**Introduction**

**Reading beneath the Grain**

_Clov: (anguished, scratching himself):_

I have a flea!

_Hamm: A flea! Are there still fleas?_  
_Clov: On me there’s one. (Scratching.)_  

Unless it’s a crab louse.

_Hamm. (Very perturbed.)_  

But humanity might start from there all over again!

—Samuel Beckett, Endgame

In the last three decades, animal studies has influenced every discipline in the humanities, including literary studies, encouraging scholars to acknowledge the anthropocentrism of the stories we have been telling about ourselves and the natural world. Nuanced analyses of what Aristotle called the “more perfect creatures” have introduced new life forms into traditional literary and cultural history, so that once-overlooked references to horses, dogs, apes, bears, cats, wolves, and other beasts in early modern texts now shimmer again with complex meaning.\(^1\) *Imperfect Creatures: Vermin, Literature, and the Sciences of Life* recovers a category of creatures—vermin—whose philosophical and literary significance in the period between 1600 and 1740 has been underestimated, if not erased. Historically, “vermin” is a slippery term because it refers neither to a particular biological classification nor to a group of genetically related animals; instead, it names a category of creatures defined according to an often unstable nexus of traits: usually small, always vile, and, in large numbers, noxious and even dangerous to agricultural and sociopolitical orders. The characteristic feature of vermin is they reproduce
so rapidly and in such numbers they threaten to overwhelm their biological, environmental and—from a human perspective—sociolegal contexts.

The first full-length study of vermin in the early modern period, Imperfect Creatures is not a straightforward cultural history but an interdisciplinary analysis of how and why these reproducing animal populations, perceived as threats to a fragile food supply, make their way into seventeenth- and early eighteenth-century literature and philosophy. Vermin play an important role in Shakespeare’s Macbeth; they are natural antagonists in the plague poetry of Abraham Cowley; and they enable Thomas Shadwell’s satire of science, along with his critique of a parasitical social order. As the constitutionally simple beings against which the complexity of the human brain and body are defined, imperfect creatures anchor experiments in early modern neuroanatomy. And disappearing magically from Crusoe’s wrecked ship, they serve as the absent center of an island economy that has grounded discussions of modern subjectivity and political economy. By bringing scholarship from agricultural history, environmental history, and medical history to bear on these and other works of literature, I argue rats, frogs, flies, and other animals located at the limits of our now-suburban zoography have shaped humanist practices, writings, and systems of thought. My historical focus is on the period 1600 to 1740, when religion, art, and science, in different ways, cast vermin as agents in studies of, and debates about, the socio-natural world. Throughout this period, fleas, worms, wasps, maggots, and other swarming things carried considerable metaphysical and ethical weight, continually reshaping fundamental categories of analysis and perception.

By far, the most sustained body of scholarship on vermin during the early modern period has been written by medical and agricultural historians: the former focus on microscopy and plague treatises, and the latter focus on farming and extermination manuals. Medical historians trace a line of thought linking vermin and disease that runs through the works of Athanasius Kircher (1601–80), William Harvey (1578–1657), Robert Hooke (1605–1703), Antony van Leeuwenhoek (1632–1723), Francesco Redi (1626–97), Marcello Malpighi (1628–94), Jan Swammerdam (1637–80), and Sir William Ramsay, author of the first full-length treatise on worms in English.\(^2\) The root of vermin is vermis, from the Latin word for worm, and the origin of worms was a subject of ongoing debates about the origin and nature of the universe and, in microcosm, of the human body.\(^3\) Kircher describes the blood of those infected with plague as “so crowded with worms” that he is dumbfounded: “I have even been persuaded forthwith that man both alive
and dead swarms with numberless but yet invisible little worms.” In his *Helminthologia* (1668), Ramsay, one of two physicians to Charles II, claims the body’s “innumerable” vermin are “the most material enemy” of the physician, responsible for diseases from flux to melancholy. Parasitology and medical history have generated their own subgenre of literary criticism, with critics such as Jonathan Gil Harris demonstrating how English writers imagined internal others—Jews, Catholics, and witches—as pathogens within the body politic.

The work of agricultural and legal historians offers a glimpse of how humans struggled to protect an often-fragile food supply from vermin—crows, rats, locusts, and other pests. Animal trials, in particular, provide a window to assess the status of vermin as local and national threats. In *The Criminal Prosecution and Capital Punishment of Animals* (1906), E.P. Evans describes attempts on the part of ecclesiastical and civil courts to punish, rehabilitate, or excommunicate insects, rooks, roosters, caterpillars, pigs, and other animals between 1266, the first recorded instance of an animal prosecution, and the eighteenth century. Nicholas Humphrey singles out a 1478 Swiss prosecution against insects called the Inger: “Thou irrational and imperfect creature[s],” the proclamation begins, are “called imperfect because there was none of thy species in Noah’s ark”; they are charged with destroying or devouring “food for men and animals” and are ordered to “depart” or else present themselves for trial on the sixth day. Their advocate used the usual defense that God had directed all creatures to “go forth and multiply”; the court, however, countered that because the Inger, like other insects, had not been placed on the ark but were products of spontaneous generation, they had no rights, and their defense did not hold. While animal trials were less frequent in England than on the Continent, English rats and other creatures were subject to ongoing extermination campaigns, and vermin-killing treatises described a wide range of technologies. Leonard Mascall’s 1590 *Book of Engines*, subtitled *Sundrie Engines and Trapps to take Polecats, Buzards, Rattes, Mice and all other Kinded of Vermin and Beasts Whatsoever* attests to the battles humans waged against creatures that threatened crops and grain supplies.

By grounding my analysis in medical, agricultural, and environmental history, I explore the relationships between scientific accounts of vermin and literary and philosophical representations. Focused, as they are, on the pre-history of germ theory, medical historians often overlook the role of vermin in the everyday attempts of people in the seventeenth century to put food on their tables. Agricultural historians reverse the problem; concentrating
almost exclusively on the food supply, they focus, understandably, on extermination campaigns, farming technology, and wetlands drainage, always with an eye to economic rather than epidemiological consequences. Literary critics have inherited and even reinforced this division, recognizing the importance of vermin to literature but rarely attempting to think outside of traditional disciplinary divides, seldom investigating relationships among a fragile food system, dearth, disease, and social order. Part of the problem is humanists have tended to base their analyses on culturally individuated vermin or, more precisely, on verminized individuals, such as Reynard the Fox or the other trickster figures who populate Aesop’s fables. As a composite of characteristics packaged for human consumption, these speaking rats, fox, and ravens necessarily reflect to readers their own fears and desires, much as John Donne’s flea becomes the emissary of the speaker’s erotic ambitions or Anna Letitia Barbauld’s eloquent “free born” mouse ventriloquizes Barbauld’s revolutionary views. Significantly, Aesop’s rat, Donne’s flea, and Barbauld’s mouse, unlike their real-life counterparts, travel alone. If we are to understand vermin as a category and as genuinely agential creatures in the early modern world, it is necessary to resist subjectivizing tendencies to treat dangerous and annoying animals as allegorized, isolated, domesticated, personified or even eroticized beings. In order to appreciate—indeed, even to recognize—the specific role of vermin in early modern literature, we must supplement an emphasis on individual animals or anthropomorphic representations by focusing on how writers and their readers perceived the creaturely populations who were their fellow travelers and constant, if unwanted, companions.

*Imperfect Creatures*, accordingly, argues what made vermin dangerous was less their breed-specific cleverness or greed than their prodigious powers of reproduction through which individual appetites took on new, collective power, especially in relation to uncertain food supplies. Bitterly cold winters during the Little Ice Age brought with them not only skating parties on the Thames, the first in 1607, but widespread dearth, if not famine. Temperatures in northwestern Europe dropped an average of two degrees during the period 1350–1850. During these centuries of comparatively cold winters and wet, cool summers, national policies on vermin control began to be developed; Henry VIII’s 1533 policy mandating villages collect dead pests was renewed and amended under Elizabeth in 1566. It required citizens to make and maintain nets and snares for trapping crows, rooks, and choughs—birds that devoured seeds before they could take root and sprout.
and grain before it could be harvested. Mascall estimates crows and other birds in England consumed or spoiled eight bushels of grain per parish; this amounted to 13,000 tons a year across the kingdom. On the Continent, where grain prices were even higher, vermin—and especially rats and mice—began to be prosecuted vigorously during this same period. Walter Hyde’s 1916 count suggests a direct correlation between climate change and the increased number of animal trials: in the fourteenth century, only twelve animals were tried; that number nearly doubled in the early days of the Little Ice Age, and then in the sixteenth and seventeenth centuries, it rose to fifty-seven and fifty-six, respectively. While it is easy to dismiss the animal trials as superstitious or archaic practices supplanted by advances in philosophy and science, we should not underestimate the panic they expressed or the extent to which populations of rats, moles, rooks, choughs, and mice were perceived as eating into the health of the body politic.

To view vermin in their stark collectivity during the early modern period—as “infestations,” “crowds,” “hordes,” and “swarms”—is to acknowledge their agency, including their role in disease. Francis Bacon observes in *Sylva Sylvarum* (1627) that during the plagues of 1624 and 1625, “many toads” with tails appeared in the ditches and “low grounds” of London, “which argueth,” he writes, “a great disposition to putrefaction in the soil and the air.” Even in the absence of germ theory, early modern writers were attuned to the relationship between “swarms” of imperfect creatures and threats to the human body. According to Paul Reiter, Shakespeare, Defoe, Pepys, and others commented on changing weather patterns and what we now recognize as malaria, the physician Thomas Sydenham (1624–89) even noting relationships between fevers and rapidly reproducing insects. “When insects swarm extraordinarily,” Sydenham writes, “and when . . . augues . . . appear early about mid-summer, then autumn proves very sickly.” Late seventeenth-century travel writers such as John Ovington (1653–1731) similarly remark, with horror, that “the prodigious growth of Vermin, and of venomous Creatures” during India’s monsoons are seemingly both cause and effect of the “malignant Corruption of the Air,” which has “direful Effects upon the Europeans”:

> For Spiders [in India] increase their Bulk to the largeness of a Man’s Thumb, and Toads are not of a much less size than a small Duck; whereby ‘tis easily seen by these venomous creatures, what encouragements these infectious and pestilential Qualities meet with in this place, and
under what a contagious Influence all the Inhabitants must consequent-
ly be seated. This induc’d a Gentleman one time in the Governours and
my Company, and some other person of Note, to affirm, that he believ’d
it rain’d Frogs; because he espied upon his Hat small Frogs, about the
bigness of the end of one’s Finger, when he was at a great distance from
any House or Covering, from whence they might drop.¹⁸

Like Sydenham and Bacon, Ovington links vermin infestations to life-
threatening effects on human health: “All Wounds and Contusions in the
Flesh,” he continues, “are likewise very rarely healed here” (145). If vermin are
not quite disease vectors in such accounts, they are harbingers and agents of
malignant forces.

On transoceanic ships, the malevolent triad of illness, effluvia, and ver-
min was intensified. Writing from Commodore George Anson’s flagship,
the Centurion, in the 1740s, Richard Walter describes efforts to eliminate the
“noisome stench” below decks and destroy “vermin” by cleaning, smoking the
deck, and then washing the whole ship with vinegar. Both stink and vermin
had “increased upon us to a loathsome degree,” he reports, “and besides being
most intolerably offensive, they were doubtless in some sort productive of
the sickness we had labored under for considerable time.”¹⁹ Walter’s phrase
“doubtless in some sort” is extraordinarily suggestive. Three quarters of An-
son’s crew died of scurvy and other diseases during the four years that the
Centurion spent circumnavigating the globe.²⁰ While the specific role of ani-
mals in shipboard illness was subject to debate, Walter joins other writers of
the period in assuming that “infection” and “infestation” are related, perhaps
different aspects of environmentally induced disease, one endoparasitic, the
other exoparasitic.

Imperfect Creatures explores the associative linkage noted by Sydenham,
Ovington, and Walter through several literary genres and across a range
of disciplines that were once folded into the broader rubrics of “natural
philosophy” or “physico-theology.” In contrast to the dominant trends in
scholarship on early modern animals, represented by the groundbreaking
work of Erica Fudge, Bruce Boehrer, Karen Raber, Laurie Shannon, Donna
Landry, Richard Nash, Tobias Menely, Nathaniel Wolloch, Laura Brown,
and Jonathan Lamb, I turn away from so-called “charismatic megafauna”—
including companion species with whom humans affectively identify—in
order to analyze animals as part of dangerous or noxious collectives.²¹ Im-
perfect Creatures also lies outside the tendency of animal studies to align
itself with animal welfare movements; I do not, admittedly, have an over-
riding interest in the welfare of weevils. But, as Cary Wolfe argues, it is not
necessary to “like” animals in order to confront speciesism or to craft a post-
humanist theory of the human subject. Indeed, critical animal studies, to
which I am deeply committed, can only benefit by sustained critical atten-
tion to zoological outcasts, those “imperfect creatures” traditionally excluded
from Noah’s Ark. As the onto-historical “others” of dogs, horses, apes, and
humans, vermin offer a new, post-Cartesian way to understand the mate-
rial and ethical systems underwriting early modern literature: the “perfect”
creatures of Renaissance humanism are, in a very real sense, dialogically de-
pendent on “imperfect” ones. Whether depicted as frogs raining from the
Indian sky, as plagues of lice swarming over bodies in Egypt, or as packs of
dogs roaming the streets of London, populations of vermin move through
history like locusts through a field. They contribute materially to dearth,
famines, and disease—and discursively to ethical and political systems that
expose or exploit human corruption, competition, violence, and vice. Wil-
liam Shakespeare, Abraham Cowley, George Wither, Thomas Willis, Ber-
nard Mandeville, Thomas Shadwell, John Wilmot, Daniel Defoe, and their
contemporaries write vermin into history and, in so doing, gesture toward
the larger systems that define early modern culture.

ACTANT FLEAS, NESTING SYSTEMS

“Mark but this flea,” writes Donne, drawing attention to a parasite that,
in biting him and his lover, has “mingled” their blood. In order for Don-
ne’s poem to work as a mode of playful seduction, it must figure the flea
as an individuated agent, an accidental (or contingent) opportunity for the
poet’s sportive, metaphysical speculation. In its solitude, Donne’s flea is
decontextualized—not party to bodily pain, not a harbinger of a parasitical
infestation that might remind us of the couple’s proximity to disease and
death. His flea, singled out by the speaker, allows the poem to bypass or even
eclipse a larger biopolitical system in order to focus on a singularly specific
and explicitly erotic situation. Metaphysical wit depends on such decontex-
tualizing: “this flea” that joins the lovers—not “these fleas” that collectively
bite and torment their hosts.

Donne’s “Mark but this flea” evokes a prior tradition of already-eroticized
parasites celebrated in the genre known as La Puce, or “Flea Searcher” paint-
ings. In these often-puzzling and much-debated treatments of women grooming themselves, the (always invisible) flea symbolizes, for the viewer, the potential of vermin to define and cross boundaries between inside and outside, self and other, innocence and corruption.²⁴ Georges de la Tours’ *The Flea Catcher* (1630–34), the most famous painting in this tradition, features a (possibly pregnant) young woman in a stage of partial undress, sitting before a candle in an austere room, crushing between her fingers an invisible parasite. In its apparent religiosity, de la Tours’ painting often is contrasted to secular versions of the genre, such as *The Flea Hunt* (1628) by Gerrit van Honthorst, one of several flea-searcher paintings set in a richly decorated brothel, where a bare-breasted woman, usually with the help of one or more servants, investigates her naked body while two or more men look on. Within the erotic tradition, the flea serves as a point of (impossible) identification for heterosexual men, fantasizing (in the words of the seventeenth-century poet Peter Woodhouse) about being transformed into a parasite who has “free scope him selfe to sport” in the “soft bosomes” of women, even to “lower stray” at his “best pleasure.”²⁵ For Woodhouse and the painters like van Honthorst, the flea is the inferred agent of a forbidden intimacy that, two centuries later, still finds expression in the semi-pornographic novel, *Auto-biography of a Flea*.²⁶ The women in the flea searcher paintings and literature are always the objects of a scopophilic gaze. Having said that, the very possibility of scopophilia depends, to some extent, on the flea as an agent. Without the flea, the woman is not searching, her breasts are not uncovered, the voyeurs in the painting see only the interior of a room, and the viewer’s gaze is not directed to the actions that precede the imperative, “Mark but this flea.” The actions and identities of the men and women in the room are bound up in the set of relations that includes, but is not limited to, the fleas being purpled under women’s fingernails.

By insisting on the agency of invisible fleas, I am invoking the post-Kantian tradition of analysis associated with, among others, the work of Michel Serres and Bruno Latour.²⁷ For Serres and Latour, there are no a priori distinctions between humans and nonhumans, subjects and objects, because these distinctions depend on complex relational networks of actors, forces, objects, and so on. The actor-network theory (ANT) with which their work is allied promotes a relational materiality that presupposes all entities in a system can be identified and analyzed only in relation to a larger system. Within this context, nonhumans are more than Cartesian objects or mere vehicles of our thoughts and intention; instead, they do things in
specific sociohistorical, ecological, institutional, and psychological environments. They are, like humans, *actants* in the world. Latour coined the term *actant* to distance himself from anthropocentric accounts of intentionality; it is only through a series of networked associations that actants are provided with substance and action. Actants, he writes, “modify other actors”; they are not subjects, but “interveners.” In this respect, for Donne or de la Tours, fleas are actants because they compel changes in those around them: women search, men watch.

Latour’s work has been useful to scholars in Animal Studies because, in the words of Erica Fudge, it allows “us a way of rethinking not only how we conceptualize the arrangements of culture and the structures of thought that organize human’s perceptions of animals and themselves in the past—it might also allow us to rethink how it is that we understand the history of being human, and from that gain a better understanding of what it means to be human now.” In treating distinctions between agents and structures, in perceiving humans, animals, and objects as equally significant actors in dynamic and interlocking systems, historical animal studies and ANT share post-Cartesian assumptions about the socionatural world. Latour’s theory of actants shifts fundamental questions from the identity of actors to their functions; the “who am I?” of western philosophy is superseded by another question: “what is my place in the system”? Moreover, the idea of system itself is destabilized: systems are not regarded as hierarchical or unidirectional arrangements of actants and forces but as what some historical ecologists call “heterarchies.” Rather than emphasizing stability in ecosystems and holistic and deterministic notions of “system,” many historical ecologists base their analyses on models in “which elements are unranked . . . or ranked in a variety of ways depending on conditions,” or on “scalar hierarchies” in which any level of organization can affect or control temporarily others. Imperfect Creatures offers a heterarchical reading of key texts in early modern literature in order to explore how sociohistorical, biopolitical, and ecological conditions reconfigure seventeenth-century perceptions of fleas, curs, rats, worms, and other vermin. If these are the despised and wretched creatures at the lowest rungs of the Great Chain of Being, they are also, paradoxically, crucial constituents of early modern eco-culture.

A brief look at Guiseppi Maria Crespi’s flea searcher painting reveals how the concept of heterarchies can be useful as an interpretive strategy. The so-called Italian Hogarth, Crespi produced seven paintings in this genre between 1715 and 1740; most of them feature a woman delousing
herself as her lapdog, a King Charles spaniel, looks on. While its focus is on the woman disrobing, Crespi’s painting (fig. 1) differs from works in both the earlier religious tradition, associated with de la Tours, and the overtly ribald one of the *Merry Flea Hunt*. Crespi depicts what many critics have regarded as a more realistic, ostensibly less emblematic, depiction of everyday life, possibly the first plate in a lost series about an opera singer from the lower ranks who arrives through youth, beauty, and talent to a life of luxury. Commenting on the painting’s “fully detailed ambience and situation,” Mira Pajes Merriman finds:

A slightly dissolute air pervades the scene, perhaps through the suggestion made by the baby in the care of people who seem to be too old to be its parents. The ingénue—in charming disarray—takes center stage, absorbedly looking within her bodice. . . . Her profession is indicated by the announcements on the wall and primarily by the presence of the musical instrument, wholly out of place in the otherwise unrelievedly lower-class scene of hanging garlic and clay pots.

This interpretation divides the painting into humans and the objects around them—garlic, pots, the spinet, papers on the wall—an “ambience” that accords with critical perceptions of seventeenth-century realism. The only action in the painting is described as a form of seeing: the woman is “looking within her bodice,” oblivious to the stares of those around her. She is the only real agent in the room.

Yet from a heterarchical perspective, the painting depicts multiple actants—the young woman, the old man, the woman at the door, the baby, the dog, and the invisible flea. While all of them look at something, the organization of the painting, its kinetic energy, hinges on what we cannot see—the biting flea or louse. As in Donne’s poem, then, the flea draws the viewer into a quasi-intimacy with the young woman. An irritant in a seemingly anthropocentric system, the flea provokes the action and is the source of the painting’s humor. The obvious and lewd joke of most flea searcher paintings is that the female breast, which should nurse a human child, is instead the dinner table for vermin; in this painting, the flea feeds on a woman’s breast, the old man feeds the child, and the dog waits to be fed. Part of a network of relations, the flea and its actions are not necessarily subordinated to an anthropocentric social order. Indeed, the more sophisticated, second order joke of Crespi’s painting is all the actants are in some sense parasites, feeding
off others. The baby is parasitical in an obvious sense, living on the body of the young mother. The young mother, in turn, depends on the gifts of her admirers (the spinet and the lapdog). If the old couple can be seen as the woman’s parents, then they too may be living off her singing or sex work, but the lapdog may be the most overtly parasitical of the portrait’s actants. Having replaced both the baby and the lover in the woman’s bed, stripped of the ability to feed itself, the small dog stares at the viewers, drawing us into the system of parasitical relations.

As Latour and Serres suggest, parasitical relations need to be viewed as temporary alliances—as elements of a system that come together, disrupt previous arrangements, and then are disrupted. Nested within Crespi’s painting, in this regard, is a gendered network of relations that turn on the historical association between the lower creatures and women, between vermin and female “imperfections.” In Aristotelian taxonomies, modified throughout the seventeenth century, women were identified by a comparative lack of physiological development, regarded as cold and therefore imperfectly formed versions of men. As Aristotle writes in On the Generation of Animals:

For females are naturally more imbecile and cold; and it is necessary to conceive the female sex as if it were a physical mutilation. Within the womb therefore the female acquires a perfect organization slowly; for the separation and distinction of the parts [by which a perfect organization is effected] is a concoction; but heat concocts, and that which is hotter is more easily concocted. Out of the womb, however, the female quickly arrives at perfection and old age. For whatever is less, more swiftly arrives at the end, as in the works of art, so likewise in the productions of nature.33

Morally, an “imperfect” constitution implied an “imperfect” moral nature, one lacking a masculine, guiding rationality.34 Despite objections by Cornelius Agrippa (1486–1535) and other less orthodox thinkers, so established was this historical connection among women, insects, and constitutional inferiority that it was only in 1701 that the parasitologist Nicolas Andry de Bois-Regard congratulates his readers for having overcome the mistaken Aristotelian assumption that insects and women are intrinsically defective.35 Writing after microscopy revealed complex nervous systems in fleas and women alike, he asserts,
That it is not at all to be wondered at, that some Philosophers have looked upon Insects as imperfect Animals, since some of them have so far been mistaken as to advance, that the Body of a Woman is an imperfect Work, a rough Draught formed contrary to the design of Nature, as if a Body perfectly proportioned, in which no irregularity can be observed, which wants no necessary part, and has none that’s Superfluous [can be imperfect].

Microscopy, the two-sex model, and the argument from design potentially freed women from the traditional association with imperfect creatures like flies, spiders, reptiles, and shrews.

At more or less the same time, however, women were assigned, in their roles as housewives and mothers, the function of policing the parasites in the household. “The whole Preservation of Men’s Health and Strength,” writes the author of a 1750 book on parasites, “chiefly resides in the Wisdom and Temperance of Women.” While the author of this treatise (an “Eminent Poulterer, Lately Deceased”) is not the first to enjoin women to flea patrol—a famous Dutch Proverb is “Lazy mother, lousy heads”—he describes how “cleanliness,” defined simultaneously as a moral and spiritual category, turns on new intimacies between women and vermin. The “greatest Slut in the World,” he asserts, “does hardly smell her own House or Bed stink; For in Man is contained the true Nature and Property of all things, both of Good and Evil; therefore he is both liable, and also apt, to receive all Impressions, and to be wrought on by all things he shall either communicate with, or joyn himself to, whether it be Cleanness, or the contrary” (22). Her sense perceptions dulled by long habituation to filth, the “slut” becomes immune to the vermin around her; the good woman, in contrast, is “wrought on” by their presence and exercises “Wisdom and Temperance” in combating their filth.

In the context of this discourse of parasites and medical hygiene, some of the “realistic” elements of Crespi’s painting, his highly textured “ambiance,” become particularly meaningful. Herbal nosegays, including elder, fern, penny-royal, rue, mint, wormwood, and hops, were employed to ward off fleas and vermin. In the painting, herbs around the bed, intertwined garlic on the wall, the pot of water for drowning fleas, the woman’s aired clothes, the open windows—all these may indicate that the poor flea-searcher (or perhaps her mother) is aware of verminous forces of corruption and is trying to combat them. Working against such efforts, however,
is the presence of the dog on the bed. By the time Crespi painted, theories of spontaneous generation used to explain the rapid proliferation of insects had largely been replaced—thanks to Van Helmont, Harvey, Redi, and others—by notions of biogenesis, or reproduction from eggs. Although Robert Hooke was uncertain about the process of spontaneous generation, later microscopy placed domestic animals unambiguously in the chain of relations that lead to infestations:

Fleas are produced of Eggs, which the Females stick fast by a kind of glutinous Moisture to the Roots of the Hairs of Cats, Dogs, and other Animals, and also to the Wool Blankets, Ruggs, and other such-like Furniture. Of these Eggs, a female lays ten or twelve a Day, for several Days successively, and they hatch in the same Order, about four or five days
after their being laid. From the Eggs come forth not perfect Fleas, but little whitish Worms or Maggots, whose Bodies have annular divisions, and are thinly covered with long Hairs. They adhere closely to the Body of the Animal, on whose Juices they feed; or they may be kept in a Box, and brought up with dead Flies, which they eat with Greediness.\footnote{38}

This popular description makes lapdogs parasitical in an originary sense; they sustain the maggots that will later metamorphose into “perfect fleas” that then begin to feed on humans. The staring dog in the young woman’s bed—whatever else it says about her sexual liaisons or class relations—is already a sign of potential corruption, notice of her inadequate hygiene during a time when the policing of vermin was widely regarded as the cultural function of women.\footnote{39}

Nested within this gendered set of relations, moreover, is yet another heterarchical set of elements linking sex, species, medicine and theology. That vermin played a role in the very act of breast-feeding is always the subtext of all flea-searcher paintings. Londa Schiebinger has demonstrated the importance of work on the maternal breast to Linnaeus’ (somewhat arbitrary) introduction of the term \textit{Mammalia} to distinguish hairy animals with a four-chambered heart from others.\footnote{40} Vermin helped create the conditions for the taxonomic system she describes and to which humans are consigned. Working in the 1720s (more or less at the same time as Crespi’s paintings), the Italian physician Antonio Vallisneri, much of whose empirical research was based on dissected insects, wrote a treatise on why even some newborn infants can be infected with worms. His argument is reported in the contemporary English redaction “by M. M.,” \textit{A Short Historical Account of the Several Kinds of Worms Breeding in Human Bodies}.\footnote{41} Vallisneri had argued that chyle is produced in the mother’s stomach and filtered through the intestines, which “are the general Seat of Worms”; since milk is simply chyle “conveyed from the Bowels to the Breast,” a nursing child will “receive this Verminous Progeny” should the mother (or a wet nurse) be infected (56–57). The medical issue converts into a theological one: whether these “colonies” of worms were created with humans (“originally implanted in the Body of the first Man, or Woman”) or whether they emerged after the Fall as a scourge for sinful humans. Such debates similarly filter through Crespi’s flea-searcher painting. Like all those in the genre, it depicts a more-than-human world in which vermin act in systems of nourishment, gender, cleanliness, the domestication of animals, and species identity. Invisible fleas
disrupt interlocked systems, provoke action, forge interspecies intimacies, occasion gendered performances, and raise questions about the nature of creation, infestation, disease, and death. Vermin, in short, compel us to examine the distinctions between “inside” and “outside,” self and other, nature and culture—but also “perfect” and “imperfect” creatures—that have governed centuries of liberal humanist thought.

READING BENEATH THE GRAIN

To read for vermin is not to read “against the grain,” as Terry Eagleton termed his Marxian notion of critique, but “beneath the grain”—beneath the social, political, and anthropocentric modes of humanist analysis to the life-forms and energies that enable it. While Eagleton focuses on the complex relations between literature and economic hierarchies of modern civilization, Michel Serres is more useful to my analysis. Serres deploys the notion of the parasite to yoke biological, information, and communication systems. In French, le parasite (the static on a radio broadcast) signifies noise, and Serres plays on the double meaning of the term to explore irritants or interruptions within multiple systems. Serres’ The Parasite, written partly through an analysis of Aesop’s fables, is notoriously difficult to adapt to familiar modes of literary criticism. On the one hand, as Latour points out, Serres is not a “critique” philosopher who “sees his task as that of establishing a distinction between beliefs on the one hand and knowledge on the other, or between ideologies and science.” Latour calls him “provisionally” an “anthropologist of science” who treats the sciences “as local achievements extracted from the world”: “they do not replace it, and cannot be substituted for it, no more than any other metalanguage” (95). Yet because Serres refuses to follow the protocols of a single discipline, his insights have led to significant reconsiderations of the early modern period, including an important essay by Karen Raber. “There is no system without parasites,” she argues, and “there is no theory of the human without them.” As Raber suggests, The Parasite opens up literary and scientific history to whole categories of creatures essential to our ecologies, creatures that have neither an obvious relation to (economic) production nor an obvious role to play in aesthetic-theological readings of the natural world. An interdisciplinary book about vermin, consequently, must be willing to be verminous—that is, to read beneath, across, and through the grain.
A broader category than parasites, although no more stable, “imperfect creatures” means different things to different early modern writers, sometimes referring ostensibly to creatures of putrefaction and, at other times, to beings regarded as anatomically or morally less complex than humans and their mammalian kin. But in the five chapters that follow, I maintain that the Aristotelian division between “perfect” and “imperfect” creatures is as historically important, in its own way, as the Cartesian distinction that has shaped our philosophical analyses of subjectivity and identity. While “imperfect creatures” are not necessarily verminous and verminous creatures not always “imperfect,” the fact that these categories overlap so frequently in the early modern period is itself significant. Early modern writers, as Laurie Shannon has argued, upheld an interspecies sense of community; they “routinely understood a condition of membership and mutual participation to hold across species,” rather than stressing a human-animal divide. When imperfect creatures turn vermin, however, they test the limits of interspecies “cosmopolity”; a (real or imagined) ability to reproduce rapidly and in large numbers become a marker of (perceived) constitutional inferiority. What worms, rats, mice, frogs, insects, and reptiles have in common, then, and what distinguishes them from horses, elephants, domesticated canines, and even hedgehogs, is not simply a matter of intelligence or domestication, but a deeply disputed place within theological and scientific histories and their correspondent social visions.

At bottom, early modern writers had to contend with the question of how a perfect God could create imperfect creatures, those seemingly absent from the Garden of Eden. Alexander Ross’s (1591–1654) exposition on Genesis puts the question this way: “Did God create in the beginning, imperfect creatures, as Bees, Wasps, and such like?” To justify the ways of God to man, Ross depends on some Aristotelian casuistry: “He did not create them actually, as he did the perfect creatures, but he created them in their causes, as he gave that faculty to the flesh of an horse, to beget Wasps being dead.” In other words, although imperfect creatures were not part of the original zoography, God made it possible for them to breed through the process of putrefaction. Similarly, both John Wilkins in his Essays Toward a Real Character and a Philosophical Language (1668) and Athanasius Kircher in his Arca Noe (1675) discuss the architectures and animal populations of Noah’s ark, yet neither allocates any space for caterpillars, insects, or other creatures thought to spring from dust and mud. This absence symptomizes another set of theological problems: were Adam and Eve born with lice, or did
those emerge after the Fall? As I suggested in the previous discussion of breast-feeding women, worms and other noxious creatures cannot easily be assimilated to arguments from providential design. In fact, given their endless reproducibility and the unpredictable nature of their swarming motion, imperfect creatures may actually threaten the ideas of an orderly universe and the regeneration of Nature symbolized by Noah’s Ark. When scholars ignore “imperfect creatures,” they help gloss over the urgency of these seventeenth-century theological problems and downplay the ways in which so-called pests were conceived as material and ideational agents.

To be an agent, though, does not require what we now think of as ontological or taxonomic stability. Indeed, a pathologized instability is typical of most vermin and imperfect creatures. Seventeenth-century writers rarely distinguished between lice and fleas, or between rats and mice. The “ancients,” writes Michael McCormick, “did not have use of the Linnaean conceptual apparatus to name and describe their animals.” In classical Latin, mus, and in Greek, mys, may refer to either a rat or a mouse; seventeenth-century writers tended to follow their predecessors in using both “rat” and “mouse” to signify common rodents. Frogs and toads, similarly, may have been distinguished in Edward Topsell’s Historie of Foure-Footed Beastes (1607) or other texts of natural history, but poets, painters, and novelists rarely exercised such precision. This taxonomic vacillation frustrates efforts to impose a representational coherence on a particular animal in order to tell the “story” of a singular species: the ape, the horse, the rhino. Vermin simply thwart such representational schema. Writing the story of the “worm,” as Janelle A. Schwartz asserts, requires being attentive to representations of “everything from an earthworm to a larva to a maggot, to a flying insect, and the unknown.” But while vermin spoil nominalist schemes—and this is an important point—in their categorical instability they often constitute the temporary stability of any system in the first place. Serres claims, “We parasite each other and live amidst parasites. Which is more or less a way of saying that they constitute our environment” (10). Although it was not always apparent to early moderns who the “they” were or how “they” originated, writers from Shakespeare to Defoe similarly acknowledged the fundamental role of vermin. Reading beneath the grain allows us a more comprehensive (if shifting and squirming) appreciation of biopolitics in the period.

In the first chapter, “Rats, Witches, Miasma, and Early Modern Theories of Contagion,” I confront the problem of how sixteenth- and early seventeenth-century thinkers understood the role of rats in the transmis-
sion of disease. The transmission of bubonic plague by rats was established only in 1894 when the bacteriologist Alexandre Yersin located the *Pasteurella pestis* (later, *Yersinia pestis*) bacterium in the blood of infected hosts and isolated the role of the flea as a disease vector; as the host-animal died of plague, the flea, feeding on its blood, leapt off onto another host, human or animal. Although the Chinese in the late Ming and early Qing era may have had a nascent understanding of the role of rats in the transmission of plague and although the English sometimes mentioned the role of animals as disease vectors, rats rarely make early modern lists of plague animals. Yet rats and other small animals nonetheless played an important role in linking environmental and supernatural accounts of disease. On the one hand, because they were still widely regarded as creatures of putrefaction, born of rot and corruption, rats signified, by their very presence, an unhealthy environment from which illness may emerge. On the other hand, it was widely believed that demons and witches could assume the shapes of “some small creatures” such as toads, salamanders, and rats by virtue of what is called “inspissated” air, that is, air that “partakes of some of the properties of earth.”

Within theories of miasma, or polluted air, rodents bear an analogous (or even, for some, homologous) relationship to witches, and witches, in turn, are held responsible for physical and spiritual disease. As King James puts it in his *Daemonologie*, witches are “like the Pest.” I trace this constellation of witches, vermin, and “inspissated” air in contemporary treatises on witchcraft and plague in a series of engravings by the Dutch artist Jacob de Gheyn and in Shakespeare’s *Macbeth*, written and performed during the London plague years of 1605–7.

In different ways, de Gheyn and Shakespeare suggest how theories of contagion developed within and were responsive to a world wracked by climatic instability and repeated local dearth, if not outright famine. Disease, plague, and famine comprise three of the four aspects of “pestilence,” a term that had naturalistic and metaphysical connotations. As late as 1799, Noah Webster’s *A Brief History of Epidemic and Pestilential Diseases* attempts to reconcile descriptions of plague in ancient, scriptural, and medieval sources and confronts the question of causality. Webster traces plague, famine, and war to “one common cause”—weather—or what he calls “a pestilential state of the elements, as fatal to vegetables as to animal life.” In a study that includes an impressive series of tables detailing the weather patterns, comet sightings, murrains, and crop failures for every recorded account of pestilence, Webster makes the case that “famine and pestilence are equally the
effects of . . . a temporary derangement of the regular operations of nature” (86). Such “derangements” include comets, volcanoes, droughts, rains, and overpopulated cities—any number of conditions that give rise to a corrupt state of air. At the same time, Webster’s seemingly empirical imperative is linked to his theological effort to authenticate biblical accounts of the great plagues of Egypt, a land whose climate, he argues, was especially conducive to pestilence. For Webster, as for his predecessors, plague and famine appear as part of the same complex of medical, historical, environmental, and theological discourses that are borne on the backs of frogs, flies, and the “swarming things” of Genesis.

I bring this understanding to the next chapter, “Swarming Things: Dearth and the Plagues of Egypt,” in order to focus on seventeenth-century adaptations of the Exodus story. At the heart of the ten plagues of Egypt is an age-old interpretive problem: are the lice, frogs, and swarming things to be read allegorically or literally? Is the story about political sovereignty or natural populations? Focusing on the former, Graham Hammill has argued convincingly that plague discourse exceeds its traditional function—to “imagine new forms of social and political control”—and instead may undermine sovereignty, narrowly conceived. Like Hammill, I turn to Foucaultian ideas of biopower to examine plague discourse but reintroduce to biopolitical readings the question of the animal, demonstrating how naturalistic and typological readings prove mutually constitutive. A woodcut by Jan Sadeler (1550–1600?) depicting the plague of frogs raises critical questions about the apparent agency of vermin invading the dinner table of fashionable Egyptians. Encouraging his viewers to read history and typology as complex overlays of natural phenomena, Sadeler underscores the interpretive problems posed by vermin: if the plagues of Egypt can be read in terms of responses to political and moral crises—in terms, that is, of sovereign power—they can also, like Macbeth, be regarded as deeply entangled in contemporary epidemiological and ecological crises, especially food shortages. Focusing on discourses of dearth and famine in plague poems by George Wither (1588–1667) and Abraham Cowley (1618–67), I trace their efforts to stabilize the interpretive strategies—religious, political, and naturalistic—that could be brought to bear on the ten plagues. Cowley’s heavily footnoted poem reflects the erudite author’s knowledge of contemporary science; and without surrendering an overarching providential narrative, Cowley brings the biblical infestation of vermin very close to naturalistic explanation.

In the plagues of Egypt poems, where hordes of loathsome toads and
armies of winged invaders darken the Egyptian skies and cover the tables of decadent slave owners, imperfect creatures constitute a kind of verminous sublime. These poems exemplify in dramatic ways the collective agency of vermin, their ability to alter domestic, national, and natural economies. At the same time that Cowley was writing, Royal Society virtuosi were pressing vermin into a different kind of service; lice, insects, frogs, and other beings were used to prove the empirical reality of what Robert Boyle called “the argument from design,” the belief that providential wisdom could be read in the physiology of all God’s creations. Robert Hooke’s now-iconic description of the flea in *Micrographia*—a “small creature” praised for the “strength and beauty” of its limbs and parts, “adorn’d with a curiously polish’d suit of sable Armour”—brings to the fore late seventeenth-century attempts to argue that anatomical structures were, in their very complexity, evidence of providential design. The next two chapters examine questions raised by the argument from design in neuroanatomy, especially in the work of the physician Thomas Willis.

Like his predecessors William Harvey and Pierre Gassendi, Thomas Willis appeals to the Book of Nature in *Cerebri Anatome* (*The Anatomy of the Brain*) (1664) and *De Anima Brutorum* (*Of the Soul of Brutes*) (1672) to provide a theological justification for comparative anatomy. Whereas Harvey had turned to “larger and more perfect animals” to demonstrate the “perfect and divine” harmonies of Nature, the wisdom of the Creator, claims Willis, is manifested “even in the smallest and most despicable Animals” who share, with humans, hearts, or “so many altars and hearths to perpetuate this vital flame” of life. And, like Harvey and Boyle, Willis uses resemblance to emphasize the difference between humans and animals; by “confronting these Brains,” he continues, “the vast difference of the Soul of a Brute and that of a Man may . . . be shewn” (152). Yet the significance of Willis for animal studies, I argue, is not his critique of Descartes on some absolute difference between man and animal—the “more perfect” animals, Willis admits, are capable of judgment and even imagination—but his distinction between “perfect” and “imperfect” creatures. Willis reexamines this Aristotelian distinction through comparative neuroanatomy, identifying structural differences in the brains of different species by exploring the central nervous systems of oysters as well as those of humans, apes, and domesticated quadrupeds. While Willis is not the first seventeenth-century natural philosopher to distinguish between “perfect” and “imperfect” creatures, he naturalizes a theologically motivated discourse that associates instinct with
a swarming, soulless form of behavior that both reason and imagination enjoin us to contain and control.

In chapter 3, “‘Observe the Frog’: Imperfect Creatures, Neuroanatomy, and the Problem of the Human,” I suggest Willis’ theologically laden anatomical writing leads to a concept of “an amphibious human,” one who shares with other “perfect” creatures wit and intelligence. Comparative neuroanatomy, then, collapses the Cartesian difference between “human” and “animal”—a difference that Willis must reinstate theologically (rather than anatomically) by positing that humans alone possess an incorporeal soul, also located in the brain. A similar kind of category collapse underwrites seventeenth-century satires of Royal Society experiments on vermin. Thomas Shadwell’s _The Virtuoso_ mocks Sir Nicholas Gimcrack’s fascination with insects, spiders, and frogs at the expense of his discovering anything useful or reinforcing the civilized virtues of wit and good nature. To read Shadwell’s play within the context of Willis’ experimental philosophy is to appreciate in a profound and immediate way how insects, mollusks, worms, and frogs trouble Cartesian binaries. While Shadwell’s play manifests this discomfort at the level of farce, Willis’ scientific work, I conclude, exhibits the two-fold process of translation/purification typical of what Latour calls the “modern constitution”; in trying to draw a line between Nature and Culture, Willis proliferates hybrid beings, notably his “Amphibious” “double-soul’d man.” In an important sense, “imperfect creatures” emerge, in such works, from the mud of scholastic philosophy and reappear as the introjected other of the early modern self.

In their rejection of Cartesian binaries, Willis and other comparative anatomists are important for animal studies because they promote the notion the “more perfect creatures”—always mammals—share with human beings fundamental neuroanatomical structures, including structures of feeling intrinsic to a social world. Significantly, Willis refers to the more perfect beings as “twin species” with humans, created, according to Genesis—unlike crawling things—on the fifth day. In chapter 4, “Libertine Biopolitics: Dogs, Bitches, and Parasites in Shadwell, Rochester, and Gay,” I focus on the complex biological and social status of one “perfect creature”: _Canis lupus familiaris_, or dogs. Donna Haraway has remarked about dogs that “the familiar is always where the uncanny lurks,” and in this chapter, I explore the role of dogs in the depiction of gendered madness and disease. That early modern Europeans, during times of plague, feared and executed dogs is well documented. Defoe’s _Journal of the Plague Year_ reports over 40,000 dogs and
perhaps 200,000 cats were destroyed during the plague of 1665 (along with, I might add, a “prodigious” number of rats and mice). The Restoration dog, similarly, brings together many of the thematic concerns I examine in the first three chapters: scapegoating, mimetic contagion, and the logic of expulsion; relationships among infection and infestation; and the intimate relationships among women and verminous animals. Tracing those discourses through analyses of Shadwell’s *Timon of Athens* and Rochester’s “A Ramble in St. James’s Park,” I emphasize the porous boundaries separating domesticated and verminous creatures.

“What Happened to the Rats? Hoarding, Hunger, and Storage on Crusoe’s Island,” circles back to rodents and explores the significant absence of rats on Robinson Crusoe’s island. In marked contrast to eighteenth-century accounts of island ecologies ruined by rodent infestations, Crusoe—unlike his real-life progenitor Alexander Selkirk—suffers no depredations by rats. The economy Crusoe constructs depends, I argue, not simply on the presence of European corn but on the absence of the rats that plagued Selkirk and the millions in Europe who tried desperately to protect grain supplies from vermin. In discussing both *Robinson Crusoe* (1719) and *The Farther Adventures of Robinson Crusoe* (1719), I focus on the ways in which food accumulation and storage are essential for social virtues like compassion and benevolence, and for the reassertion of an European, civilized identity on Crusoe’s island. Bees, particularly in the first half of *Farther Adventures*, help Defoe to imagine a system that might be immune to the threat posed by rats, crows, and other vermin. While Defoe joins Bernard Mandeville and others in imagining the apid colony as an alternative to constant competition for food, the hive itself, I maintain, is based on a form of organized violence, what eighteenth-century naturalists saw as the periodic “sacrifice” or expulsion of hungry drones. Generalizing from such examples, I conclude what we call “the animal” is bound not only—and maybe not even primarily—to “the human” but to fundamental questions of food and diet as well as disease.

In different ways, these chapters explore some of the implications of Serres’s observation that “We have made the louse in our image; let us see ourselves in his” (7). Given the vast range of early modern texts featuring vermin, I have had to make some strategic decisions, and these chapters should be taken as necessarily exploratory rather than comprehensive. What unites them is the paradoxical logic of the parasite: vermin must be banished from biological, economic, and theological systems, and yet they remain essential to their constitution. Vermin become convenient scapegoats for
those qualities that must be repressed or controlled in post-Cartesian ideals of the human, even as they return, invariably, to plague our economies and haunt our constructions of human exceptionalism. Vermin—either early modern fleas or twenty-first century “trash animals”—always plunge humans back into complex ecologies. Swarming and multiplying, biting and eating, they threaten to overwhelm the orderly, theologically buttressed sociopolitical economies we tend to identify with Enlightenment and modern thought. Snarling curs, voracious rats, and omnipresent fleas mark the limits of Timon’s generosity, Cowley’s biblical commentary, and Defoe’s colonial endeavors. Ultimately, they encourage us to rethink the constitution of “the animal” as well as the human in the ongoing development of animal studies.