic species pluralism. This form of Indigenous epistemic pluralism shares with theory-dependence a recognition that how one proceeds, what community one belongs to, what norms one conforms to, and which actions or means one uses will condition and alter the truths and knowledge one comes to. And like theory-dependence, because one's goals, community, and norms are different in each instance, there is no one

⁴³ Here and throughout the chapter, I follow philosophers like Anne Waters, Thomas Norton-Smith, V.F. Cordova, and Vine Deloria, who refer to the commonalities among Native philosophies without reducing the diversity of Indigenous communities to a homogeneous unity. As Cordova suggests, although Indigenous philosophies have always been irreducibly diverse, settler colonialism has highlighted that they differ more from Western philosophies than they do from one another (Cordova 2007). Thus, a kind of Indigenous philosophy has emerged that nevertheless still allows for internal differences.

⁴⁴ The American Indian scholars I reference here are not alone in this belief and are joined by more recent observations in Western philosophy about the way scientific knowledge and truth take shape under certain political and ethical conditions and in relation to values, power, and norms. Consider arguments about the way the concept of the *Homo sapiens* was a biologization of the normatively and racially construed human (the subject of human nature) as written by Wynter (2003), Weheliye (2014), Lugones (2007, 2008) McWhorter (2010), and others. Or consider the retelling of how biological accounts of *Homo sapiens* as mammals naturalized middle- and upper-class European sex and gender norms (Schiebinger 1993); how genes have been construed as essence and destiny (Fallbear 2013; Lewontin 1984); or the way capitalist, colonial, and heterosexual racial relations influenced key concepts and taxonomies in bottony (Schiebinger and Swan 2005).

ultimate knowledge that constitutes absolute truth and toward which everyone ought to strive. Rather, “right” knowledge depends on the community and their needs in a manner at least similar to the way different species knowledges are beholden to different scientific communities and needs. As I have argued elsewhere, the affirmation of different and conflicting knowledges or truths are regularly accepted as a matter of course in Indigenous philosophy, since the truth of one does not have to invalidate the truth of the other (Sinclair 2019). Indigenous epistemic pluralism rejects the necessity of the logical premise governing so much Western philosophy that the law of non-contradiction must always and necessarily hold. They do not reject this law entirely, but rather see it as only one way among many of understanding the world and the relation between propositions. This permits an openness to specific instances in which alternative relations between propositions might better articulate the problem or situation. Instead, like theory-dependence, Indigenous pluralisms often affirm that many opposing things can be equally true at the same time.⁴⁵

Beyond epistemic pluralism, and similar to the form of ontological species pluralism I took up last section, Indigenous affirmations of ontological pluralism make space for organisms or entities to be part of different categories or sets of relations (or lineages) at the same time. Anne Waters claims that Indigenous ontologies build worlds that are multiplicitous, fluid, complex, relational, and entangled, and in which persons (understood as humans, animals, spirits, and others) can participate in multiple ways of being or multiple categories at the same time without conflict—beings can be both female and male, woman and man, human and animal, present and absent, and so on. For Waters, Indigenous ontologies are characterized by affirmations of the multiplicity and comingling of categories and identities rather than separation, fixed essence, or clear divisions. In fact, Waters claims that this is so significant a feature of many Indigenous ontologies that some American Indian students have difficulty in Western philosophy or logic courses that reject such possibilities. In summarizing the distinctions between Western and Native American ontologies, Waters suggests that Indigenous ontologies are usually “inclusive (nonbinary)

⁴⁵ A clear example of this can be found in a story told by Charles (Ohiyesa) Eastman of a 1911 encounter between a missionary and group of Indians in which they shared creation and origin stories. Believing that only one of the stories could be true, the missionary exclaimed in disgust, “What I delivered to you were sacred truths, but this that you tell me is mere fable and falsehood!” In awe of the defiance of the basic premise that both options might be equally true, the offended Indian replied, “My brother . . . it seems that you have not been well grounded in the rules of civility. You saw that we, who practice these rules, believed your stories; why, then, do you refuse to credit ours?” (Eastman 1980, 30).

rather than exclusive (discrete binary), and have non-discrete (unbounded) entities rather than discrete (discretely bounded) entities” (2004, 107). Something being two things, or part of several groups at the same time—for example, different species lineages or different species—can result from the fact that, as Jarrad Reddekop describes, Native ontologies are often characterized by relationships, “beginning with an assumption that *relations* are prior, that any atomistic ‘thing’ is rather only a kind of (at least temporary) fixity or concrescence, a gathering constituted in and through these prior, dynamic, and contextual relations.” That is, Native ontologies often focus on what “happens *between* (including between levels of structure) rather than focusing *on* supposedly individual things, and indeed do so as a way of understanding what any particular thing is at any given time” (2014, 35). American Indian epistemologies and ontologies tend to affirm both the world and their maps of the world but do not confuse one for the other (Norton-Smith 2010).

Yet—and here is where we find ourselves adding the “ethical” to species pluralism—following Burkhart (2004) a bit deeper, Indigenous epistemic and ontological pluralism are not understood as independent from ethics. Instead, epistemology, ontology, and ethics are interrelated or, to borrow from Lugones (1994), curdled: they are not completely reducible to one another, nor are they split-separable such that one could have knowledge that is not ethically laden or clean divisions and unbridgeable gaps between knowledge and reality. Rather, ways of knowing and choices to know in certain ways or through specific frameworks always have world-shaping or world-creating effects (Norton-Smith 2010). Furthermore, in many Indigenous knowledges, the shape of knowledge and reality are contingent on knowing *rightly*, or in ways that help the community (even if “help” does not itself have the same prescriptive content in each instance) (Burkhart 2004).⁴⁶ There are many articulations of the fact that one will find just what one is looking for such that different ways and dispositions of seeking knowledge (for example, disrespectful attitudes) bring about different results and concepts (Deloria 1999; Norton-Smith 2010; Whitt 2009). Lee Hester and Jim Cheney argue that American Indian truths are fundamentally guided by the

⁴⁶ English-language concepts Indigenous peoples use to refer to knowledge systems, including traditional knowledge (TK), Native Science (NS), Indigenous knowledge (IK), Indigenous knowledge of the environment (IKE), and traditional ecological knowledge (TEK). I follow Kyle Whyte in referring to all these English-language concepts as Indigenous knowledges, or Indigenous knowledge systems (Whyte, Kyle Whyte, “What Indigenous Knowledges do for Indigenous Peoples.” In *Traditional Ecological Knowledge*, eds. M. Nelson and D. Shilling (Cambridge, UK: Cambridge University Press, 2018): 57-82. 62).

concepts of right actions, right goals, or what they call responsible knowledge (“responsible truths”) and an “ethical-epistemological orientation of attentiveness” rather than of domination (2001, 319-320). For Norton-Smith, knowledge is characterized by “a *respectful* success in achieving a goal” (2010, 64). Knowledge is thus based on a particular context and for specific purposes: “Without context there can be no knowledge, or knowing, and hence knowledge exists only when belief practices develop and are in harmony with communal well-being” (Simpson 2014, xxi). In other words, *how* we come to understand inflects and colors the things that we know, and what we know needs to be directly related to helping our community (Cajete 2000). Vine Deloria Jr. suggests that “no body of knowledge exists for its own sake outside the moral framework of understanding” (1999, 47). In this way, knowledge is not understood as primarily propositional, focused on justified true beliefs, and is more procedural, focused not as much on knowing a particular thing and more on how to do something, or how that knowledge impacts and is impacted by the world. So, knowledge must be both respectful and useful for the community: these are the ways of determining the success or accuracy of knowledge within a particular circumstance (Basso 1996; Simpson 2014).

Building on this treatment of pluralism as morally weighted, I suggest that ethical species pluralism centers two Indigenous insights that can move us beyond scientific species pluralism. The first has to do with how we understand the values that are included and the second with who is included in the community to which one’s knowledge is beholden. Unlike theory-dependent pluralism, “values” within Indigenous pluralism mean more than mere acknowledgement that social location impacts knowledge production to include the way explicit moral attunements significantly impact the outcome of what is known. Because knowledge is always created using particular values, in particular contexts, for specific reasons and goals, and because which values, contexts, and goals one uses delimit and condition what can be true, the knower has a responsibility to choose a path of knowledge and criteria for implementation that meet community goals and needs. While the theory-dependent epistemic pluralists admit that each definition and concept emerges from a specific context and is a result of the shifting agreed-upon disciplinary norms within the sciences, the idea that moral, social, and political norms condition the emergence, sedimentation, and priority of certain species definitions over others is not taken very

seriously, or that the moral goals could and should play a role in implementation, is not considered.

By adding this ethical perspective on the nature of pluralism to species pluralism, I argue that the heuristic of ethical species pluralism can begin to see and evaluate each definition and concept (or group of definitions and concepts) in light of its underlying values, assumptions, and implications, and can evaluate them in light of their outcomes. There are, for example, some fairly explicit moral and political paradigms that have impacted the conceptualization and naming of species throughout history. I explore this more deeply in the next chapter, but for just one example for now, consider the way Preble's meadow jumping mice (or "the Preble mouse") have been variously named a species and had their species status revoked or challenged based on competing concepts of species (loosely ecological versus genetic), which themselves variously aligned with or challenged highly political development and conservation interests in the Colorado river basin (Crifasi 2007). In this ongoing saga, which began in the late 1990s, different accounts of species align with different moral and political interests. I am not attributing explicit moral or political motivations to biologists in this instance—though there might be room for that—instead, I think ethical species pluralism allows us to see and critically evaluate the way "economic forces and ideological perspectives influence taxonomists and the names they give plants and animals" and the categories in which they place them (Crifasi 2007, 511). Incidents like this are by no means uncommon, such as the infamously vague language of the Endangered Species Act, which intentionally does not define species or subspecies and thus leaves who and what can be covered open to much debate. There are many, many species whose identification and delimitation as distinct depend on which species concepts are used, and who suffer a related flux in protections or precarity.

Furthermore, and as another example, which species concepts or definitions get included within species pluralism is itself not a result of neutral or objective principles but of particular Eurocentric values and beliefs. With few exceptions, the versions of species that are taken seriously by the bulk of species pluralists (including everyone mentioned above, besides Dupré 1993) are limited to those that have emerged from Western biology and its governing scientific norms and are in use by biologists to have any consequential scientific weight (Ereshefsky 2009). This is true even as many of them were developed geographically within or through colonial relations with human and nonhuman communities in the Global

South.⁴⁷ Debates about which definitions should be counted or excluded in species pluralism (so that pluralism does not permit all and any possible species categories) have not yet begun to consider including concepts of species (or even analogues ideas) from Latin America, Native American communities, for example.⁴⁸ Yet these norms and the species definitions and scientific norms that manage them are no less local and provincial simply because they take themselves to be universal. The exclusion of other ways of understanding the species concept or defining and dividing biodiversity is an example of what Ivan da Costa Marques calls “ontological politics,” the way Western scientific standards foreclose what counts as properly scientific and objective (2014).

Beyond this first important intervention of eliciting attention to underlying values of species concepts (or groups of species concepts), ethical species pluralism also draws attention to who, exactly, counts as part of the “community” in and for which knowledge is formed. One consequence of the ontological politics Costa Marques outlines above is that, within Western science, the community that conditions the values, goals, and truth of statements around species concepts and definitions in any given case have been almost entirely anthropocentric. I say “anthropocentric” rather than “speciesist,” because I take only a very specific version of “the human” who use only specific frameworks of reason to constitute these communities. But species knowledge is often constructed through moral hierarchies in which humans take priority over other animals, plants, land, and all manner of other groups and individuals. But, according to Viola Cordova, Native American knowledges often reject hierarchical ways of organizing such relations (2004, 177). For Richard Atleo, the ethics that shape knowledge are not strictly deployed with other humans but are exchanges between the entire peopled world, where “people” includes plants, places, lands, animals, and so on (Atleo 2011; Cordova 2004; McPherson and Rabb 2011; Norton-Smith 2010; Whitt 2009). Native ethics affirm differences between creatures, land, and forces, all of whom equally “participate in the continuing creation of reality” (Deloria 1999, 47) and all of

⁴⁷ I am thinking, for example, of Mayr’s biological species definition and its quite famous emergence in conversation with Indigenous communities of Papua New Guinea (Mayr 1930, 1932, and 1940).

⁴⁸ For example, I have argued elsewhere (Sinclair 2021) that Native American communities use species concepts that are consistent with Native worldviews but which are often excluded from cross-cultural scientific work. In fact, differences in species concepts or definitions are never even raised as a question. Instead, the species framework in use by the specific Native communities engaged in cross-cultural knowledge exchange are taken to be identical to and substitutable with the Western scientific species concepts, as though both knowledge traditions understood the category in the same way and referred to the exact same species groups.

whom people, as knowers, are equally responsible to. What if we took epistemic and ontological multiplicity to be the result of the variety of values, powers, and relationships that cohere and interact not only among those we call humans—whomever we take that to be—but also among other speciesed life and persons?

In my view, one key reason why species pluralism is an ethical issue is that speciesed lives themselves are fully morally considerable, significant, equally lively and affective co-builders of our many speciesed world(s). I take the practices of naming, dividing, and carving them into groups as morally and politically significant for reasons described above, also because I believe species groups are more than passive players in a scientific evolutionary story or mutely material bodies just playing out mechanized grouping instincts. The practices of developing and regimenting these various definitions, the consequences of these definitions on how different groups of *Homo sapiens* perceive, manage, and interact with other lives, are not morally neutral. A being might not care what we name them—or they might, who is to say—but these namings and categorizations profoundly shift, tear down, reconstitute, and otherwise impact material reality and organizations of the lived world in ways I take to be inarguably of moral concern. In other words, I take these speciesed beings to be part of the communities whose values, norms, and goals impact the operation of species concepts.

iv: Ethical Species Pluralism: Pluralism Facilitates Resistance

A second way of thinking about ethical species pluralism follows from this first: attention to different values, communities, and goals of each species concept allows ethical species pluralism to serve as a strategy for resisting dominant, institutionalized, or taken-for-granted concepts and definitions of species. This is a way of thinking about pluralism as containing the seeds for resistance. Can we see the strategic choosing of certain species concepts over others as itself something that could help reshape knowledge, combat specific dominant definitions or frameworks and their effects, and thus open onto new relationship possibilities, management options, co-existence frameworks, interspecies relations, and so on? Similar to accounts of pluralism from Indigenous philosophers, I draw the paradigm of pluralism as resistance from Sandra Harding (2016), José Medina (2011), and Marisol de la Cadena (2010). Each of these scholars articulates a pluralism that is not the result of an accidental observation or begrudgingly conceded after unity fails: it is instead a starting

premise, a strategy, a goal, and even an ideal that energizes moral and political struggle. When speaking about decolonizing the way Western sciences and philosophers thereof often lack the resources or motivations to detect their own cultural and social interests or values, Harding says that epistemic and ontological “disunity and pluralism ideals enable detection of such values and interests and also appreciation of the desirability of new or nondominant alternatives” (2016, 1069). Using pluralism as an ideal, rather than an accident or concession, the situation of multiplicity can facilitate both close reflection on the reasons for and the contexts, outcomes, and values of different knowledges and ontologies, as well as on the reasons why certain options are chosen or pursued over others.

This is similar to the way Medina frames the function of epistemic *guerrilla* pluralism. The frictions that result from a genuine epistemic pluralism not governed by the logic of purity are, in Medina’s words, “no more tools for learning than they are tools for unlearning” (Medina 2011, 23). On this view of pluralism, frictions or contradictions are “not merely instrumental or transitional—that is, tools for, or steps toward, harmony or conflict resolution” but are instead sought for their own sake, for the forms of resistance that they constitute” (24). For Medina, this attention to pluralism “aims not at the melioration of the cognitive and ethical lives of all but rather at the (epistemic and socio-political) resistance of some against the oppression of others” (23-24).⁴⁹ Rather than seeing multiple accounts as a problem, Medina articulates a version of pluralism in which “pluralistic views of truth and knowledge make productive use of those forms of epistemic friction and resistance” (22).

In short, a pluralism that does not seek unity or hierarchically organize the many can instead acknowledge distinct if interconnected or related positions and through these

⁴⁹ I recognize there is a conflict here between what we might call a genuine or more radical pluralism and one in which what gets included or excluded is conditioned by specific normative commitments, such as the goal of resistance. This tension between radical pluralism and normativity is a problem for many treatments of pluralism more generally, including species pluralism in philosophy of biology, where there are several normative commitments that determine which definitions or concepts are viable candidates to be included in pluralism and which are not. Though I do not provide a fuller treatment of how I would navigate this tension here, I want to acknowledge this difficulty and that a such a treatment is certainly warranted. But to be clear, when I build off of Medina’s reading of pluralism in ethical species pluralism, I am not making resisting oppression the sole function, purpose, or *raison d’être* of pluralism, as though pluralism were a tool created solely for that purpose or struggle. Nor do I want certain “non-oppressive” options (whatever those might be or mean), to squash or erase other options. In fact, I do not assert that any species concept or definition can be totally free from all power or oppression. Instead, the resistance I advance in part happens when these more radical forms of pluralism are reminded of their ungatherable plurality; the resistance happens when species concepts or definitions that have been excluded are resurgent and recognized (if not institutionalized or made permanent). So rather than saying that ethical species pluralism points out *the* right or better option, I suggest it can show what options have been foreclosed, and the consequences of that foreclosure.

tensions find ways to resist dominant frameworks. We see a great example of this in de la Cadena's account of the way Andean Indigenous groups are using insurgent ontologies and epistemologies to demand that earth-beings (nonhuman persons including mountains, rivers, nonhuman animals, plants, and so on) have a place in politics. When the Andean Indigenous communities advance their scientific knowledge and the worlds such knowledge holds as equally valid, true, and real, they reflect one way of "disputing the monopoly of science to define 'Nature' and, thus, provincializing its alleged universal ontology as specific to the West: one world (even if perhaps the most powerful one) in a pluriverse" (2010, 346). Through the "ontological pluralization" of nature, science, and politics, Andean Indigenous pluralism allows the "war that has ruled so far silently" between Western science and other visions of reality to become visible and to be contested (346). This pluralism also invites allies who are "committed to a different politics of nature, one that includes disagreement on the definition of nature itself" and prioritizes ethical engagements with the more-than-human world to join the resistance (346). Yet the goal of this pluralism is not a unified, utopian dream in which the Indigenous worlds or political formulations swallow all others. Against such frameworks of superiority and commensurability, this pluralism strives for an at least "symmetric understanding" and affirmation of these different worlds, the practices each world enables, and the benefits or significance of each.

The heuristic of ethical species pluralism can build from this understanding of pluralism to make the following claim: plurality is a means to reveal values, provincialize seemingly universal truths, practices, and knowledges, and contest the sedimentation or unreflective prioritization of certain options over others. By building from species pluralism in philosophy of biology—by recognizing and engaging with the multiplicity of species concepts and definitions in a real way—*ethical* species pluralism is a way of becoming attuned to the various reasons and situations in which different species concepts and definitions take priority over others. It can also give us means to reveal the values and outcomes of each definition not from "outside" of biology, but precisely from the position of other definitions and concepts. While versions of pluralism I advanced in Section I do use pluralism as a tool to closely examine the individual contexts, needs, and scientific norms that enable and benefit from each species definition or concept, this examination does not include attention to the socially, politically, or morally normative conditions in which those definitions emerge. Nor does it include attention to the different impacts of each concept and definition

on various lives. Similarly, in practical moments when many different species definitions are equally viable options, the one which wins out is rarely interrogated from a position of suspicion or with attention to values outside of “objectivity” or Lacey’s “impartiality” (1999).

To explore ethical species pluralism in practice, I will explore some examples from wildlife conservation, even though I consider ethical species pluralism to be useful for revealing and resisting the taken-for-grantedness of specific definitions in many areas, including zoo management, biodiversity studies, de-extinction, invasive species management, introduction of natural predators, pest control, reproductive management of wild populations, animal rights, domesticated and farmed animals, pets, animal testing, and so on. Wildlife conservation is a particularly striking concern for conservation since, for example, the areas and wildlands that gain conservation law’s coveted “protection” status depend largely on the number and diversity of species in given areas (Rojas 1992). Key concepts from conservation, like the minimum viable population (Gilpin and Soule 1986), or population vulnerability, or viability (Woodruff 1989, 79), are, while focused on populations, ultimately interested in populations *of* particular species. Thus, what becomes a protected area and what does not, how those areas and their populations are managed, and which beings are excluded from those protections all depends on how species groups are delimited and counted. Let us consider the case of elephants and lemurs as two examples of how different definitions conflict and produce dramatically different outcomes, with different lives lost or saved, different management practices enforced, and so on.

First, recall the debates around African elephants discussed last chapter. While the forest and savannah elephants have recently been formalized as different species, they have been the subject of much debate for quite some time, given the different species definitions in use by different biological sciences. Ecological definitions generally held that the savannah and forest elephants ought to be considered different species, due to their vastly different habits and ecosystem roles. Morphologically focused definitions made a similar case but were instead based on significant differences in traits and habits (Gilbert 2010). Meanwhile, variations on the biological species concept found evidence of interbreeding in DNA, and thus insisted on a single species taxon. It was not until 2010 that deeper genetic evidence and a stricter account of monophyletic lineages led to them being reclassified as two species (Rohland 2010). This is an instance in which different competing definitions eventually coalesced to corroborate the same species divisions, but even that might be temporary, as

new evidence emerges and as definitions themselves shift or change (and as we see in the case of lemurs, below). Nevertheless, the prioritization of genetics has led to genetic definitions (either based on mitochondrial DNA, from maternal ancestry, or nuclear DNA) having priority above other options, despite the fact that each definition had captured significant and meaningful taxa divisions and that letting the genetic definition govern had substantially worse consequences for the speciesed beings involved. And by “worse,” I mean less desirable by pretty much all barometers, from consequentialist positions on suffering to the ecological and biodiversity goals of conservation. The result of the prioritization of specific genetic concepts over equally valid morphological or ecological options meant that, numerically, the species looked like it was doing much better than it actually was (though those numbers were already pretty bleak). This impacted different national and international regulations on management practices, interbreeding techniques, hunting permissions, and so on. This is the result of a kind of monophilia by which a single definition is carved out from and prioritized above the many and is to be taken as the authoritative option. Only one sense of species was thought to have the final say in terms of conservation, as though these groups could only participate in one version of species.

In the second example, consider the case of lemurs, a community of our primate kin found almost exclusively on Madagascar and its surrounding islands. For lemurs, strict species divisions are notoriously difficult to construct. Though, at last count (Mittermeier et al. 2011), current numbers have this group divided into 8 families, 15 genera and about 101 species, those numbers are subject to a fair amount of change depending on the species definitions being used. Lemurs are one of the most critically endangered mammal groups in the world. Yet even as their numbers are dwindling, the number of lemur species is on the rise at a 1.88% increase in species *per year* for the last 25 years. As is often the case in conservation, what Rosi Braidotti calls the “despotic authority” of DNA has tended to reign rather supreme in Lemur taxonomy, and what Kim Tallbear calls “gene talk” continues to maintain that the most “essential truths [including species truths] about identity inhere in DNA” (Braidotti 2014, 4; Tallbear 2013). Yet, as Matthias Markolf, Markus Brameier, and Peter Kappeler note, neither the very prominent biological species concept nor the phylogenetic species concept work well to clearly differentiate or install adequate protections for these groups (2011). This is an instance in which the same bodies are able to be categorized with very different groups based on how one understands species. Or, another

way of saying that is these groups belong to more than one community or set of relations at a time, which cannot be captured with a single species concept or definition. Once again, we see calls for adding morphological and ecological data in order to arrive at the best possible species assessment of species numbers and in order to avoid a loss of biodiversity (Sanders, Malhotra, and Thorpe 2006). Conversely, we see concerns raised that consistent hybridization will, while producing more biodiversity (where biodiversity is understood as having more genetic diversity among breeding populations, rather than more species) nevertheless muddle species groups too significantly to generate meaningful protections. To this, one must add the moral concerns with the practices of determining species by collecting samples (killing or harvesting or sacrificing animals, to use industry language), practices that are more often required for the demonstration of certain species concepts than others.⁵⁰

Each species definition used has implications for collection practices, management practices, protections, and so on. Rather than defining the “best” species concept or definition as the one that best fits with dominant genetic species concepts, for example, ethical species pluralism allows us to see subtler ways these many concepts and definitions might be leveraged for different goals. Ethical species pluralism builds from ethical pluralism of Native American scholars to disrupt the “knowledge for the sake of knowledge” effect that motivates, for example, the historical drive to uncover, take samples of, and count absolutely every species and subspecies that exist purely for the sake of cataloguing them.⁵¹ Instead, knowledge serves a purpose, supports, and affirms different many-speciesed communities. I take it that, by playing these species concepts off of one another, we can critically evaluate and provide alternatives to the often-harmful actions, practices, and techniques of engaging and managing speciesed life that can result when myopic species definitions are taken for granted or assumed.

⁵⁰ For example, while this is considered a norm for many taxonomic endeavors, there are more ways around this when looking at ecological and genetic species concepts than, say, morphological.

⁵¹ One might claim that this cataloguing is actually for the specific purposes of understanding and preserving rapidly waning biodiversity. But this pursuit of cataloguing reaches back well before concepts of biodiversity, let alone values of biodiversity, were circulating.

v: Ethical Species Pluralism: Pluralism Elicits Responsibility

A third aspect of ethical species pluralism is an unapologetic attunement to the enormous moral responsibility and burden inherent in having many right or equally valid options from which not all will or can be chosen. Even as epistemic and ontological pluralism can be wielded to strategically prioritize subjugated or more excluded concepts and definitions of species over more dominant ones for various ends, pluralism can also germinate moments of indecision and stagnation. What about the moments when several species definitions seem equally and justly applicable, and where the outcomes of these decisions will have very different and real consequences on, for example, how conversation unfolds, who gets killed to become a “specimen” for a new species, how particular groups are managed, and so on? Even as ethical species pluralism can invite action, in certain instances and for certain purposes, it can just as quickly stall it and birth a moment of fecund silence, mourning, responsibility, and the weight of choice. I believe ethical species pluralism allows and even insists that we feel the weight of this responsibility in full.

An acknowledgement of responsibility in the face of many options is a theme in many Native American stories and writings. For example, in his account of Indigenous knowledge and the proper response to oral science and history, Donald Fixico (2003) offers some thoughts on what to do—on what is required—when one encounters a multiplicity of equally valid but conflicting meanings or interpretations. This multiplicity could appear as a result of an event, story, bit of data or information, body, or person. Fixico notes that the proper response to this rich plurality is to pause, wait, listen carefully, and engage in self-examination (2003, 5). The pause and silence that comes after the recognition of the multiple meaning options is the not a roadblock to moving forward, as might be conceived by certain ways of thinking about decisions as being obvious based on evidence. Instead, this pause is the key to proceeding. It is not the key because it makes the decision easier, or clearer, by offering a moment to become certain of the ideal option. This pause is key because it holds the weighted recognition of a situation in which there is no single right answer: from a plurality of options, a decision and choice will be made, and events and meaning will continue to unfold as a result of this decision. Self-examination of one’s motives, relations, past, and so on are useful not because they can get rid of bias or make the decision more objective, but because, on the contrary, they hold the knower, the chooser, to account for the decision that will unfold.

I propose that ethical species pluralism requires just such a pause. When finding that many, seemingly equally valid species concepts or definitions can be deployed and that they cut biodiversity in various ways which have very real, lived consequences for bodies, ethical species pluralism demands an attention to the consequences and moral responsibilities of this choice. I see recognizing this difficulty and responsibility of choosing as efficacious not because it eases the decision, but because it actually prompts awareness of the fact that it *is* a decision and that outcomes could be otherwise. Picking between species concepts is a decision with moral weight not just a neutral apprehension or purely objective recognition of mutely material facts and realities. This self-examination espoused in the above account of how to properly respond to multiple good options is intended to make that person present for the decision through the weight of responsibility, rather than absent, under the guise of objectivity.

This position lies in stark contrast to the prominent way of understanding these decisions as ideally engaged through the lens of impartiality. For Hugh Lacey (1999) the concept of impartiality is the only chance at preventing relativism within species pluralism. He suggests that pluralism focus on the cognitive or epistemic criteria of impartial acceptance or rejection of a scientific theory rather than on any social or ethical values. Yet impartiality is itself also a value: the value of having all other values ignored in the generation of knowledge. This belief in an objective world independent from both internal, mental worlds and from ethics and culture is itself a cultural artifact.⁵² Impartiality does not allow us to regard the application of criteria as having moral consequences, or for the choice itself to be morally significant.

The examples I raised of elephants and the lemurs are perhaps more straightforward instances where ethical species pluralism can invite action and resistance. But let us return to the Preble's meadow jumping mice (or "the Preble mouse"), only relatively recently named in Western taxonomies (the late 1980s) and even more recently (1998) included on the list of threatened species in the Endangered Species Act. This little family of mice has been at the center of some extremely heated battles over the conservation and protection of other endangered species, as well as the use and development of riparian lands in its native habitat (in Colorado and Wyoming). Whether Preble mice count as their own species or a distinct

⁵² For various comments on this, see Black Elk 2016; Cajete 2004; Burkhart 2004; Ingold 2011.

subspecies has depended on deployments of the biological species and ecological species concepts, different genetic markers, reproductive isolation, and so on. Calling them their own species enables protections for not only them but their habitat range, which is also refuge for all manner of other plants and animals. At the same time, naming it a species or subspecies and placing it under protection permits acts against and management of other groups, including the killing of non-native plants that are harmful if eaten by Preble mice, as well as stronger measures against certain predators (like cats) (Clippinger 2002). Preble mice are one example of the ways species definition and the taxa they divide and name impact conservation and group well-being. In William Morrison et al.'s (1990) qualitative study of the impacts of taxonomic change on conservation, they found examples where the change had a positive impact on conservation efforts (by splitting species and offering taxonomic recognition to previous subspecies), some where the impact was negative (by lumping groups and thus diminishing protections), and in some instances, changes in taxa had no impact at all.

To be sure, the moral weight of these decisions is not independent from the moral or political problems with the structures in which these decisions are imbedded. The ethics of the many systems of killing, managing, or extracting plant and animal bodies also need to be considered. This is a particularly topical problem for invasive species management in which it is quite common for plants and animals who have been deemed invasive to be killed in order to preserve what ecologists take to be the native species and relative ecosystem stability. This means, for example, that some of the plants in the genus *Oenothera*, who speciate and spread quite quickly and are considered native to the Americas, are labeled invasive and disposable based on highly fraught and convoluted species identifications which change rapidly (Mihulka et al. 2001). Species that are typically divided morphologically are, the moment invasivity is suspected, divided genetically through DNA barcoding (Pyšek et al. 2013). Here, the different species concepts deployed have significant impact on plant welfare, even as that welfare also relies on problematic norms around killing those who are perceived to not belong.

In these instances of responsibility, attending to the needs or priorities of some will have consequences for certain others, and vice versa. This means that no decision can be perfect and will contain harms and goods, leaning toward some and leaning away from others. This is, on the one hand, a good sign: it means no institutionalized, already-decided

option is automatically implemented by sheer force of habit. In this way, the difficulty of choosing the perfect option is a sign that ethical species pluralism has done its work. On the other hand, that will not make the decision any easier. If anything, when decisions have to be made, this responsibility of choosing can, I think, open space for various kinds of mourning. I am not quite sure what that mourning would look like and would not want to prescribe that here, but I think it can include a recognition of what or who will be lost.

vi: Conclusion

In this chapter, I have agreed with a range of thinkers from philosophy of biology that epistemic and ontological species pluralism are defensible and preferable responses to the species problem over monistic accounts. I have also suggested that these approaches help unsettle the settled species concept. I then built on this species pluralism to develop the heuristic of ethical species pluralism, which I take to be a starting place from which to think about how to engage species more ethically and without so much intelligibility secured and captured in advance. I think this heuristic would be especially complementary to other critical approaches to, for example, species management practices, the assumptions behind and strategies of conservation, the concepts of invasivity or nativity, and so on. Ethical species pluralism can help in destabilizing the sometimes-settled or monolithic species concepts taken for granted in those discussions, while those literatures could help to paint a clearer picture of the networks of power, material organizations of life, and other discourses with which species concepts are imbricated.

Yet, perhaps one comes away from all of this still a bit skeptical that, on the whole, species are not clear enough to be taken for granted. Sure, maybe there are certain circumstances in which ethical species pluralism might be warranted or needed, but surely most species or species groups are fairly straightforward, and we do not need to be skeptical of their presentation in science or society. For this reason, my next chapter takes up Medina's *guerrilla* pluralism to speak to exactly these concerns. There, I explore a history of one group of species whose intelligibility and disposability is imbricated precisely with such discourses and power relations.

CHAPTER V: SEEING WITH COMPOUND EYES: ETHICAL SPECIES PLURALISM AND THE CASE OF MOSQUITO VECTORS

Introduction

Thus far, this project has focused on how the species category in general (and each of its definitions and concepts) takes shape and is used within particular material, epistemic, ontological, and value-laden contexts. Chapter IV considered a version of pluralism that focused on bringing together contemporary and coexisting species concepts and definitions so that their frictions might motivate forms of resistance and responsibility. This chapter will take an insect-eye view of the problem and advance a method by which we can challenge the way that *specific species* or groups of species became legible and intelligible within Western science and society. Specifically, I take up another form of *guerrilla* pluralism (Medina 2011), or what I also articulate as a form of seeing with compound eyes, that focuses on the importance of providing additional or plural histories of the way certain species or species groups become visible and the discourses that determine what can be said about them. This historical or genealogical iteration of ethical species pluralism is an important complement to the work of reframing how we treat species concepts more generally. For even after we articulate that species definitions take place within a given context and find ways to productively use the tensions and frictions between these definitions and concepts to open space for different ways of coexisting, the species or species groups we consider are often already layered with all kinds of naturalized and taken-for-granted meaning and unity. Using alternating definitions of species to make the most of elephant conservation, for example, does not necessarily address the generalized and culturally articulated figure of the elephant which still plays a role in the outcomes of these debates. After all, the way elephants get more conservation attention than, say, insects, has much to do with the way these beings are presented and made legible in relation to humans.

In taking on critical genealogies of specific species groups, we can begin rethinking our present in ways that do not assume fixed species essences or natures at the outset: natures which are only then reaffirmed with every retelling of the history. The goal of these counter-histories is to take an extended look at how knowledge and taxonomy of certain species can be produced or generated in morally problematic ways that have lasting social

and political implications for them as well as other groups. To do this, I will look at how specific species life becomes legible in science and society—which traits are made visible and how, which are prioritized or neglected, what comparisons are made and which are subjugated, what metaphors are used, what discourses of illness, health, power, race, sex, beauty, and so on participate in making them visible? I see this as a way of not taking species essences or natures for granted, but, instead, tracking how they become legible precisely through contact with social, political, moral, and power relations, with the hope of finding other ways to see and be with them.

The group I consider in this chapter is everyone’s favorite arthropods: mosquitoes. I focus on mosquitoes for several reasons, or because I take them to be at the center of several important debates and issues. One key reason that will guide the historical inquiry in this chapter focuses on the understanding and articulation of mosquitoes in the scientific and public spheres primarily as vectors of disease. Starting around the Zika virus outbreak in 2016, I began noticing that mosquitoes were being widely labeled the “the most dangerous animals in the world” and that the bulk of public attention about Zika actually focused not on the virus itself, but either on mosquitoes or microcephaly (a condition sometimes causes by the Zika virus in gestating fetuses).⁵³ The formulation “most dangerous animal in the world” struck me as strange since, as biological individuals, mosquitoes are actually quite benign and harmless to humans. Yet the ability of *some* mosquitoes, depending on their species and sex, to carry diseases had led to *all* mosquitoes grouped and rendered legible through the language of transmission.⁵⁴

But this is not just any formulation of transmission; it is a special vectorial formulation of transmission and thus of mosquitoes’ lives in which the latter are made both hyper-visible as culprits of mass death and destruction and also completely invisibilized and made mere agents of the real biological pathogen. Statements like “mosquitoes are the most

⁵³ This and similar formulations (including “deadliest animal”) can be found at the following locations: <https://www.cdc.gov/globalhealth/stories/world-deadliest-animal.html>; https://www.isglobal.org/en_GB/-/mosquito-el-animal-mas-letal-del-mundo; <https://www.nationalgeographic.com/magazine/article/mosquito-disease-zika-malaria-science-eradication>; <https://www.bbc.com/news/magazine-35408835>.

⁵⁴ Why frame this as an ability rather than an inability? The *ability* I refer to is not just the carrying of certain microorganisms, because the mosquito exists at a level of biological complexity which necessitates all manner of microorganisms. By ability, I refer to the capacity to transmit very specific kinds of organisms (only certain parasites), in very specific ways (through feeding and through specific body parts), from one very specific kind of body to another. In a longer project, I will make the case that literature itself seems to treat this as an ability, almost like a special and maleficent talent.

dangerous animal in the world” blur individual species groups, ignore ecological and multi-species reasons why transmission happens, and distract from all non-transmission-related biological, ecological, or ethical content. In the rather aporetic structure of the vector, mosquitoes become visible simultaneously as virulent bastions of disease and benign vessels that merely carry the “real” harmful agents. Mosquitoes are thereby both discursively and juridically reduced to positive and substantive content. In other words, the mosquitoes themselves are not understood to have any substance (other than that of a hollow container) but are rendered intelligible (and often treated) as if they were nothing more than a conduit for more affecting material. The important distinction between the vessel and its contents collapses. This vectorial model of life or bodily relations has created a grid that delimits the biological (but also social, ethical, and political) intelligibility of mosquitoes (as well as ticks and flies, cows, pigs, and rats, and even certain human populations). Whenever there is the possibility of disease transmission, the host bodies (or the hosts of the hosts) are often treated as indistinguishable from the parasite, virus, fungus, or bacteria they might carry. I take mosquitoes to paradigmatically exemplify the problems with this vectorial grid of intelligibility and argue they were the organisms whose study, breeding, experimentation, dissection, and deaths mobilized the vector concept. But it is not strictly a mosquito problem. In fact, I argue that it historically emerged through the connection of mosquitoes with certain ways of seeing particular racialized and gendered humans. But there are other examples of this extending beyond mosquitoes as well.⁵⁵

In large part because of this vectorial formulation, mosquitoes are at the center of several other ethical debates which constitute the other reasons mosquitoes are of particular interest to me. With the Zika outbreak, popular and government support and funding for genetic technologies (e.g., CRISPR technologies and gene drives) aimed at extinguishing local

⁵⁵ For example, in 1917, concern about typhus and its lice vector led to the implementation of a severe quarantine at a US-Mexican El Paso border crossing: “Mexicans crossing the border, which was previously open, were segregated by sex, stripped naked, and examined for lice” (Smart 2012). The fear of disease, combined with the failure to distinguish Mexican persons from the typhus-infected lice they may or may not have carried (or the lice from the typhus), contributed to anti-immigration sentiments brewing at the time and helped justify a severe stigmatization of Mexican immigrants and strong anti-immigration policies along the Mexico-US border. The tendency to collapse the distinction between host and pathogen was common in medical institutions of the time, like the Rockefeller Foundation’s Sanitary Commission, which wrote about the hookworm epidemic, “Every Indian coolie already in California was a center from which the infection continued to spread throughout the state” (Farley 2004, 4). In both cases, management techniques developed in medicine, and population control were directed at the Mexican and Indian populations, as if they were the cause and not at the pathogens.

mosquito populations has skyrocketed. It was noticeable that neither of the main strategies for addressing the Zika virus outbreak addressed Zika as such: instead, they include genetically manipulating the *Aedes aegypti* (Yellow Fever Mosquito) and *Aedes albopictus* (Asian Tiger) mosquitoes through either suicide genes, which kill mosquito larvae before they reach maturity, or infertility genes, which sterilize males and prevent offspring.⁵⁶ Gene-altered versions of these mosquitoes have been released in several countries and most recently in Florida. These approaches exemplify a regulatory focus on charismatic host bodies; either mosquitoes or humans get all the attention, not the viruses, microbes, and other players.⁵⁷

Yet even though these technologies focus on extinctions at the local and population level, and are thus not necessarily poised to result in species extinction per se, they have raised *total extinction* as a thinkable and sayable moral question: is it ethical to consider extirpating or eradicating species who carry disease (Pugh 2016; Nussbaum 2016)? On what grounds could we justify harm, let alone extinction? Martha Nussbaum tries to tackle a very similar question and makes the claim that “if we abstract from the harm that mosquitoes do to other animals . . . there would seem to be something wanton and unpleasant about devoting a lot of energy to killing mosquitoes. Harmless insects of similar capacities should not be unnecessarily killed” (Nussbaum 2006, 362). Yet, here, mosquitoes are again placed in contradistinction to “harmless insects of similar capacities” precisely because they are understood through a vectorial formulation as themselves the agents of harm (i.e., “harm that mosquitoes do”). This even causes Nussbaum to take mosquitoes as representative of a specific moral question: should the capabilities approach, permit, or encourage the flourishing of traits (or the trait-bearers) that are unintentionally harmful to others? After describing a similar moral question raised by predators (what she calls “the case of the predator”), she states: “In another case, some characteristic activity of the animal causes harm to other species (bearing disease, killing crops), even though the animal is just going about its life without hostile intent or even hostile behavior; let us call this the case of the

⁵⁶ In tests conducted by Oxitec in the Cayman Islands and Brazil, the release of modified male “self-limiting” mosquitoes (whose offspring self-terminate) led to a 90% reduction in *Aedes aegypti* mosquito population (Oxitec Brazil).

⁵⁷ The World Health Organization is funding vaccinations and medication research that will address the human part of this vectorial equation, but such medications will take years to make it to the shelf. For now, the best-funded and most-deployed technologies focus on diminishing mosquito populations.

mosquito” (369).⁵⁸ In Nussbaum’s wording, it is a trait of mosquitoes themselves that causes harm (even though not all mosquitoes are transmitters), rather than the pathogens, who do not even get mentioned. Of course, the general question Nussbaum raises about unintentional harms is interesting and important. But how such questions get answered depends on how they are asked, and I wonder how that question might look with a different, less vectorial framework at play.

Finally, the moral permissibility of eradicating certain mosquitoes is a particularly striking debate given the increasing scientific concern and growing public awareness of the dramatic disappearances of insects and the catastrophic impact such losses will have on the world. Are mosquitoes not also insects? How could we rush to save insects but in the same breath raise the possibility of extinguishing some? In my experiences at a local gardening club in Eugene, Oregon, that focuses on native plants and pollinators, group members will in the same breath mention drawing pollinators to one’s garden and advocate planting and landscaping in ways that will deter or kill mosquitoes. While I do not expect everyone to love mosquitoes or host them in their gardens, what strikes me is the way mosquitoes are not even recognized as pollinators, even though that is, in fact, a primary way they interact with their environments. Even the females, the only ones who bite, primarily eat nectar and only eat blood when reproducing. Why aren’t mosquitoes visible as pollinators? And do they not count as part of the group of insects we are worried about saving? What places them outside this global effort to save and mourn vanishing insect species? How did we get to a place where intentionally extinguishing mosquitoes through gene drives makes sense to us? What are the conditions that enable and facilitate such drastic measures?

To answer these questions, and to try to make space for a different approach to mosquito lives, I offer a critical genealogy that counters the official history of how mosquitoes were first classified and understood in Western science and how the vectorial formulation gave rise to the possibility of and motivation for determining mosquito species differences. I also clarify that the vector concept of transmission itself developed precisely at an interspecies nexus between certain mosquitoes and certain human lives and power relations. Specifically, mosquitoes became visible as individual species and as carriers of disease in the same moment and through the establishment of knowledge intricately bound

⁵⁸ Even the naming of these cases is striking: the first is not called the case of the lion or the orca, but the second picks out a specific group of species she takes to be representative of the problem.

up with highly racial, gendered, and colonial projects. Attention to the imbrication of species intelligibility with paradigms of race, (hetero)sexuality, and coloniality is a feature of the method I employ here.

The need to explore the history of our present understanding of and relations to mosquitoes, to rethink or problematize the seemingly naturalized concept of the vector and its rule over mosquito legibility, is clearer now than ever. In Section I, I explain the function of counter-histories as a form of genealogical pluralism, give a brief account of the official history to which this genealogy is an alternative, and then explicate the Foucauldian version of genealogy and specific methodological tools and categories of analysis I deploy to activate the counter-history or counter-vision of mosquitoes. Then, in the following three sections, I deploy these genealogical categories of analysis in order to present a history of our present concept of the vector, the emergence of mosquitoes into science and Western society and the significance of this alternative history for possible ways forward.

i. Guerrilla Pluralism and Compound Vision as Resistance

In providing an alternative and critical history of mosquitoes' emergence into visibility and taxonomy and of the vectorial concept that played/plays such a big role in determining mosquito intelligibility, I pursue what Foucault calls counter-history, what Medina names "counter memory," and what I call a counter-vision. Because these plural visions of history open onto plural visions of the present and the future, I refer to this counter-history as opening up space to and for counter-vision, or alternatives ways of seeing and interacting with mosquitoes and other vectorial others. Counter-vision emerges from a version of pluralism I call, in my own tongue-in-cheek manner (or is it proboscis-in-cheek), "seeing with compound eyes." Unlike simple eyes, of the sort most mammals evolved, compound eyes see multiple images of the world, coming in from different receptors, each tracking its own appearance, colors, and shapes.⁵⁹ Counter-vision is a way to pluralize the history and

⁵⁹ If one looks too closely, this analogy of course somewhat falls apart, since mosquitoes and other insects, along with cephalopods and others with compound eyes, are thought to ultimately resolve these many versions from different eyes into a single picture. Yet it is significant that another mechanism outside the vision apparatus is required for this unification—particular neurochemical processes that translate the material a particular way. But just the eyes themselves, they do not do that work.

legibility of mosquitoes, a key for pluralizing the possible visions (pluri-vision) and frames of visibility through which bodies become intelligible.⁶⁰

I base this counter-vision on the methodologies of Michel Foucault and Foucauldian scholars, and specifically, his works on philosophical archeology and genealogy. Unlike linear intellectual histories of the sort often found in histories of science, which run along a “cognition-truth” axis, Foucault describes a “genealogy of knowledges” (in the plural) that is “located on a different axis, namely, the discourse-power axis or, if you like, the discursive practices-clash of power axis” (2003, 178). In contrast to what Medina calls “official histories,” which are produced through the idea of a shared past and the monopolization of knowledge, counter-histories or additional histories of the sort genealogy generates (or recovers) undermine the unity, necessity, and naturalness of the official story. In doing this, they can reactivate, generate, or mobilize new interpretations, meanings, norms, and attitudes. Counter-histories and counter-visions do this by reveling in disunity, thwarting the unifying desires of official histories by highlighting the contingency of events, the ways concepts and forms of understanding could have been otherwise, the ways intelligibility took shape to cover over certain things and amplify others, and the way power was involved. For Foucault, the task we undertake in doing genealogy is “an immense and multiple battle, but not one between knowledge and ignorance, but an immense and multiple battle between knowledges in the plural—knowledges that are in conflict because of their very morphology, because they are in the possession of enemies, and because they have intrinsic power-effects” (2003, 179). Thus, through a counter-history or counter-vision, we engage in a kind of battle in which the legitimacy of justifications, actions, frameworks of knowledge, forms of intelligibility, and installed relations are thrown into question and opened to revision and reimagining.

⁶⁰ I take this guerrilla pluralism/genealogical approach to be a companion or complementary approach to multispecies ethnographies, which I understand to be characterized by deep commitments to understanding interspecies being and agency. For examples, see Govindrajana 2018, Kohn 2013, Tsing 2015. Multispecies ethnographies surely can arrive at similar insights about the problems with how species are understood or conceived and open onto alternative ways of interacting. Yet, multispecies ethnographies can, but are not bound to, use analytic categories I engage—attention to power, knowledge, discourse, conditions of acceptability, and I thus take the genealogical approach to offer particular kinds of insights. This, even though there are some that do rely quite a bit on Foucauldian insights (see work by Wadiwel 2016 and Pachirat 2011). The application of these specific theoretical tools to do a specific kind of work of resistance and denaturalization is what interests me. Having said that, it’s very likely that certain multispecies ethnographies could still be part of this guerrilla pluralism, provided the epistemologies they worked within provide sufficiently distinct counter-histories or counter-visions.

I take genealogical pluralism to also be in keeping with Maria Lugones's articulation of ways to resist taxonomies of purity which strive to domesticate multiplicity and plurality under the governing logic of a natural unity. She asks that we turn to "the concrete," to history, where "the training of the multiple into fragmented unities can be seen (1994, 464). For Lugones, this means beginning from a different logic that does not take the naturalness and ahistoricity of these unified and naturalized groups and categories for granted, since "the ahistoricity of the logic of purity hides the construction of unity (464-465)." Recalling Lugones's critique of purity, this chapter will historically analyze the way multiplicitous relations and bodies that have been "trained into unity" and taken for granted as essential groups (465).⁶¹

I lack sufficient space to first recount the "official history" of mosquitoes to which I am responding as thoroughly as Foucault recounts the repression hypothesis at the beginning of *History of Sexuality Vol. I* (1990). Yet the official mosquito and transmission history merits at least some attention here in order to see the how my history differs. Interestingly, that history is also tied up with transmission. Mosquitoes had not yet been grasped by the ever-reaching taxonomic arm of Western science *until* medical entomologists in Europe, Southeast Asia, Central America, and South America began to explore the connections between mosquito geographic ranges and life habits and the spread of diseases among humans and domesticated animals. That is, mosquitoes were not thought of as different species until it was discovered that certain groups seemed to play a role in the spread of disease and others did not (Kitcher 1984; Mayr 1963, 35). The concept of transmission is in fact so tied up with the speciation of mosquitoes that different species concepts were explicitly deployed precisely in order to solve different questions of transmission. For example, while the biological species concept was used to "understand the distribution of malarial infection" by making distinctions between different species of *Anopheles* mosquitoes, which otherwise had very minor morphological differences found principally at the egg and larval stages (Kitcher 1984, 317; Mayr 1963, 35), morphological species concepts were used to differentiate between three different disease-carrying *Aedes increpidus* species groups in California (Eldridge 1992, 219) and the ecological species concept

⁶¹ Lugones's call, as made in "Purity, Impurity, and Separation," to analyze the historical connections between power and knowledge is later actualized in several articles in which she strives to see the coconstitutive historical force of relations among gender, race, coloniality, and species.

to differentiate between *Anopheles homunculus* and *Anopheles bellator*, the latter of which is thought to be a vector for plasmodium species (parasite) (Mayr 1963, 73).⁶² Yet as many such scientific histories go, the classification of mosquitoes and their articulation in science centers on major figures and discoveries, on careful charts and graphs of morphological and genetic differences, and so on, while being (or being perceived to be) almost entirely isolated from political conditions, from gender and racial norms, from discussions of power, and from discourses outside of biology, entomology, epidemiology, and taxonomy.

These historical accounts of the “discovery” of mosquito species, ecosystem roles, and transmission abilities all begin with the object of inquiry already formulated and clear and then set about articulating a history that neatly meets up with this present. Histories as told in Spielman and D’Antonio’s *Mosquito: A Natural History of Our Most Persistent and Deadly Foe* (2001) and Winegard’s *The Mosquito: A Human History of Our Deadliest Predator* (2019) open with the figure of “the mosquito” (in the singular) already established as a conduit of death, a “magnificent enemy,” a spectacular and fecund product of nature and evolutionary prowess, an “agent of history” due to their spread of disease (Spielman and D’Antonio 2001), and so on. These books focus on mosquitoes as agents in a largely human-centric history but leave out humans as agents and shapers of mosquitoes lives and how they are understood. Furthermore, without the naturalized and seemingly value-neutral vectorial formulation that I will problematize, many of the comments in these histories of “the mosquito” do not make much sense.⁶³ For example, entirely unreflective about the seemingly “purposeless” and an-ecological position from which they speak, Spielman and D’Antonio explain that

⁶² Actually, Mayr spends a huge portion of his highly influential *Animal Species and Evolution* speaking about mosquito species and speciation, and a good deal of that time on the different ways of understanding species and their intricacies (sister species, sub-species, hybrid species, and so on) is told through and around various moments when different mosquitoes were discovered as conduits for different diseases.

⁶³ I use the language of problematizing following Koopman’s work on genealogy as problematization in *Genealogy as Critique* (2012). Koopman suggests that genealogy as problematization assesses practices and knowledges without presupposing a normative path forward. It is radically unprescriptive. While I do intend to show how dangerous these vectorial practices and knowledges are, I leave open the sorts of thing that might follow my genealogy. This is why I have chosen the language of problem and response. There are many ways we could bring to language the relationship between history and genealogy: a making and unmaking, a problem and response, a problem and solution, a subjugation and desubjugation. I prefer the languages of problem/response and making/unmaking. I see genealogy as paving the way for different, novel responses to problems and as unmaking in order to make space. An additional benefit of the language of response is its non-anthropocentric quality. There are many possible responses to power from lots of different bodies; there are many ways the made can be unmade. A project at the intersection of species renders subjectivity/desubjectivation metaphors (with their baggage of the human subject) less appealing and probably less helpful than something as open as response.

“more than most other living things, the mosquito is a self-serving creature. She doesn’t aerate the soil, like ants and worms. She is not an important pollinator of plants, like the bee. She does not even serve as an essential food item for some other animal. She has no ‘purpose’ other than to perpetuate her species. That the mosquito plagues human beings is really, to her, incidental. She is simply ‘surviving and reproducing’” (2001, xvii).

Spielman and D’Antonio also open their book with a disturbing quote from the famous eugenicist doctor Havelock Ellis (1921), “If you would see all of Nature gathered up at one point, in all her loveliness, and her skill, and her deadliness, and her sex, where would you find a more exquisite symbol than the Mosquito?” (Spielman and D’Antonio 2001, xiii). This entire way of understanding mosquitoes is, as I will show, consistent with the model of the vector, which I show was built alongside highly racialized and sexualized rankings of human life. This formulation through which history is read was also made possible within a *dispositif* of efficiency that treated certain bodies as either evolutionarily superior to or in service of others and was prominently circulating during the discovery age of vector biology (which was also the discovery age of mosquito biology). These histories vacillate between extremely specific species details of the roughly 3,000 species of mosquitoes (often related to different transmission patterns) to rendering mosquitoes in the singular and in the gendered form “she,” also emphasizing “her” fecundity, skill, and ability to transmit disease, while de-emphasizing other traits or roles like pollination and food provision. These histories have mosquitoes already formulated in terms of a feminized empty vessel, ready to be filled with pathogens before spilling them into the next unsuspecting host through shamelessly “hardy, clever, and relentless” means (Spielman and D’Antonio 2001, xix).

Yet this is not a neutral way of making mosquitoes intelligible. The formulation of “the mosquito” as a she and as the most pristine version of “Nature’s” sex and deadliness is interwoven with the way mosquitoes have become visible as biological beings. These frameworks or lenses condition how mosquitoes can be understood and engaged with. Thus, to combat this, the counter-history I undertake in this chapter uses a version of the genealogical method to demonstrate that the vector concept which helps organize these frankly bizarre statements about mosquitoes is a problematic and historically contingent scientific concept rather than a neutral apprehension of biological reality. I claim that this concept, developed at the intersection of highly fraught racial, colonial, and gender relations, played a major role in enabling the circulation of statements about and intelligibility of

mosquitoes as a family of species, and certain mosquito species in particular, even as it also played a role in the intelligibility of certain members of the human species and racial groups, pathogen lives and transmission, and so on.

One notable exception to the above histories, and a project that methodologically and thematically foreshadows my own, can be found in Francois Delaporte's, *The History of Yellow Fever: An Essay on the Birth of Tropical Medicine* (1991). Delaporte was Foucault's only official student and writes using similar tools and analytic frameworks in what he calls an "archaeology of science" (144). Specifically, Delaporte tracks the epistemic, historical, and political conditions that made it possible for Cuban physician Carlos Finlay to make certain statements and think specific thoughts that paved the way for understanding mosquitoes as "hosts," "vehicles," and "carriers" of yellow fever nematodes (109). He frames the mosquito (in the singular) as a concept and an object (31) that was taken up differently by mechanistic interpretations (i.e., agent of transmission) and biological interpretations (i.e., intermediate host) (31). The difference between these two paradigms played a major role in shaping the theories of transmission that emerged. Finlay helpfully analyzes each of these metaphors (vehicle, carrier, and host), their relation to other medical terms and mechanical-versus-biological articulations of life and disease, and some of the subsequent statements such metaphors made possible. He also showed that "the mosquito theory"—that movement of yellow fever from human to human included mosquitoes—was one particular "interpretive scheme" by which certain theories or organization of concepts made possible particular observations, not vice versa (91). "The science of vectors is nevertheless rooted within [a] discursive structure" that combines previously incompatible formulations: that of mosquitoes as host and as vehicles (119). This project, similar to Foucault's own commitments, moves against histories of science which treat the knowledge arrived at as inevitable, the result of a linear history of peeling back secrets. Delaporte shows how the theory of the mosquito (and the metaphors used to make it legible) was not itself a discovery but a lens through which reality was then interpreted and "discoveries" retrospectively justified (91).

Some of the many insights I borrow from Delaporte include an attention to the development and use of metaphors (like the vector) which made possible the intelligibility of transmission, attention to the way mosquitoes are understood with respect to their activity or passivity (118 and 120), and Delaporte's belief that the interpretative schemas make possible

the truth statements about mosquitoes, rather than serving as mere observations. Yet my project is also irreducible to Delaporte's. I spend time tracking the conditions in colonial China, where Patrick Manson (whom Delaporte mentions but does not explore in great depth) worked on malaria and Wolbachia. I also take a greater interest in non-transmission-related political happenings. While Delaporte speaks of colonial power struggles between the US and Cuba and pays particular attention to the way various nationalist interests and narratives of scientific greatness impacted the race to discover transmission methods, I focus on how mosquito intelligibility became possible through contact with colonial projects and problems seemingly unrelated and far afield of scientific debates themselves (i.e., including infant mortality and the use of wet nurses for European families in China). This brings me to one final distinction between Delaporte's project and my own. He tracks yellow fever transmission and follows how mosquitoes are understood by virtue of their role in that history. I, however, am doing a genealogy from the mosquito's point of view: only by starting to question, problematize, and denaturalize the myopic way mosquitoes as organisms and lives are circumscribed and made legible did I find myself doing a genealogy of the vector concept. Put differently, the problems we are tracking are quite different: I track a problem around mosquito legibility to which the vector is an answer, while Delaporte tracks a problem around transmission, to which mosquitoes were an answer. This difference in focus is made more concrete in Canguilhem's (I think accurate if somewhat melodramatic) characterization that Delaporte's book "introduces us to another phenomenon of the world of death. Insects, often associated in the imagination with flowers, are sometimes unwitting terrorists capable of sowing fear across entire continents" (1991, ix). Canguilhem then cites Delaporte's own claim: "Death came now not in the form of a man with a scythe but of a biting insect" (1991, ix). If my own genealogy can do anything, I hope it contests this collapse between mosquitoes and death.

Building on both Foucault and Delaporte, my analysis here tracks and expands on their methods and insights. Since many of the concepts I use have very specific analytic functions, let me explain how I understand genealogy (and archaeology). I will also outline four of the main concepts and tools I use to unpack the epistemology and ontology of the vector and the historical emergence of mosquitoes on the taxonomic stage: 1) truth

statements; 2) power-knowledge assemblages; 3) *dispositifs*; and 4) conditions of acceptability.⁶⁴

First, from archaeology, I borrow an emphasis on uncovering the conditions of the possibility of thinking and of statements by looking at how networks of thought and practice produce discursive formations specific to a given time period.⁶⁵ Archaeology understands the objects of science not as neutral or objective apprehensions of the given world, as they are often presented in other scientific histories, but as products of historically contingent and generative processes by which aspects of the world *are both foreclosed and created*.⁶⁶ Archaeology especially provides tools for analyzing the production of truth, where truth is “understood as a system of ordered procedures for the production, regulation, distribution, circulation, and operation of statements” (Davidson 1986, 221). Statements are claims that can only be true or false (and indeed, only become intelligible) in relation to an existing network of knowledge. For example, the statement, “the *Aedes aegypti* mosquito species is a vector of disease” is only intelligible in relation to other statements about the nature of a species, disease, vectors, and transmission and can be rendered true or false only with respect to

⁶⁴ The categories I choose to use are by no means solely constitutive of genealogical method. Other important genealogical tools I do not rely on so heavily in this chapter include, but are not limited to, practices, subjectivation, and techniques. Furthermore, I refer to these tools as categories and genealogy as an analytic, following Colin Koopman and Tomas Matza’s classification of various elements of Foucault’s work. They refer to genealogy and archaeology as analytics, and the conceptual lenses they deploy as categories. Koopman and Matza, 2013 “Putting Foucault to Work: Analytic and Concept in Foucaultian Inquiry,” *Critical Inquiry* V. 39 no. 4. pp. 817-840.

⁶⁵ There is much debate about the relationship between archaeology and genealogy in Foucault scholarship. But I follow the school of thinking in which these are compatible projects and in which genealogy builds upon archaeology. As Koopman argues, following Davidson, genealogy does not leave behind the elements of archaeology but instead adds to them (2013, 31). In his first lecture at the Collège de France, Foucault suggested that “the critical [archaeological] and genealogical descriptions are to alternate, support, and compete each other” (1970, 234). As Foucault’s own later work suggests, the archaeological method declines to theorize knowledge in its relationship to power and to the social institutions and practices out of which they emerge and to which they contribute (Dreyfus and Rabinow 1983). So, in later work, especially *Discipline and Punish* and *Will to Know*, Foucault presented his historical methodology under the new label of “genealogy,” thereby signifying an approach irreducible to archaeology. I understand genealogy to add to archaeology, to “widen” the kind of analysis that can be pursued and take them to be complementary projects (Davidson 1986, 227). Also, see François Delaporte’s discussion of Foucault’s archaeological method in “The Birth of the Clinic and the Sources of Archaeological History” (2018).

⁶⁶ Here I am not supposing the existence of something like “reality itself.” Rather, Foucauldian genealogies trace the existence of paths never fully taken or objects of knowledge and experience that are subjugated or erased by dominant histories. I refer to these as “aspects of the world that are foreclosed”: they are, so to speak, buried alive in the annals of history. I see my work as tracing not only those aspects of the world that are created in the sense that they persist but those paths that are blocked, never allowed to be walked, or which once glimpsed must be forgotten.

those other claims. This attention to scientific truth statements is crucial for exposing contingencies within the sciences and will allow me to raise fundamental questions about the relationship between those discursive objects (mosquitoes, vectors, transmission) and the social relations of colonialism, racism, biopower, and so on.

A second tool I take from genealogy is the concept of a power-knowledge assemblage. For Foucault, power-knowledge assemblages serve as a framework of intelligibility to help render visible the relations among various forms of knowledge, techniques, and practices. Specifically, they help excavate the way knowledge and truth are constituted in coordination with power and social practices (Foucault calls this coordination “interplay”) (2015, 233).⁶⁷ For Foucault, “every point at which a power is exercised is, at the same time, a site of formation, not of ideology, but of knowledge; and, on the other hand, every knowledge formed enables and assures the exercise of a power” (2015, 233). In the case of the vector, the idea of power-knowledge assemblage will help me explicate the way the biological and the historical aspects of the vector are bound together with what Foucault calls “technologies of power” (1976, 152), and in this instance, the ways bodies are invested with power—their materiality the result of political and social processes. The conditions of knowledge formation are intimately tied to operations of power, with knowledge of bodies made possible by generating new strategies for controlling and manipulating them.

I also rely on the concept of a “*dispositif*,” which Foucault described as a network of heterogeneous institutional, organizational, discursive, and physical mechanisms and knowledge constructs that result from and facilitate power’s exercise in society (2018, 2013). A *dispositif* refers to the connection and relation between these elements which allows this delocalized mechanism to be deployed in a number of settings for a broad range of

⁶⁷ Davidson argues that genealogy entails an increasing attention to the role of power in producing truth: “Truth is linked in a circular relation with systems of power which produce and sustain it and to effects of power which it induces and which extend it. A ‘regime’ of truth” (1986, 221). Genealogy is thus “the mutual relation between systems of truth and modalities of power” (1986, 224), or as Koopman suggests, attention to “multiple vectors of practice,” such as both power and knowledge, not one or the other (2013, 31). Here he describes archaeology as dealing with “a system’s enveloping discourse; attempting to mark out and distinguish the principles or ordering, exclusion, and rarity in discourse.” Meanwhile, genealogy “deals with series of effective formation of discourse; it attempts to grasp it in its power of affirmation . . . the power of constituting a domain of objects, in relation to which one can affirm or deny true or false propositions” (1970, 234). In short, the latter refers to the relationship between power and knowledge insofar as they produce a domain in which things can be said to be true or false.

purposes.⁶⁸ Foucault also describes a *dispositif* as consisting in “strategies of relations of forces supporting, and supported by, types of knowledge” (196) and as having a predominantly strategic function: a *dispositif* is formed in response to a moment of “urgent need” (1980, 195). In other words, a *dispositif* posits itself as a solution to a problem, and in so doing is traceable through a “particular manipulation of forces, either developing them in a particular direction, blocking them, stabilizing them, utilizing them, etc.” in order to address a specific concern (196). This decentralized set of relations between both discursive and non-discursive forces has the effect of creating a milieu in which diverse and heterogeneous forces generate and justify statements and practices.⁶⁹ So while a *dispositif* is not necessarily the cause of any concept, it does have an effect on what is taken for granted or what is understood to be *real*. *Dispositifs* permit the division of all possible statements into those statements that are acceptable within “a field of scientificity”—statements that can be said to be true or false—and statements which cannot be characterized as sensible in a scientific sense. In short, a *dispositif* conditions what can be understood as real. I suggest that the *dispositif* of efficiency and development is crucial for understanding the formation and dissemination of the vector concept.

Finally, genealogy offers the analytic categories of conditions of extraction and conditions of acceptability, which will help me analyze how the model of the vector was able to be transmitted across time, academic fields, and geography. In his Collège de France lectures from 1972 to 1973, titled *The Punitive Society*, Foucault suggests that rather than looking at a single origin point of the prison form that was then generalized or “widely copied,” it is more likely that there was a whole “network of exchanges” taking place between the US and Europe, creating a decentralized social knowledge (2015, 100-101). Foucault eschews historical models that look for a causal structure, with a single cause and a linear series of effects—the sort that is given in official histories, and instead proposes a “network of communication” through which certain models or knowledges are extracted

⁶⁸ *Dispositif* is often translated as “apparatus,” “assemblage,” or sometimes “deployment,” but because these words are attached to other literatures and authors (like Agamben and Deleuze) and thus potentially sneak in assumptions about what a *dispositif* is or can be into Foucault, I choose to stick with the original French.

⁶⁹ Foucault gives the example of the *dispositif* of imprisonment, which not only had the effect of making detention seem like “the most efficient and rational method” in response to illegal activity, but constructed an entire milieu of delinquency and criminality in and through which a whole set of knowledges and practices around the truth and reality of criminality arose.

from one historical period, discourse, or area of the world, and received by another based on conditions of extraction and acceptability. This eschewal of linear causation fits with genealogy's resistance to the concept of a pure origin or original unity (1984, 370, 373).⁷⁰ Following Foucault, my own analysis of the conditions of acceptability of the vector in biology will lean heavily on analyses of power.

In doing this work, I produce a counter-history and counter-vision to conventional wisdom about mosquito taxonomy, biological legibility, and ethical precarity. The purpose of this counter-history is to provide something for the present and even the future; to bring subjugated knowledges and relations into focus in the now so that they can be examined alongside the inherited descriptions, accounts of truth, and so on. In other words, the function is to denaturalize and show the contingency of the ways society and knowledge are organized, to hopefully open onto alternative relations.

ii. Entomology in Europe and China, 1875-1900: Nursing Mosquitoes and Conditions of Acceptability

The concept of the vector that we find at work in vector biology was drawn from mathematics. In the interest of length, I have placed a sketch of the debates about the nature and content of mathematical vectors in Appendix A. From mathematics, the concept of the vector jumped both to sanitary (or medical) entomology and genetics. I focus on the conditions of possibility in medical entomology that made space for the uptake of the mathematical concept of the vector, since my real interest is in tracking the conditions of the

⁷⁰ Rather than tracking a vague influence of one domain on another, Foucault wants a careful outline of 1) “the vehicle and trajectory of the transfer”; 2) the “constant elements that form the model”; and 3) the “conditions that make extracting the model possible and, at its point of arrival, its insertion and acceptance” (2015, 101). Though I cannot claim that these concepts belong exclusively to the analytics of genealogy, insofar as they might also be useful categories of analysis in archaeologies, I treat them as genealogical for the following reasons. They were developed during Foucault's transition to genealogy, which I have suggested is characterized by an increasing attention to power's intersection with knowledge, and they helped Foucault explore the power/knowledge assemblages that allowed the transmission of concepts and forms. Specifically, Foucault deploys them in his work on prisons to explain how the prison form could be extracted and taken up into different geographical locations and domains of knowledge. As he explores the extracting and accepting of the prisons and the *dispositif* of criminality, Foucault deals explicitly with the relationship between power and knowledge. He tracks the relations between the juridical power of police and law, moral systems, and the organization of bodies (specifically, different classes) (1973, 102-111). This does not mean power necessarily plays a role in all possible conditions of acceptability, or that this tool requires an analysis of or attention to power. But when Foucault develops these categories and first deploys them, they are in order that he might more precisely analyze the particular power/knowledge assemblages that make concepts or forms of power extractable.

vector's uptake in epidemiology and impact on mosquitoes. How does the vector end up allowing the functional collapse of the distinction between transmitter and transmitted? What was happening in the study of medicine and insects in the nineteenth century that allowed this vectorial model to create the framework of intelligibility for mosquitoes as nothing more than disposable, killable vectors?

To answer this question, we need to look back to the connections between entomology, parasitology, and epidemiology in East Asia in the mid-nineteenth century to early twentieth century.⁷¹ Before 1875, the role of arthropods in the lifecycle of nematodes (parasitic worms) was unknown. Just prior to this, between the years 1858 and 1876, Leuckart had discovered that Cyclops (water fleas) was the intermediate host of a fish nematode, but very little was known about other intermediate host species or the lifecycles of the parasites that infected them. To put this in perspective, this is just as Louis Pasteur expanded the germ theory of disease in 1857, and the causes of and relationship between microbes and diseases were also only just at that time being illuminated (1850s to 1900s). There were many early observations of connections between arthropods and diseases, but it was not until 1878 through 1915 (virtually the same years that mathematicians vigorously debated vectorial models) that entomology began connecting to epidemiology in what was called at the time sanitary entomology or medico-entomology.

Patrick Manson is widely credited to have discovered that mosquitoes were the intermediate hosts of *Wuchereria bancrofti* (the cause of lymphatic filariasis, more commonly known as elephantiasis). Manson was a Scottish doctor, trained at the University of Aberdeen in the 1860s, who worked in Formosa (what is now Taiwan) and China in the late 1800s attempting to track the lifecycle of *Wuchereria* worms in order to prevent or cure elephantiasis. On a trip back to London in 1874, Manson learned of a discovery by T.R. Lewis, a British doctor stationed in Calcutta, who connected the particular microfilaria to elephantiasis.⁷² Manson discovered that these small filarial worms were the offspring of adult worms that lived in the blood but needed to discover how these beings were passed from

⁷¹ Unfortunately, time also prevents me from providing a thorough account of tropical entomology in the Caribbean and South America, both of which bear striking similarity to the gender and colonial issues as they develop in East Asia.

⁷² Both Lewis and Manson had found the filariae in the bloodstreams of patients with elephantiasis, but Lewis made the connection between the two.

person to person. It was by studying the lifecycle of these worms that he began to reason the need for an intermediate host, stating, “some other agent must intervene . . . one which is capable of piercing the skin of the human body. Now the agent which occurred to me as being the most likely to effect the necessary step in the translation of the filariae was the mosquito” (1878). In his pursuit of the lifecycle of the parasites, Manson discovered that while the microfilariae were in the mosquito, they grew from embryos into larvae only after entering the mosquito’s gut. Just before exiting the mosquito, they migrate to the mosquito’s head and proboscis, where they are subsequently placed back in the body of the next human the mosquito bites.

When Manson identified the mosquito as the intermediate host of the filarial worm, he called the mosquitoes the nurses, or nursemaids, to the worms (1878). This designation, while strange to our ears, was not without precedent, since Manson’s theory of filarial lifecycle followed the cestode-trematode model laid out by Japetus Steenstrup, who used the term nurse (*amme*, more appropriately translated wet nurse) to talk about invertebrate sexuality.⁷³ Nineteenth-century naturalists noticed that invertebrate animals sometimes alternate between sexual and asexual models of reproduction. This created lengthy debates about theories of reproduction. In Steenstrup’s theory, called the alternation of generations, in the lifecycle of some invertebrates, “each cycle could be mentally broken down into a series of genetically connected but separated individuals, starting with the product of a fertilized germ, passing through an indefinite number of intermediate asexually reproducing forms, and finally terminating in a sexual individual” (Churchill 1979, 143).⁷⁴ Steenstrup called the asexual generation a “preparation generation,” and their function was to “prepare the way for the later, succeeding generation of animals destined to attain a higher degree of perfection.” Arguing that these generations were similar to those of bee and ant communities who lose sex organs in order to serve as feeders for their colonies, he called these intermediate bodies the “nursing generations” and each individual organism a nurse

⁷³ Nineteenth-century naturalists noticed that invertebrate animals sometimes alternate between sexual and asexual models of reproduction.

⁷⁴ This is in contradistinction to a butterfly, for example, which begins as an egg, then develops into a caterpillar before transforming itself into a butterfly. At least, that was Steenstrup’s claim. We now know more about what happens inside a butterfly chrysalis, which might cast a little doubt on this, but the major effort was to distinguish between these two kinds of lifecycles.

(Steenstrup 1845, 4).⁷⁵ The nurses were there to ensure the perfection, the evolution of subsequent generations of offspring, not primarily to advance or protect themselves.

Steenstrup's work on the alternation of generations was significant in parasitology and gained influence on and attention from many, including Manson (Churchill 1979; Farley 1982; Winsor 1976; Li 2004).⁷⁶ Yet Manson's model, while borrowing from Steenstrup, differed in one key way: in Manson's case, the nurse and the perfect generation did not belong to the same species. So why did Manson still feel comfortable applying the term? Steenstrup had organized his analysis of sexual and asexual reproduction in terms of a division of labor in domestic arrangements. In fact, many biologists in the nineteenth century used the differences in sexual reproduction within a species as a crucial example of the division of labor in nature's economy. Much nineteenth-century biological research on reproductive mechanisms was conceived through division of labor in nature's economy even outside of a single species.⁷⁷ For Manson, then, it made sense to consider that these intermediate hosts play an important role in the developmental labor of the worm species (Russett 1989, 144).

Manson's model of the mosquito-parasite relationship placed mosquitoes in a harmonious, caring relationship to the parasite. Indeed, the concept of nature as harmonious and full of perfect, efficient adaptations was very prominent in natural history (Ospovat 1981, 2022). Manson believed it was a perfect adaptation that enabled the filarial parasites to live in mosquitoes without harm or, rather, for mosquitoes to nurse and care for the filarial embryos. It was not a symbiotic or mutualist relation, because mosquitoes did not appear to benefit in any way and were simply willingly used.⁷⁸ He stated, "like many other parasites, it requires the service of an intermediate host . . . to nurse it till it becomes equipped for

⁷⁵ This is also not without precedent, since William Kirby and William Spence did a great deal of entomological work with bees and distinguished between two kinds of worker bees, the "wax maker" and the "nurse." Kirby and Spence, 1815.

⁷⁶ There were, however, plenty many who disagreed with this interpretation, variously claiming that the relationship was not one of a mere nurse or attendant but of a parent: someone who both begets and nurtures. Then there were others, like Thomas Huxley, who recognized the nurse and the perfected generation as the same biological individual in two forms (1898, 146-151).

⁷⁷ For more on this, see Londa Schiebinger's "Why Mammals are Called Mammals" (1993) and Schiebinger and Swan's *Colonial Botany* (2005).

⁷⁸ We now call this kind a commensal relation, where a larger host is unaffected or essentially unchanged by smaller species that often does show at least some morphological adaptation to the host.

independent life” (Manson 1984, 369). Evidence for this was, among other things, the fact that the number of filarial embryos in the mosquito’s stomach usually outnumbered that found in an equal quantity of blood obtained from a human from which a mosquito drew blood (Manson 1878a 11; 1878b 308). Manson suggested, “From this it would appear that the mosquito has the faculty of selecting the embryo filariae; and in this strange circumstance we have an additional reason for concluding that the insect is the natural nurse of the parasite” (1878a 11; 1878b 308). He also noted that the embryos existed in far fewer numbers in the blood during the day than at night, indicating they had “nocturnal periodicity,” i.e., there were limited numbers of them in the blood during the day but they reappeared at night coincident with the vector’s greatest biting activity. He also argued that “the mosquito” was “adapted for fishing the filariae out of the bloodstream. The proboscis of the insect . . . must tend to arrest the parasites as they are swept against it by the stream and the lashing movement of the little animals tend to eatable them still further, and bring them under the influence of the suction-force exercised by the insect” (1884, 371-372).⁷⁹ Manson argued that they were adapted to each other, or what he called a bidirectional adaptation, and thus mosquitoes were in some ways to blame for its transmission, since mosquitoes had adapted to and made themselves available to these parasites. Though Manson initially thought the filarial worms emptied themselves into nearby available water after a mosquito’s death, he eventually did demonstrate that they were the agents of transmission when, in 1900, he carried malaria-infected mosquitoes to London and then had them bite two volunteers (his son and his assistant) (Manson 1900).

According to Manson’s problematic language, mosquitoes play a more or less *passive* role with regard to transmission, even though the role of mosquitoes is active, insofar as they have adapted themselves for the benefit of the filarial embryos. Manson renders mosquitoes passive. As nurses, mosquitoes are not understood to have other purposes or value. The other bodies inside them (other bacteria we now recognize as crucial to mosquito health) were also ignored as irrelevant. Instead, mosquitoes were thought to exist in relation with, and purely for the purposes of helping the embryos complete their lifecycle. Mosquitoes were more or less confined to this domestic role of passive caretaking but not of creating or

⁷⁹ Because Manson held to the widely held belief at the time that mosquitoes only drink once, and from a single host, he did not feed the mosquitoes in his care and study. Because they then died after only a few days, Manson never saw any further development of the filarial worms. Instead, he argued that after the death of their nurse, the filarial escaped into various water sources.

being affective in any other way. They were emptied of biological roles and all content except as they were the conveyers of these other worms. There is a note in “On the development of *Filaria sanguinis hominis* and on the mosquito considered as a nurse,” that states, “Throughout this memoir Dr. Manson employs the term ‘nurse’ in the same sense as that in which helminthologists use the term ‘intermediate host’” (1878, 304). Yet “nurse” is not a neutral, benign substitute for “intermediate host.” Instead, it smuggled in all kinds of assumptions about mosquito lives.

What made this reading of mosquito life possible? Why render mosquito life intelligible through a division of labor framework at all, let alone understand them to be nurses, wet nurses, simply existing for the benefit and perfection of another species? I suggest that we understand the relationship between mosquito life, colonialism, and sexual division of labor through what I call a *dispositif* of efficiency and development. As a reminder, a *dispositif* is a network of heterogeneous elements (power, knowledge, techniques) developed in response to certain problems, such as we see on the colonial frontier: population die-offs or conflicts, environmental hazards, and material resource conflicts or scarcity. It has the effect of generating a milieu in and through which various sets of knowledges and claims about the truth of reality become possible. The various colonial, medical, scientific, and political assemblages of power/knowledge in East and Southeast Asia operated within a milieu of efficiency and development that determined the kinds of questions that could be asked, the relationships that could be made visible, practices that made sense, and the solutions that could be imagined. In essence, the world was understood in terms of efficiency and development, and this *dispositif* connects the various scientific, social, economic, and political expressions of power/knowledge at the time.

In the nineteenth century, this *dispositif* of efficiency and development intimately connected biological theories of natural order and concepts of social order.⁸⁰ Evolution was perceived to be a machine of efficiency, weeding out the least effective, or most superfluous and wasteful. Perhaps there is no better example of this than Manson’s own rendering of the mosquito and parasite relationship as one of perfect adaptation—a closed and efficient loop of energy exchanges, without waste, to enable the extreme fecundity of virus and mosquito. Society was also understood through evolutionary, developmental, and teleological

⁸⁰ For more examples, see Richards 1989, 1994; Russett 1989; Schiebinger 1993; McWhorter 2009.

processes, with social Darwinism (and its eugenicist tendencies) becoming popular across the political spectrum. Economic and banking systems were imagined in terms of efficiency, productivity, and development, even bodies themselves were increasingly legible through their ability to produce (children, money, labor). In particular, the division of labor was understood as a natural model of efficiency and also the most efficient way of organizing a home or a workforce. This concept of the division of labor in biology was not unrelated to the existing colonial and gender hierarchies of European hierarchy. In particular, it is well documented that the concept of the sexual division of labor was used to justify existing gender hierarchy by European and American nineteenth-century scientists. For example, German zoologist Rudolf Leuckart voiced the standard view that females only had one role in evolution: reproduction, while males had additional roles, such as fighting and protecting society (Farley 1982, 111). Herbert Spencer's theory of social evolution argued that European women's specialization in domestic matters was a result of evolution. American biologist William Brook, the prominent American psychologist Stanley Hall, and a number of influential others all used the evolutionary concept of the division of labor to argue against the demands of women for higher education (Russett 1989, 130-153; Farley 1982, 113-120). Evelleen Richards even makes the convincing case that Darwin's theory of sexual selection was influenced by his own childhood family relations and his adult relationship with his wife (Richards 2017). This social concept of the division of labor was used to explain organic phenomena, even as the social manifestation justified itself through the observations of the life sciences.⁸¹ Manson's self-described "comparative pathology" approach relied on the concept of a unity in nature that allowed scientific principles to be derived or deduced from social relations (Manson 1877, 31).⁸² Stephen Jacyna has even suggested that comparative methods were widely held to be the basis for the "possibility of arriving at biological laws" in general (Jacyna 1984, 48). Manson's use of the language of domesticity is not merely metaphorical.

⁸¹ For more on the relation between nineteenth-century British biology and the political and social thought, see Young, "Darwinism is Social" in *The Darwinian Heritage*, ed. David Kohn (New Jersey: Princeton University Press, 1988); Adrian Desmond and James Moore, *Darwin*, 1994. Evelleen Richards, "The 'Moral Anatomy' of Robert Knox: The Interplay Between Biological and Social Thought in Victorian Scientific Naturalism," *Journal of the History of Biology*, 22 (1989).

⁸² For similar work happening in comparative methods, see William Carpenter, *Comparative Physiology* (London: John Churchill, 1841).

In the colonial context, there were also racial and colonial dimensions to the division of labor in the colonies which arguably made their way into Manson's framework of intelligibility of mosquito as wet nurse. Just before Manson began exploring the filial worm's lifecycle, he and colleagues in China discussed the role of Native wet nurses in the healthy rearing of young European children. The wet nurses were called in to solve the problem, as Alexander Jamieson notes, of extremely high mortality rates amongst European children (1873, 104-105). Yet while no clear medical cause for these mortality rates was consistently documented, the blame often tended to fall on the children's mothers, who were considered too fragile to properly care for their children in China's trying climate.⁸³ Somerville claimed, "it is unfortunately the case that it is very rare to find in China a foreign mother who is capable of adequately providing for her child during the whole period of lactation. The debilitating effects of the hot season have, I dare say, much to do with this, it at all events I think there is no doubt as to the fact" (Somerville 1873, 64). Manson even coauthored a report and agreed,

"Dr. Somerville has pointed out, and everyone who has had as much experience on the subject must confirm his statements, that a very large portion of European mothers are unable to suckle their children in China" (Manson and Manson 1874, 31). This problem, encountered in other East Asian countries in the same era, caused British surgeon Stuart Eldridge to claim of the European women in Yokohama Japan that they were "bad mothers" (1878, 70).⁸⁴

To solve this problem, it became common practice for European families in East Asian colonies to take on a Native wet nurse (Chaudhuri 1988, 529).⁸⁵ This caused a great deal of anxiety, both in the medical and scientific communities, as well as in the lives of colonists. These nurses were often the only way European children could survive infancy in the colonies. Referring to the need for wet nurses in East Asia, Manson even claimed that "the European constitution must be altered in this respect before it could flourish" in the

⁸³ For more about the various discussions and possible causes, see Reid 1872, Somerville 1873, and Steward 1880.

⁸⁴ This was not exclusive to China. British doctors in Japan found the same problems. In Yokohama, Japan, Stuart Eldridge, a surgeon of the General Hospital of Yokohama, claimed that "an exceedingly large number of women here are unable to nurse their children though otherwise in good health . . . At least 33 percent of the parturition women of Yokohama are, in this sense, bad mothers . . ." Eldridge 1878, 70.

⁸⁵ It was very common in India for British families to hire *amabs*, or Indian wet nurses. Chaudhuri 1988.

colonies. In other words, the high rates of British mortality and the need for wet nurses represented threats to the British colonial project. How were British families to colonize or conquer these places if their women and children were not capable of withstanding the climates? In reference to this problem in India, where colonial families suffered similar fates, British doctor Edward John Tilt even worried, “we could conquer India, but we succumb to its climate. As far as women are concerned, the various processes of reproductive function are less perfectly performed” (Tilt 1875, 4). The inability of women to properly nurse and the requirement of Native wet nurses was considered one of the primary threats to the racial degradation of the tropics, and thus threatened the whole colonial project (Fayrer 1873).

This anxiety about racial purity or racial degradation is consistent with Foucault’s own claims about the relationship between power and race. In his 1975 to 1976 lectures to the *Collège de France* (collected and translated into English under the title, “Society Must be Defended”), Foucault describes the way the state began to treat its society as a living being whose precarious purity and safety justified mechanisms of control. In particular, Foucault suggests that in the eighteenth century especially, race “became the discourse of power itself” (2003, 61). In effect, the discourse of race generated the possibility of “a single race, portrayed as the one race, the race that holds power and is entitled to define the norm, and against those who deviate from that norm, against those who pose a threat to the biological heritage” (2003, 61). Phrased another way, Foucault argues that societies unified under the belief that, “we need to defend society against all the biological threats posed by the other race” (2003, 62). This generated a state-sanctioned biological racism. But, as McWhorter notes, the particular kind of racism that arose during the nineteenth century was not focused on attacking members of other races outright but, rather, with protecting the boundaries of “the only race that matters, the human race embodied in its ‘highest’ representatives” (McWhorter 2009, 140). This kind of racism, continuous with colonial conquest, was “unthinkable in the absence of the biological sciences, clinical medicine, and institutional psychiatry that arose in the last half of the nineteenth century” (2009, 140).

For Foucault, biopolitics names the kind of power that manages the life of the species and produces biological racism. Foucault claims that “biopower will derive its knowledge from, and define its power’s field of intervention in terms of, the birth rate, the mortality rate, various biological disabilities, and the effects of the environment” (2003, 245). While biopower is often associated primarily with the practices of managing human

populations, it is centrally concerned with relations between and control of various species (including, but not limited to, humans), waterways, land-management practices, food sources, and so on. As we will see, mosquito lives fit neatly into this biopolitical matrix, because they were both models of biological efficiency (many marveled at their fecundity, abundance, effectiveness) and a threat to productivity of the human species. Biopower also managed populations in terms of capacity, activity, and productivity—the old, sick, or otherwise (seemingly) diminished were carefully monitored, and an entire domain of monetary (savings and insurance) and social (hospital and charity) practices were erected to know and control the efficiency of populations.

Thus, the use of wet nurses essentially threatens the colonial project, if the colonial project is understood as the securing, proliferation, and successful management of white, European bodies and interests in the Asian theater. The possibility that colonial bodies were not suited for East Asian temperatures or climates, and the fact that they might need to supplement weak bodies with more successful, fecund, and productive Native populations threatened the very possibility of distinct, pure, hierarchically organized races: in other words, it would disrupt the “discourse of power itself” (2003, 61). From the perspective of biopower, and certainly from within the *dispositif* of efficiency and development, wet nurses are a means of solving a biological problem: an antidote to the problem of the falling productivity, efficiency, and mortality of the species (or its highest members). But to solve this problem of racial purity, wet nurses were essentially emptied of their own content—their own cultural, sexual, or familial preferences—to become conduits for the health of white colonial children. They needed to be empty and ultimately passive—to, in a sense, lose their Nativeness, their otherness, but to also have their bodies reduced to a set of health statistics about breast health and fertility, or milk production. Then, they could supplement the white population while not posing any threat to the purity of the white family. Wet nurses were understood to be mere feeders (in Steenstrup’s sense), or as nurses, in Manson’s description of the perfection of one species by the nursing of another.

As Shang-Jen points out, rendering mosquitoes intelligible as wet nurses also draws uncomfortable parallels between colonizers and filarial worms. This connection could have highlighted that the British presence in East Asia was thoroughly parasitic (Li 2004). But that kind of statement was not possible, given the *dispositif* of efficiency and development, and evolution toward perfection which necessitated and justified the subjugation, use, and

expendability of some bodies in the lifecycle of others. In the East and Southeast Asian theaters of colonial power, we see this *dispositif* of efficiency and development linking a kind of biological racism (which we explore more in a moment) with a mastery over nature; it joined efforts to control fertility, sexuality, reproduction, and infant mortality in a number of species (human, farmed animals, and mosquitoes) with division of labor both in and outside the home: all of these various sites of knowledge/power were joined in order to increase bodily efficiency, and “in order to direct the course and evolution of human life itself,” nothing less (145).

So even as Native wet nurses were understood to be empty vessels, their bodies were tediously managed and imbued with fantastic sexual and reproductive powers, for the purpose of creating a sustainable population in Asia. In contrast to European women’s diminished ability to lactate, “Chinese women were reported to possess peculiar lactation ability” (Li 2004, 119). Manson’s colleague Augustus Müller spent years studying the unusual and heightened ability of Chinese women to lactate (1876). Müller noted a number of women were able to begin lactating after he had diagnosed them with “shriveled” and “dried” *mammae*; their *mammae* once again became “firm, well developed, and yielding on pressure a free flow of milk” (1876, 15-17).⁸⁶ Müller argued that this phenomenon was quite common in Chinese women as a whole. Through various biopolitical practices of calculating, measuring, monitoring, their lives were rendered legible in terms of a *dispositif* of efficiency.

Thus, on the one wing, Native Chinese wet nurses were understood to be empty vessels, passive in that their presence was purely for the facilitation of the colonial project, white lives, and thus the perfection of the species. But on the other wing, their bodies were simultaneously understood to be quite active and intensely productive. They became an immense curiosity to medical and psychological disciplines. They were both emptied of their own content and also filled with slightly deviant content, with the reproductivity of their bodies understood to be abnormal and even excessive.

Native wet nurses and mosquitoes as nurses were rendered intelligible through a framework of power-knowledge in which colonial social practices were naturalized through understanding them as biological processes of evolution. Meanwhile, biological paradigms were heavily reliant on the discourses of sexuality, labor, and divine will at work in colonial

⁸⁶ It is not beside the point to note that this doctor went around China feeling the breasts of many Chinese women in order to discover their breasts’ productivity level.

and patriarchal projects. Knowledge of mosquito bodies was constituted in conjunction with social practices, and their bodies were invested with social meanings about excessive fecundity, propensity for servitude, and other things supposedly true of Native Chinese women. So, it is that Manson fashioned mosquito nurses in a remarkable resemblance to wet nurses in the colonies. Though he understood them to be mere caretakers for the filarial worms, and in a sense, passive, in his blame for transmission, he collapsed the distinction between the transmitted and the transmitter.⁸⁷⁸⁸

Due to his discovery of the relationship between mosquitoes in the case of elephantiasis, and his role in the discovery of their transmission of malaria in 1900, Manson is widely recognized to have had an “epoch-making” impact on tropical medicine. He went on to write one of the most widely cited texts on Tropical Medicine, “Tropical Diseases,” in 1898. There have since been twenty-three updated editions. Perturbed by the slow spread of information about such important and potentially empire impacting diseases, Manson founded the London School of Tropical Medicine in 1899. He was also president of the Society of Tropical Medicine and Hygiene, founded in 1907. It is in England, in the context of lectures at these schools and societies, that we see the vector first appear in entomology.

iii. England and America, 1901-1921: The Vector Jumps

So far, I have demonstrated that Manson rendered the mosquito-parasite relation intelligible through power-knowledge assemblages that used colonial social practices to render both female mosquito and Native women’s bodies intelligible as natural and necessary stages in

⁸⁷ Biology separates two kinds of vectors: mechanical and biological, which differ in mode of transmission of disease. A biological vector is said to transmit actively, usually through biting. In this instance, the insect is an intermediate host in the lifecycle of an organism. A mechanical vector transmits passively, usually taken up on a part of their bodies and transmitted merely by touching. However, in the above analysis, the act of transmission here has so entirely given way to the transmitting agent, that even within the discussion of a biological vector, the agent is both passive and active at the same time (Marquardt 2005; Atkinson 2010). Its active role is what allows for it to be the subject of blame, while its passive role is what renders it legible as a mere receptacle of a more insidious agent.

⁸⁸ Manson and so many other sanitary entomologists focused almost exclusively on female mosquitoes and became almost obsessed with their bodies and their role in this transmission process. He, like so many other entomologists of the time, spent his time with a harem of female mosquitoes, investigating their mating habits, their fertility, their preferences for egg laying, how many eggs they laid, which species laid more eggs at what time of year, and so on. This nursing of filarial worms then came to be understood as a female function, and thus the attention to female fertility and productivity was justified. Steenstrup even frames this as a matter of excluding males from the process: “This previous or preparatory multitude seems to consist, invariably, of females, the male being apparently excluded from any participation in the office” (Steenstrup 1845, 111).

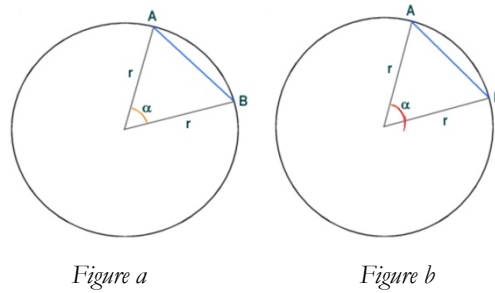
the lifecycle of the powerful. These power-knowledge assemblages and the various practices and techniques through which they developed were connected through a *dispositif* of efficiency and development focused on concepts of perfected nature and the evolution of the human race through the management of bodies, some of which were managed as expandable, and others enabled to flourish. Through this *dispositif*, Manson rendered feminized and racialized bodies vessels for the propagation and evolution of the human race and mosquitoes as empty vessels existing for the propagation of parasites. This network of power/knowledge that understands mosquito life through colonial, racialized, sexist frameworks of intelligibility and justifies its exercise of power on these bodies through a *dispositif* of efficiency and the biopolitical defense of the species serves as a condition of acceptability for the concept of the vector from mathematics and the theoretical sciences. Because the vector is the direction of a relationship between two other charges, without its own positive or negative value (or content), it sits very nicely within the framework of intelligibility through which mosquitoes and other lives were made visible by Manson and other entomologists of his day (see Appendix A). But where and when exactly does the concept of the vector make the jump?

We can see the same model of empty nurse vessel transmitting positive content in the first, second, and third editions of *Tropical Diseases* (1898 to 1903). For example, Manson claims that mosquitoes, “so to speak, *prepare them* [respective germs] *for entrance* into their human host.” The language of “preparing” the filarial babes for entrance into their human host is consistent with his earlier framework of intelligibility. Mosquitoes are still understood to be engaged in a kind of labor, or care work, on behalf of the filarial worms. The worms and the humans take on significance, and the mosquitoes are only there by virtue of their role in transmission, even as they are also blamed as a causal agent.

But we also see the introduction of mathematical language to describe the relationship: “When this third animal happens to be a tropical species, the disease it *subtends*, so to speak, is, in natural conditions, necessarily tropical also” (1989).⁸⁹ In mathematics,

⁸⁹ The full passage goes as follows: “The geographical range of malaria and of filariasis is determined by that of certain species of mosquito which ingest and act as intermediate hosts to the respective germs, and, so to speak, *prepare them for entrance* into their human host. The distribution of a large number of animal parasitic diseases depends in this way on the distribution of the living inoculating agency, as in “fly disease,” or of the intermediate hosts, as in malaria and filariasis. When this third animal happens to be a tropical species, the disease it *subtends*, so to speak, is, in natural conditions, necessarily tropical also.”

angles are subtended by arcs. For any angle, there are two rays (marked by r in figures below). To mark the angle, you can draw an arc, connecting the rays across the angle, as shown by arc a in figure a . This is a subtended angle: the arc begins and ends on the rays that form the angle in question. However, one could have angles that are not subtended by an arc, or an arc not subtended by angles, if the arc exceeds one or both of the rays, as shown by arc a in figure b below.



This language suggests the mosquito as a vector of transmission is more appropriately represented by arc a in figure a , because it does nothing other than connect the two rays: it does not exceed them in any way. In the analogy, the disease and the humans are the positive content—the entities with substance whose interaction matters, and the mosquito is the arc, measuring and making possible that connection. This replicates the model of the nurse as well, where mosquitoes (and the Native wet nurses for whom they are named) are delivery mechanisms connecting one to the other. So far, we at least know that Manson is pulling from math to clarify the role of mosquitoes in transmission.

The first use of the mathematical concept of the vector in medical entomology occurs in London, in 1907, in Manson’s inaugural address to the Society of Tropical Medicine and Hygiene, of which he was president. There, Manson makes the claim, “Everyone knows that the mosquito is the sole vector of malaria, and an enormous literature has grown up around a discovery which has changed radically our views, now only as regards the etiology and prophylaxis of malaria, but has given a powerful stimulus to the study of the Protozoa in general, and to the role of insects in the transmission of disease germs” (1907, 4). Though this is the first place the vector appears in writings of an entomological and biological nature, the fact that Manson did not need to explain what this meant to the crowd indicates the idea of mosquitoes as vectors was perhaps circulating at the time. In other words, it was already possible to make certain statements about mosquito life as

vectors, because by that time, there already existed a specific framework of intelligibility through which insect and parasite relations became intelligible as empty vessels.

Indeed, much of the language accompanying the concept of the vector (at least at the turn of the century) is accompanied by language that reflects the *dispositif* represented in sciences of the day: concepts of a perfected, efficient, cooperative nature that allows scientists to evoke images of mosquitoes as willing and earnest participants in this process of transmission or fulfilling their destiny by harboring and transmitting mosquitoes. We see this same language about other kinds of arthropod species and research in Europe and the Americas during the “discovery age of vector biology” (roughly 1875 and 1933).⁹⁰ For example, C.W. Metz, special investigator for the United States Public Health Services, described the malaria vector *Anopheles quadrimaculatus* as “transmit[ting] the malarial plasmodia readily” and being “physiologically well adapted to this role” (1919, 169).⁹¹ In a sense, within the *dispositif* of efficiency and development, the vector seems to be a concept par excellence: an evolutionary achievement with ruthless efficiency. Recall that this is exactly how Spielman and D’Antonio think of and describe “the mosquito” as some 100 years later (2001).

From this moment, there is a steady increase in the usage of the vector in both the United States and Britain (and the American and British doctors in their respective colonies) over the next twenty years or so. In 1908, Manson delivered another lecture, this time at a Charing Cross Hospital in London. There, he used the language of both nurse and vector to describe the relation of mosquitoes to parasites and disease transmission (1908, 991).⁹² In 1914, American doctors used similar language in the second volume of *American Journal of Tropical Diseases and Preventative Medicine*. In their chapters “Ants and Bees as Carriers of Pathogenic Microorganisms” and “Notes on Anopheles Production from a Malarial Survey,” William Mortan Wheeler and H.R. Carter (then assistant surgeon general for the United States Public Health Service Commission), respectively, both use the word “vector” to

⁹⁰ For a partial list, see Philip and Rozeboom, *Medico-Veterinary Entomology*, 1973, in *History of Entomology*. The years between 1875 and 1933 are widely considered to be the “discovery age” of vector biology, with entomologists discovering intermediate hosts for dozens of important diseases impacting human and other mammals (Eldridge 1992; Philip and Rozeboom 1973).

⁹¹ “Some Aspects of Malaria Control Through Mosquito Eradication” in *Public Health Reports*, Volume 34, Washington, Government Printing Office: 2019.

⁹² The Hurley Lecture on Recent Advances in Science and Their Bearing on Medicine and Surgery. *Lancet* 1908, Vol. 172, 991-997.

replace “mosquito” altogether in several passages (as in, “the vectors lay this many eggs”) (1914, 753). It was used in sanitary entomology and parasitology texts, like the influential 1917 text by Leland Howard, Harrison Dyar, and Frederick Knab, “the Mosquitoes of North and Central America and the West Indies.”⁹³ And finally, even though Manson had been using the language of the vector in his public lectures for years (since 1907), the concept made it into his influential *Tropical Diseases* in the seventh edition, in 1921.

By May 1918, the framework of vector biology was sufficiently stable and set, and the language of the vector in fairly wide use, such that Dwight Pierce (from Insect Investigations in United States Department of Agriculture, Bureau of Entomology) integrated vector language into his lengthy course on all relevant materials for sanitary entomology.⁹⁴ In this course’s proceedings, the concept of the vector was already taken for granted to describe mosquitoes and other arthropods (Pierce 1921). In this lengthy course on sanitary entomology, very little about parasite or germ lifecycles is discussed. Instead, the course focuses entirely on the vector agents—breaking their lifecycles down into stages, uncovering their secrets, their preferences, for the explicit purposes of destroying them.

iv. Winged Enemies: Biopower Renders Mosquitoes in War and Law

As vector biology gains its wings in the early 1920s through 1950s, its justification and aims are rendered legible through the language of warfare, juridical languages of criminality, and biological languages of abnormality. The language of warfare is scattered throughout Pearce’s foundational course on medical entomology and other texts of the time. There are references to battling and destroying mosquitoes, ticks, lice, and others. Speaking about the knowledge of horsefly lifecycles and disease spread, Pierce states, “Fortified with this ammunition and more which he will personally gain, the sanitary entomologist must fight for better sanitation” (1921, 36). Speaking the juridical language of criminality, there are

⁹³ Leland Howard, Harrison Dyar, Frederick Knab, “Mosquitoes of North and Central America and the West Indies (DC, Carnegie Institution of Washington: 1917).

⁹⁴ The lectures were mimeographed and mailed each week to over 500 doctors and entomologists in order to prepare US doctors for potential outbreaks during WWI (which ended only a few months later, in November of that year) (Pierce 1921). The course was so thorough that some contemporary scholars, like entomologist Bruce Eldridge, suggest that the course “bears a remarkable resemblance to the latest available medical entomology textbooks, complete with definitions of mechanical and biological transmission mechanisms” (1992, 215).

everywhere the frameworks of judging, investigating, pursuing, convicting, rendering bodies guilty, and “offering proofs which have accumulated against these various insects” (36).

Where are these languages coming from? For Foucault, they are each developed within particular *dispositifs* and are enabled by different concepts or techniques of power (disciplinary and sovereign power, for example). How is it these diverse medical, military, judicial, and criminal languages come to be blended against mosquitoes’ lives? Certainly, the major voices in this discovery age are those of doctors and entomologists working with or employed by colonial military units, hospitals, and colleges on the frontlines of colonial projects (as was the case in the Caribbean, South America, and East Asia), various branches of United States and British governments, or some combination thereof. But is that sufficient to explain why an arthropod could be rendered in the same terms as the criminal or enemy of the state?

Recall that for Foucault, biopower is linked with a kind of racism or hierarchy that does not produce a single enemy but, rather, produces a unified race or population, “the one race,” who may be justifiably defended against any and all threats (internal or external) to purity, efficiency, and development. But Foucault also tells us that through biopower, the war that undergirds or justifies sovereign power and policies (the us versus them) is decentralized, proliferated, presenting in the form of management rather than mere exclusion (2003). In this sense, biopower does not replace so much as transform or subsume sovereign power’s juridical rights to kill or let live. At the turn of the twentieth century, biopower is not only interested in the minute mechanics of mosquito life (understood as almost unnaturally efficient and fecund little bastards); biopower is still invested with both the power to kill or let live, and it can still selectively deploy the juridical languages of war or criminality to render mosquito lives killable and expendable under the new terms of the health of the species. Mosquitoes do not threaten the state; they threaten lives—the lives biopower is determined to make live.

Thus, the language of warfare is produced *through* the integration of projects on sanitary and disease control with projects of national and racial purity and with the maintenance of productive, efficient bodies (human and nonhuman). Pierce states the *motivation* for the course as follows, “Our nation, as well as all our world civilization, is facing the greatest crisis in its existence in these days of reconstruction [following the First World War]. We must conserve human energy and keep it at its greatest possible point of efficiency.

This means above all that questions of health are foremost today” (1921, 19). The explicit *aim* was to “show them [medical entomologists] why insects are dangerous, how they are dangerous, what their habits disclose as weak points subject to attack, and finally, how to go about controlling them” (1921, 19).⁹⁵

This is consistent with Foucault’s claims in “*Society Must Be Defended*” that as society came to be understood as engaged in a struggle for being (in the evolutionary sense), states began to understand themselves as being infiltrated or invaded with foreign bodies against which they needed to defend themselves (2003, 254). He suggests that in this way, biopolitics comes under the control of the state, and justifies “murderous function of the State,” as that which is allowable to combat all that threatens the race under its protection (255). This follows the production of race in the biomedical senses, which was produced over the course of the nineteenth century (Foucault 2003, 254-255; McWhorter 2009). The protection and purification of the national race through the right to kill all threats became a central aim of the nation-state right at the turn of the nineteenth and twentieth centuries. Simultaneously, the race struggle intersected with a class struggle, which is picked up in the sanitation war. Foucault suggests that attitude of the time was that the “death of the inferior race will make life in general healthier” (2003, 255).

Since Manson’s writing on wet nurses, the concept of disease transmission and the vector have focused on the health of a nation-state and the white race. In the early twentieth century United States, the war against mosquitoes was framed as a preservation and purification of America’s white population, both domestically and in colonial ventures. It was not “human health” in general that was at risk because of these vectors: white bodies were at stake, both in their own home countries (in cases of yellow fever and Texas fever)

⁹⁵ In the afterword of Dreyfus’s and Rabinow’s seminal text, *Michel Foucault: Beyond Structuralism and Hermeneutics*, Foucault famously states, “My point is not that everything is bad, but that everything is dangerous, which is not exactly the same thing as bad. If everything is dangerous, then we always have something to do. So my position leads not to apathy but to a hyper- and pessimistic activism. I think that the ethico-political choice we have to make every day is to determine which is the main danger” (1983). Here, Foucault is defending his vigilance with regard to power, clarifying that it is not a judgmental disposition. It is an open and insistent attention to the fact that while things always have the potential for harm, that does not necessarily make them bad or terrible. Foucault is certainly talking about power and not mosquitoes, but perhaps the concept of danger here is still useful. For mosquitoes, the fact of being dangerous makes them bad. Following Foucault, I think this is a misunderstanding of what it means for something to be dangerous, and I would like to show how dangerous that particularly thoughtless, wide-sweeping, and universalist position on vectorial bodies like mosquitoes actually is. Vector biology and its power/knowledge assemblages are definitely dangerous, as are certain mosquitoes, but, ultimately, I want to distance myself from a thoughtless version of danger, in order to figure out how to treat the dangerous with greater care.

and in their colonial projects. For example, in the early 1900s in the US, both Mexican and Native American bodies were considered vectors for typhus and hookworm, respectively, rather than being understood as victims of either mosquitoes or pathogens, as their white neighbors were (Smart 2012; Farley 2004). Meanwhile, transmitted diseases were killing thousands of British and American soldiers in WWI and many colonists in East and Southeast Asia and the Caribbean. So many colonists died in the tropical colonization of the late 1800s and early 1900s, that the tropics were considered the “white man’s grave” (Philip and Rozeboom 1973, 342).

The war against mosquitoes and other vectors was a war to control the bodies of the intermediate hosts themselves. At the level of populations, the goal was to establish normal lifecycles and habits of arthropods in order to sufficiently alter them (Marquardt 2005, xxi). That is, much of the knowledge being gained about mosquitoes and other intermediate hosts was in the service of their destruction. The literature of the early 1900s is not shy about this point. In his 1901 book on mosquitoes, Howard makes the especially broad claim that “Knowledge of mosquito habits is more general than any previous time, and almost everyone is interested in the subject of mosquito extermination” (1901, vi). It is suddenly possible to make the statement that all mosquitoes should be destroyed and exterminated. He continues,

With the knowledge which we now possess, it seems almost incredible that people should all these years have suffered, more or less patiently, the tormenting bits of *Culex* and the insidious but more dangerous punctures of *Anopheles* without making the slightest effort to abate the nuisance and the danger, beyond slapping, in a revengeful way, at individual biters. In many places infested with mosquitoes nothing could be easier than to put a stop to the whole tormenting plague (Howard 1901, vi).⁹⁶

⁹⁶ The rest of the quote goes as follows: “With the very perfect proof that the mosquitoes of the genus *Anopheles* are instrumental in the carriage of malaria, the interest became intensified, and the late discovery of our Army Yellow-fever Commission in Cuba, that a mosquito is the conveyer of yellow fever, has added to the general interest in the subject. In fact, the whole mosquito question is a live topic of the day. Knowledge of mosquito habits is more general than any previous time, and almost everyone is interested in the subject of mosquito extermination. With the knowledge which we now possess, it seems almost incredible that people should all these years have suffered, more or less patiently, the tormenting bits of *Culex* and the insidious but more dangerous punctures of *Anopheles* without making the slightest effort to abate the nuisance and the danger, beyond slapping, in a revengeful way, at individual biters. In many places infested with mosquitoes nothing could be easier than to put a stop to the whole tormenting plague.”

Howard's book is replete with knowledge of mosquito lifecycles and the best time during those lifecycles to kill them. Knowledge of mosquitoes was put almost exclusively in service of their destruction, which also means that the facts that were known and circulated about mosquitoes were in this service (see Howard 1917 and 1901).⁹⁷

This war was waged at the local, state, and national government levels, in science labs and on streets. We have already noted the US federal government departments and bureaus dedicated to insect investigations, entomology, and pathogens, who did much of the funding and distributing of vector control literature. But there also existed institutions on the local and state levels. Many states formed their own commissions, boards, or bureaus, with New Jersey being the first to create a Mosquito Extermination Association, followed by Florida, Utah, Illinois, and so on. Most of these are still in existence, though largely unified under the American Mosquito Control Association. These usually employed their own doctors and entomologists, directed community efforts at mosquito control, and fully funded extermination efforts.

Still, the inclusion of the language of national efficiency signals that the goal was not simply *preserving* the life of the right (white) few. This war of sanitation against mosquitoes and other vectors was not the protection of life for life's sake, and it was not just a war against mosquitoes and other arthropods: it is an enactment of power over every body, population, and domestic space.⁹⁸ The control of mosquitoes was intended to enable a smoother, more predictable control of the output of human and other animal bodies. Pierce's statements of the courses aim, along with others made at proceedings around this same time, reflect a *dispositif* of development and efficiency.⁹⁹ They also reflect an assumption the vector is naturally (without any need for explanation) connected to processes of managing bodies and productivity. The issues here are bodies, species, and populations—

⁹⁷ He wrote a very similar book on houseflies, "The House-fly, Disease Carrier: An Account of its Dangerous Activities and of the Means for Destroying It" (1911). Again, we see the attention to regulating the bodies and fertility of females. "If an adult female fly can be destroyed before she lays her eggs, we will have killed not only the actual fly, but 120 to 600 potential flies due in a very short time, and if this female fly can be caught in the early spring the table on an earlier page will indicate that instead of performing a very simple act we have apparently saved the world from almost a calamity. From this can be seen the value of fly traps" (Howard 190, Fayrer, Joseph. 1873. *European Child-Life in Bengal*. London: Churchill 1, 60).

⁹⁸ Though there were plenty of individuals on the mailing list who were not American, this was put together by the US government and directed toward (and primarily used examples and knowledge from) the United States.

⁹⁹ We see the same kind of attention to development in criminology, psychology, and medicine.

extracting labor from them, controlling resource consumption, managing and increasing their output for maximum efficiency. As McWhorter reminds us, at the turn of the century “for a nation-state to maintain and better its position *vis-à-vis* other nation-states politically and economically, the bodies of its people, its soldiers, its laborers, its mothers—had to be healthy, variously skilled, and mentally competent” (2009, 196).

A crackdown on vectors enabled an intensification of management of bodies. Discussions of horseflies included not only best techniques for exterminating them, but also strict rules for household and bodily management, especially of women and children: where they could play, when they could be allowed to open their windows, how they should sleep, the list goes on. There was even an insistence that children should be made to carry flyswatters around with them regularly (Pierce 1921, 38).¹⁰⁰ The money expended on flyswatters and screens was intended to reduce doctors’ bills and create healthy workers. The goal was to produce more efficient bodies with greater output. This was true for humans as well as livestock. In the case of nonhuman animals, the effort was to uncover the “ways and means of accomplishing this greater farm output by reducing fly and mosquito breeding (Pierce 1921, 36).¹⁰¹

If the *dispositif* of the day were efficiency and development, if those were what counted as real, then as vectors (those in whom the distinction between host and pathogen functionally collapsed), insects like mosquitoes, ticks, lice, and flies fell outside of or in opposition to the real. They were *judged* to be dangerous, there were *cases* mounted against them, and *evidence* building that they were a threat to the health and productivity of bodies. They represented expendable creatures who needed to die to properly defend the nation-state and the properly productive bodies. There is no reason to worry about their deaths, since they are understood to be without content or purpose outside of their roles as nurses or aids for parasites anyway.¹⁰²

¹⁰⁰ This process of sanitization was intimately tied not only to race but also to class. As poorer and working-class areas in the United States were the ones who came under the most regulatory efforts with respect to cleanliness education, population relocation and reorganization, regular inspections. A longer version will connect this to Foucault’s work on class in “*Society Must Be Defended*” (2003).

¹⁰¹ At the time of this lecture series, three times the US financial resources went into understanding the way intermediate hosts impacted farmed animals as human animals (Pierce 1921).

¹⁰² This same treatment of vectors as outside of the law of nature, or the efficiency of the state, also justified the securitization of borders and increased anti-immigration policies. Because the model of the vector we have

v. Conclusion

In the period examined above, there was a shift in the work a vector could do, naming directed quantities in math, then species interactions, then epidemiological problems. But these were all moments that work to inform how the concept is used today (Tyagi 2008). Had a different version of the vector been transmitted from mathematics, had colonial practices and biological discourses influenced one another differently, our concept of the vector would either look very different or perhaps never would have been able to make the jump to biology for lack of insufficient discursive similarities. And the result might have been that mosquitoes never became legible primarily as carriers of disease, with their very species divisions parsed based on transmission abilities. We can still see the effects and operations of this vectorial framework today, with the language of warfare and punishment, enemies and extinction, governing how mosquitoes are understood and discussed both in scientific literature, in the public domain, and even in gardening clubs.

What remains to be shown are the possibilities of an alternative present or future—an alternative for mosquitoes and other vectors, and a chance for us to see them, and by virtue of our mutual imbrication in hegemonic power structures, to also see ourselves otherwise. Perhaps we might turn to what Foucault calls “an insurrection of subjugated knowledges” (1980, 81).¹⁰³ Indigenous and other communities in China, Africa, South America, North American, and the Caribbean all have alternative knowledges of transmission processes and prevention, of the role of and their relations to mosquito lives. There are other knowledges that have been subjugated through their lack of conformity with dominant discourses and *dispositifs*, or their unintelligibility. By highlighting the relations between the official histories and all of the other historical material and conditions of possibility that these hegemonic stories have dismissed or ignored, we create a fissure in the epistemologies and ontologies that have suppressed these knowledges and lives.

established treated vectors as nothing more than carriers of disease, not bodies to be given medical treatment, purged of the disease, or otherwise supported.

¹⁰³ By subjugated knowledges, Foucault means two things: knowledges that have been “buried and disguised in a functionalist coherence or a formal systematization” and “a whole set of knowledges that have been disqualified” because they were “naive knowledges, located low down on the hierarchy, beneath the required level of cognition or scientificity” (1980, 80-81).

This crack in the glass allows us to notice the lenses we have been wearing, and to realize that the naturalness we have taken for granted—the “it could not be otherwise” of our and other speciesed lives—could, in fact, be otherwise. The story I have told is one whose sources are widely available for viewing in the bowels of entomology libraries under stacks of dusty journals from more than a century ago. But I have told the story with reference to things not intended for inclusion in the archives and redrawn the connections hegemonic history has erased. My goal is to open space to see mosquito species and mosquito lives otherwise, to connect them to new traits, or stories, or knowledges, or relationships. Without knowing what that otherwise will be, and without pretending that will be free from power or hegemony, I suggest we open the windows on this settled, dusty issue. Let us make things a bit messier, not quite so sanitary. Let us let in some air, and perhaps a few bugs.

CHAPTER VI: CONCLUSION

In this dissertation I have argued that as long as the concept of species continues to play such a prominent organizing role in epistemic, ontological, ethical, and political domains, we need to pay a lot closer and more critical attention. In particular, I emphasized the urgency and importance of treating the species concept as more than a value-neutral matter of biology, a “settled” concept before discourse and language, which cannot be contested. Instead, I developed an account of how the concept of species is currently used in ethical and political conversations, and how it could be used otherwise.

In Part I (Chapters I and II), I argued that without critical and careful attention to what the species term means and what kind of work it does within various arguments, the concept of species can end up being governed by the same logics or conceptual habits—i.e. essentialism, purity, and unity—that have conditioned how we understand the categories of the human and the animal. Chapter II worked primarily to lay out why and how the concept of species is being used in particular moral and social-political literatures in what I called the species turn: the turn toward a multitude of species as a replacement the problematic categories of the human and animal (or the human and nature). Specifically, I outlined two critical motivations for this turn, the anthropic and ecocentric critiques of the human, which I take to roughly (and respectively) characterize humanist and environmentalist or ecological concerns with the use of moral categories of the human.

In the literature review in this chapter, I demonstrated that a wide range of scholars use the concept or category of species very loosely, rarely provide specific definitions, and often had the unintended consequence of deploying similarly essentialist tendencies as plagued the concepts of the human and animal. Moving forward, I believe it will be worthwhile to engage the use of species concepts in some of those thinkers more thoroughly. How might a critical analysis of the function of the species concept in Peter Singer or Martha Nussbaum transform how their work and subsequent moral theories (consequentialism and virtue ethics, respectively) are understood? What might a more thorough investigation of treatment of the species concept (rather than emphasis on the human) in Judith Butler or Sylvia Wynter look like and what might that gain?¹⁰⁴

¹⁰⁴ I admit that I have already begun this project in the work of Butler, and plan to take this up in both Singer and Nussbaum, who are well known for considering and then dismissing the species category as morally relevant

In Chapter III, I built heavily on the work of Maria Lugones, and showed that not all ways of understanding multiplicity (like the multiplicity of species) are equal when it comes to resisting essentialism. Without proper caution, species concepts can render attention to multiple species in ways that are consistent with a logic of purity and monophilia. Thus, despite long-standing concerns with essentialism and criticisms of the harms essentialism has done to humans, fellow animals, and other speciesed groups (as articulated in Chapter II), particular settled concepts of species can and do treat the species category in much the same way. Specifically, when not treated carefully enough, the concept of species can ground a problematically normative and exclusionary notion of the human as morally privileged vis a vis an understanding of *Homo sapiens* as a clearly bounded biological group that corresponds to the ethical category of the human. This was a problem we saw play out in Maria Kronfeldner's attempt to rethink and pluralize human nature, even as the moral category of the human was still filled exclusively with *Homo sapiens*. A second problem, which I addressed with Cynthia Willet, occurs when attempts to ethically engage a plurality or multiplicity of species are governed by a monolithic and reductive understanding of what a species is, which I take to domestic multiplicity with frameworks of purity, or unity. Thus, the problem in the species turn lies not with the move toward multiplicity and away from essences or dualistic moral categories like human/animal or human/nature, but with how that plurality or multiplicity and multiplicity are understood. I then concluded by noting that this organization of plurality into split-separable unities, or what she calls "the training of the multiple into fragmented unities," is an exercise of power and control that we need to address if we want to move past settled species concepts (Lugones 1994, 464).

In Part II (Chapter IV and V), I strove to address these issues by developing a rich, plural, and non-essentialist approach to species. Both of the chapters in Part II were constellated around the heuristic I named *ethical species pluralism*. This heuristic is a way of understanding species concepts and species groups themselves as un-settled (i.e. contingent, multiplicitous, and impure groups whose legibility is based on applications of values, norms, and power) rather than settled (i.e., pure, fixed, and clearly demarcated groups who are self-evident and fixed in nature). To do this work, I turned to more curdled forms of pluralism, both epistemological and ontological, which I believe are not governed by logics of purity

despite my concerns that there is still more to be said. For a similar investigation on the concept of species in the work of Jacques Derrida, see Sinclair 2019.

and can help unsettle our settled species concepts and uses of species discourse. Specifically, Chapters IV and V brought together and held in tension accounts of pluralism from philosophy of biology, Native American philosophy, and Latin American philosophy, and even a genealogical or historical pluralism, each of which had key insights for resisting settled species discourse.

Chapter IV developed the case for ethical species pluralism as useful tool as a way of emphasizing the moral dimensions of the species problem and species pluralism and for resisting dominant or institutionalized definitions of species. Here I showed that the species problem and the evolutionary theory that energizes it make it very hard for ethical or political theorists, or even biologists, to casually deploy the category of species without explanation, as though everyone knew what a species was and there was only one right answer. Instead, following certain strains of epistemic and ontological species pluralism from philosophy of biology, we find ourselves with an overwhelming array of species valid concepts and definitions, each of which picks out different groups, achieves different ends, and has different effects on the world. Yet, to avoid seeing species pluralism as value-neutral or value-free (in the same way the settled species concept is), I drew on Native American and Latinx philosophies to highlight the ethical aspects, possibilities, and responsibilities of species pluralism. At the very least, when one uses or implicates the species concept in ethics or politics (for conservation, for human or animal right discourse, and so on) to do so responsibly would requires being very careful about which species definition or definitions are used and an articulation of why those definitions support the kinds of ethical or political claims being made. Finally, precisely by highlighting that it not possible to choose *the* single perfect species definition from within the multiplicity of concepts and definitions, I argued that ethical species pluralism allows us to recognize our responsibility for the definitions we use and perhaps begin to find ways of mourning or attending to all that is or who are lost in these decisions.

I then concluded with Chapter V, which also worked from within the heuristic of ethical species pluralism. Building on the themes of resistance and responsibility outlined in Chapter IV, I argued that a plurality of critical genealogical accounts of different species and species groups can reveal cracks or fissures in our settled perceptions and receptions of them. I then looked at one group of species, mosquitoes, that I take to be both at the center of key ethical questions today (about gene-editing, intentional extinction practices, and

species management) and also largely neglected in ethical conversations. My genealogy of mosquito intelligibility shows how vigilance regarding the way species and species groups are categorized and made legible can help open space to imagine and develop richer and more robust ways of interacting with and understanding our many speciesed world. Yet even as this chapter focused on mosquitoes, I also worked to show that mosquito intelligibility developed in contact with and subsequently helped naturalize particular paradigms of race, gender, reproduction, and colonial power. By doing this, I hoped to show that these genealogies are important for reframing, resisting, and reimagining relations with speciesed others, as much as with ourselves.

With this project, I hope to have insighted curiosity about the ways concepts of species work in their various instances and to have conveyed the sense of deep responsibility I believe we have to analyze and attended to these. Yet I have laid out only the beginnings of this work. In the future, I see the work of ethical species pluralism unfolding in many exciting (if daunting) directions. First, here as in some of my other works, I hope to be modeling and engaging in a form of productive and respectful dialogue between philosophy of biology and Native American, Latinx, and other anti-colonial literatures. But there is more work to be done centering, for example, how the inclusion of non-Western species concepts (or alternatives besides species) and knowledges might impact species pluralism, what this means for how taxonomy, ecology, and conservation science unfold, and so on.

Second, there are many instances in which we might use ethical species pluralism to challenge or resist the way certain species concepts or definitions are used, and how different species become legible. For example, I hope to build on my mosquito momentum and explore the way different species concepts are used to divide mosquitoes in different sectors of biology in ways that each strategically permit the use, harm, or eradication of their named groups. I look forward to exploring how the use of other species definitions (various ecological ones, for example) might impact the function and outcomes of power. This kind of work would also include doing critical genealogical analyses of how and why specific definitions come to take priority or split off from others in various arenas. What *dispositifs* and power/knowledge assemblages were involved in the development of different definitions; what techniques or practices were used to generate specific truth statements and which species groups were centered in this work; what social norms or moral values were upheld, challenged, reproduced in these becomings? What might these histories show about

the way certain species concepts function and the way we understand specific species groups in the present?

Finally, I argued that ethical species pluralism demands facing or accepting our responsibility for our use of species definitions. But I have not yet really begun the work of further articulating this responsibility, imagining how that might look in different circumstances, and figuring out what it means to mourn the consequences of these decisions, even as I think this perhaps one of the more significant future projects that this work invites. What would it mean to sit with and articulate this responsibility in specific circumstances of conservation, agriculture, bioethics, or medicine, for example? What would it look like to begin telling stories about species (our own and others) differently in ways that did not take a groups solidity and fixity for granted and instead highlighted the weight of this responsibility? What would it look like to grieve the consequences of the decision to choose one definition or concept over another, and to hold that in tension with all that is achieved by the definitions or concepts we do deploy? I see this work as informed by an admission of and attempt to live within an impure and imperfect ethics, the sort advocated by Maria Lugones, but also and more recently Alexis Shotwell in *Against Purity* (2016), and look forward to where this responsibility might take me.

APPENDIX A

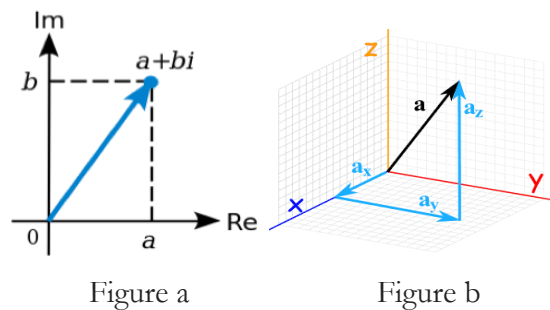
By doing a genealogy of the concept of the vector, am I denying that mosquitoes carry other parasites and other microbes from human to human? No. I could no more be suspicious of these causal processes than one could the laws of cause and effect themselves. I *am* interested in causes and effects: but are we certain we know which is the cause and which the effect? Is this process of transmission the cause of our concept of the vector?¹⁰⁵ Or is the concept of the vector the cause of this concept of transmission? My concern is not with the idea of a connection (even a casual one) between mosquitoes and malaria or Zika parasites. Rather, I am interested in the way this connection is made intelligible, that is, the concepts on which it depends. Specifically, how did the concept of the mosquitoes as vector, as empty vessels with positive content, come to be seen as a natural, neutral model, or grid of intelligibility, through which disease transmission and disease-carrying bodies are understood?

To find the answer to this, I became curious about the word's earliest uses: where was the word first used, how, and why? Were there controversies around the concept, and what motivated its sedimentation or settling into the taken-for-granted idea we have today? It is in math in the mid-1830s that the contours of the vector (as we see it in biology) began to take shape. Though in the following section I trace the development of the vector concept within math in a more archaeological than genealogical analysis, I believe it is important to include. Why? Because we must understand there were a plurality of vectorial concepts within math that could have, but did not, gain epistemological legitimacy. By underscoring the radical contingency of the conditions of possibility that enabled the *particular* concept of the vector that gets taken up in biology and etymology to gain privilege over its competitors, I hope to underscore the incidental quality, the "it could have been

¹⁰⁵ In their taxonomy of Foucauldian elements of analysis, Koopman and Matza identify concepts as the "formulations emerging out of or produced by inquiry" through archaeological and genealogical analytics. Though I do not develop this so explicitly in this paper, I believe the vector operates as a concept. Like security, biopower, governmentality, the vector is a name for a "conceptual network" (also Koopman and Matza's term) that results from my genealogical inquiry. As a conceptual network, it invokes a plurality of notions and may be deployed in different time periods or geographical locations. Though Koopman and Matza make further distinctions between operational concepts and conceptual figures, which I will explore in a longer paper, clarification about why the vector is a concept (rather than an analytic or category) seems sufficient for now.

otherwise,” of the vectorial concept inherited by entomology. In particular, I want to highlight the way the seemingly unrelated domain of electricity (electromagnetism) and its concurrent reshaping of cities and organization of bodies and work forces affected the epistemological battle within mathematics, and, thus, ultimately conditioned possibility of the uptake of the vector in biology.

In math, vectorial analyses are treatments of directed magnitudes (where the magnitude is the quantity, and the direction is a positive or negative value). Vectors are “quantities with a magnitude and a direction and commonly represented as arrows acting from the origin of a coordinate system” (Chappell 2016). There are two foundational precursors that helped shape what would come to be mathematical vectorial analysis: the idea of a complex number and the idea of a parallelogram of forces. Both ideas were necessary in order to provide a framework for the action of a quantity that would later come to be termed a “vector.” In 1545, Jerome Cardin (Girolamo Cardano) wrote *Ars Magna* [*The Great Art*], which is the first publication of the idea of a complex number (Boyer 1968). With this, he extends the concept of the one-dimensional number line to the two-dimensional complex plane (Boyer 1968). Below is a visual representation of a complex number: the “a” part represents the real number along the x-axis, and the “b” represents the imaginary part on the y-axis.



The development of this complex number makes possible the move from an understanding of three separate coordinates represented by a line on the three different axes (blue line $a+bi$, first diagram), to this new kind of thing called a vector represented by a new line (black arrow labelled “a,” second diagram). In 1687, Isaac Newton published *Principia Mathematica*, and lays out his version of a parallelogram of forces (Crowe 1967). Newton suggests: “A body, acted on by two forces simultaneously, will describe the diagonal of a parallelogram in the same time as it would describe the sides by those forces separately.” Again, this is not

quite the concept of the vector, but Newton was also getting close to the idea already becoming common in that period “that forces, because they have both magnitude and direction, can be combined, or added, so as to produce a new force” (Crowe 1967). This idea that a combination of forces can produce a new force is crucial for our concept of the vector, and took shape in the mathematical analysis of quaternions (mathematical representations of imaginary numbers in three- and four-dimensional spaces). Still, exactly how they could be combined would take another hundred years to work out.

In the mid-1800s, there were six mathematicians spanning four countries (Germany, England, Ireland, and the United States) who were working on systems that resembled vectorial systems without yet using this term. They explored several different algebras (up to 162) with which to make their cases (Boyer 1968; Crowe 1967). Two of the most prominent scholars were Hamilton and Grassmann, writing in the 1840s through 60s. Hamilton used the concept of the vector to help distinguish between the real numbers of a quaternion and the imaginary numbers, where vector refers to the algebraically imaginary part a quaternion. Grassmann noted that unlike pure mathematics, which are concerned with a theory of forms relating to nothing but other acts of thought, geometry is a form of math that “refers to a real existent: for geometry this is space. This is clear, since the concept of space can in no way be reduced to thought, but rather comes forth as something given” (Crowe 65). This will be important for our concept of the vector, because Grassmann emphasized that the vector corresponded to something real in time and space, and not simply an abstract formula. He was concerned that the concept of the vector be practically relevant to physics and other domains, including electricity. But perhaps most importantly, both Hamiltonian and Grassmannian mathematical precepts maintained the vector was itself a phenomenon capable of bearing its own sign, either positive or negative (though they disagreed about whether it was positive or negative).

In the 1870s and building from Grassmann’s principles, Maxwell wrote the influential *A Treatise on Electricity and Magnetism*, whose vectorial equations connecting magnetism and electric charge inaugurated the field of electromagnetism and further connected the vector to electricity. Maxwell furthered a theory of vectors that was not linked exclusively to quaternions, but also real-world issues.

The modern concept of vectorial analysis does not emerge until 1910, when it was agreed upon by the majority of the mathematicians and physicists of the time. From 1890 to

1894, “a widespread and vigorous debate on vectorial methods took place. No less than eight journals, twelve scientists, and thirty-eight publications came forth” (Crowe 1967, 14). This public and very “colorful debate” had the effect of alerting the scientific public to the plurality of vectorial systems, which had the subsequent effect of involving physical scientists and others in the outcome of the debate (Crowe 2008, 16).

Out of this, a third faction emerged, the Gibbs-Heaviside faction, who would come to win the debate. This faction comprised Josiah Willard Gibbs and Oliver Heaviside, American and English mathematicians, respectively, who independently revised Grassmann’s and Hamilton’s systems to remove the emphasis on quaternions and to focus on the vector’s relation to electricity. There is much evidence that Gibbs-Heaviside’s vector analysis strongly impacted the development of electromagnetic theory: they did not believe that the vector quantity of an electric field was either positive or negative. What does this have to do with electricity?

In electromagnetic theory, the vector quantity simply describes the direction that a positive charge would be pushed when placed in an electric field: the direction of a positive source charge is always directed away from the positive source, and the direction of a negative charge is always directed toward the negative source. The vector describes (and measures) the direction a current is headed. But importantly, electricity, like gravity, works through action at a distance. In other words, two positively charged sources do not need to be in direct contact in order to affect one another. Thus, the direction or vector along which charges flow is based on the lure or resistance of other charges but is itself neither positive nor negative. While the coordinates along which the vector travels might be positive or negative, the vector itself is neutral.

Gibbs-Heaviside won the debate not because their system came closer to representing objective truth, as both Gibbs and Heaviside argued for the existence of multiple algebras and vectorial systems. Rather, they won because they linked their mathematics to basic electromagnetic theory (Gibbs and Wilson 2010). Heaviside’s treatise on electromagnetic theory spoke at length about vectorial algebra (Crowe 2008, 14). The close of the nineteenth century saw many important developments as electromagnetism continued to produce such useful operators as the induction motor, the vacuum tube, and early radio receivers (Moyer 1997; De La Tour 1906). From the 1880s to the 1920s, electricity was also a major force in the reorganization of cities, populations, and social life.

Its availability in medical instruments meant a shift in the way knowledge was produced and what sorts of things were sayable about bodies (Howell 1995; Cooter and Pickstone 2000).¹⁰⁶ Its use in elevators enabled taller buildings in cities and ultimately forced greater population density (Stern and Mellins 1999).¹⁰⁷ The practices of electricity management and movement participated in and reshaped processes and practices of knowledge formation in modern life at the turn of the century. The concept of the vector that won this epistemological battle enabled a kind of transmission that made electricity the most efficient and fastest mode of energy, and it ultimately had effects on bodies, populations, and nation-states. In other words, the deciding factor for Gibbs and Heaviside's vectorial victory was not that their theory *had* "real world" applications: they actually participated in the making of the "real world" by changing communications, enabling the production of knowledges, and the rapid transmit of data in ways that were increasingly prized in that historical moment.¹⁰⁸

In this epistemic victory, the vector was produced as the directed effect of two charges on one another, even though they are not in immediate contact with one another. The vector does not have its own force or direction but refers to the direction of one body,

¹⁰⁶ For more on this, see Stuart Blume, *Insight and Industry: On the Dynamics of Technological Change in Medicine* (Cambridge, Mass: MIT Press, 1992); Roger Cooter and John Pickstone, *Companion to Medicine in the Twentieth Century* (London: Routledge, 2000); Adras Gedeon, "Science and Technology in Medicine" (Springer Science, 2006); Joel Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century* (Baltimore, MD: John Hopkins Press, 1995).

¹⁰⁷ These elevators also had the effect of impacting class distribution, as wealthier individuals moved higher and higher, farther from the streets.

¹⁰⁸ It is perhaps tempting to look at the role electromagnetism played in stacking the vectorial deck in favor of Gibbs-Heaviside and engage in ideology critique. If material resources were aligned with the enormous and growing financial investment in electric power, then there are obvious material and financial gains to be made by adopting a concept of the vector that best supports electromagnetic theory. But this analysis presupposes a unifying underlying ideological motivation governing the actions of an irreducibly diverse number of experiments, practices, and individual scientists. But Foucault warns that power-knowledge assemblages must be "formed, organized, and put into circulation" at a level that is "much less and much more" than ideology. It has to do with minute calculations, research procedures, verification methods, the movement and organization of the life and species of bodies, etc. Instead of asking why mathematics was shaped by electricity and assuming a monetary answer from the start, the question concerns why and how material practices of electricity management and movement were participating in and reshaping knowledge formation in modern life at the turn of the century. It facilitated advancements in medicine that allowed doctors access to new aspects of the human body. It modernized instruments in homes and reshaped communication pathways. It increased productivity in factories, enabled new standards of mass production, made possible increasing military sophistication, and generated a faster-paced world that became the gold standard for nation-states to be competitive. In other words, it is not simply about ideology and the possibility for money. Instead, it is about the application of power on bodies, populations, communities, and, ultimately, nation-states.

moving toward or away from another body (or charge, as is the case in electricity). We can see here the groundwork laid for later epidemiologists to discuss vectors as the actual host animal that is transporting a disease from one body to another, thereby collapsing the act of transmission itself with the agent doing the transmission. These are the conditions of extraction, the possibility of transporting this concept into another domain (PS 101).

How could the vector have been otherwise? If the vector had followed the premises of Hamiltonian or Grassmannian, we would be without the necessary separation of a vector into a kind of empty compound. Vectors could not be carriers or transmitters if they were instead assumed to be indissociable. We see here the formation of a vector as a historically contingent phenomena and not logically necessary. Vectors as infectious agents that spread disease by carrying it from one host to another is deeply reliant on the unique history (and debate around) the concept of a vector. It was necessary for the way we understand vectors today for the development of a concept of a vector as emptied of significance in and of itself.

APPENDIX B

The vector jumps from mathematics and physics to molecular biology in the mid-1950s. This coincided with advances in microbiological science exploring the roles of DNA. In 1953, Watson and Crick discovered the three-dimensional double-helix structure of DNA. Though many other scientists had a hand in the journey of DNA's "discovery," starting in 1869 when Swiss physiological chemist Friedrich Miescher first identified nucleic acids inside the nucleus of cells of human bodies. Identifying the nucleic acids was an important first step in allowing us to think about a transmitter as something more than an empty container but made up of constituent elements (Pray 2008). The structure of the DNA molecule was instrumental in paving the way to think about the transmitter of a message as containing constitutive elements itself. This marked the beginning of the shift away from the vector as an empty container.

In the 1950s and 1960s, vectors were a technique for getting slices of DNA, where subcellular components are used as delivery mechanisms. "Vector" still referred to a vehicle of transmission, or mode of transmission, essential to the sustained functioning of our bodies. Newly, we can see the mechanism of delivery from the "cleavage site" to insertion of something new. This marks another related shift in the concept of a vector, as now both messenger and message. After cleavage and the insertion of new nucleic acids, we see the becoming of something entirely new. We can thus see how the vector slips from the transporter of something to a new thing itself (Olby 1974).

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