

# Introduction

But life involves before everything else eating and drinking, a habitation, clothing and many other things. The first historical act is thus the production of the means to satisfy these needs, the production of material life itself . . . This connection is ever taking on new forms, and thus present a “history” independently of the existence of any political or religious nonsense which would especially hold men together.

—Karl Marx, “The German Ideology, Part I”

How did *Homo sapiens* come to this moment in their history where the order of economic life is at war with the Earth? The more-than-human-world has been eclipsed and degraded by an unassailable global economic system run amok. Climate change, the sixth great mass extinction, soil erosion, depleted groundwater, and toxicity are but a few examples of a seemingly irreparable turn. We know what is happening as we endlessly document this downward trend. Yet despite this knowledge we have not altered this trajectory, leading one to conclude that it is the structure, momentum, and power of the economic system that governs the forward march. We appear to be captured by a system largely impervious to attempts to alter its course.

This is the tragic economic history of *Homo sapiens*, and yet there is ample historical evidence of humans providing themselves with food, shelter, clothing, love, technology, and art for many tens of thousands of millennia in greater compatibility with the more-than-human world: quite literally living as one of many. The central focus of this inquiry is to explore a broad arc of economic history with an eye to this change; that is, to the duality that has been created between humans and Earth. There has been a decisive turn in human history where humans went from being a species embedded in the rhythm and dynamic of the Earth in their economic life to the opposite. That decisive turn was the agricultural revolution around annual grains.<sup>1</sup> It is the point where a distinctly different economic system

took hold, creating a duality between humans and Earth. Here *Homo sapiens* began an evolutionary experiment as an economic superorganism. Mostly unrecognized in its importance among scholars of our present ecological/economic crisis is this fundamental shift in economic order (collective material life). What came after is derivative.<sup>2</sup>

The narrative on agriculture has been mostly caught up in a “just-so-human-centric” story. In one form or another it usually goes like this. Smart human beings, in the endless quest for survival, invented agriculture. Some go on to claim that agriculture was but another step on the road to progress. It brought *Homo sapiens* out of the cave and into the light of civilization. The approach taken here runs against this current. I see agriculture as a universal system engaged by many species. In the shadow of the universal I move away from a just so human story toward a more expansive understanding of the etiology and importance of the profound change in human economic organization that took hold with agriculture. Humans were *collectively* reconfigured and their relationship to Earth deracinated with agriculture. The legacy of that change now has come to rest in global capitalism. Thus, the present collision course between global capitalism and Earth should be interpreted as a particular manifestation of a system change that has been in motion for ten thousand years.

Most conversations about the economy and the ecological crisis concentrate on some combination of the triumvirate of the industrial revolution, technology, and capitalism as the confluence of forces responsible for our problematic path. Scholars of our present predicament have been captured by the power of the dramatic exponential flight that followed this confluence, sidelining clues to the present that reside in the past. The importance of the agricultural revolution all but recedes into the realm of obscurity, never fully discounted but never wholly acknowledged either. So too any relevance the long span of human history that predates it might have in our thinking about the present.<sup>3</sup> The seed of the human expropriation and domination of Earth goes much deeper than seams of coal or the recent arrangement of economic life known as capitalism. A more foundational and incisive understanding of the phylogeny and etiology of our present economic system and the challenge it presents in our relationship to Earth is found in the past and the connection to the agricultural system.

Grain agriculture ushered in many aspects of modern economic life that have only become more pronounced in the ensuing ten thousand years: surplus and expansion, ecological decay, inequality and hierarchy, extreme material interdependence, as well as a structural duality between humans and

the more-than-human world. We are wholly dependent on Earth, and yet we are no longer in community with it. We are profoundly interdependent, and yet we are no longer in relationship. We are engaged in an economic system that is essentially self-referential on an Earth that is relational. Thus, we now reside in contradiction and paradox. This center will not hold. The frenzied pitch of discordant realities is not sustainable, and we are now approaching a fateful divide where we are rapidly eliminating other species and the impulse of all that is not us.

A few methodological questions must be explicated in order to understand the logic and execution of this book. I begin with a detour down the road of evolution (or what I consider a deeply materialist approach to understanding the formation of the agricultural system). Some might be thrown off by this starting point, so let me reiterate the purpose. There are many species that cultivate, and the structure and dynamic of the economic systems that develop out of cultivation are strikingly similar. I chose not to leave hanging these “universalities” surrounding agriculture. And in engaging what is universal I tapped into evolution simply because it seemed to be a logical place to look for explanation and etiology. This path took me into debates in evolutionary biology surrounding the evolution of sociality and cooperation. In the end I raise questions about human cooperation, its place in economic systems, and the place of economic systems in the matrix of evolution that only a novice would raise. My intent is not to sort out debates in evolutionary biology but to create a plausible story about the emergence of a universal system, a new collective “whole” that altered the human relationship to each other and to Earth.

I also engage history in this inquiry, and a few words must be said about how I go about that. My historical approach is likely to make historians uncomfortable. They are scholars of detail. As an economist, some abstraction from the detailed meandering of history in order to find the patterns of economic life is a necessary tool of my trade, and I take full liberty with that inclination in the pages that follow. I am interested in understanding the emergence of an economic structure and dynamic that created a duality between humans and Earth, and in this I weave the tapestry and logic of a long arc. I move away from the detailed meandering of history to elucidate an altered pattern and force to economic life that took form around grain agriculture, and then I follow that pattern to the present.

A preliminary map of the story/contemplation that unfolds in the pages that follow will help orient the reader. I offer a deeply rooted economic focal point to understanding how we came to this war with the Earth and

what appears to be an inability to do anything about it. Bitter Harvest is organized into four parts: “The Economic Superorganism,” “Bitter Harvest,” “Apogee,” and “Epilogue.” I reiterate—my purpose is to highlight the story of the emergence and power of an economic system that created a duality between humans and Earth that had not previously existed and is with us now in exaggerated form. I label this system the *agricultural* system and also an economic superorganism to denote its power. I highlight the forces that led to this inexorable change as well as its significance. An economic system contextualizes the human relationship to the more-than-human world, and that context was foundationally altered beginning with grain agriculture. This inquiry opens the door to humility rather than hubris in our approach to our problematic relationship with Earth, and it connects rather than separates humans from other species. Uncomfortable questions about determinism and the power of economic systems emerge in these pages. My intent is not to discourage action but to more expansively frame the challenge we face.

The first section of the book (Part I), “The Economic Superorganism,” begins with a simple observation: humans are not the only species to cultivate. Interdependence forged through a division of labor around the focal point of energy production, expansion, and the emergence of particularly powerful feedback loops are common system characteristics, indeed universal characteristics, found in diverse agricultural species. In concert they form a powerful universal system. I utilize a transdisciplinary methodology where I delve into the evolution of cooperation to parse the building of the universal system of agriculture, which is a complex matter involving synergies of collective evolution. I engage the possibility that the exceptionality of humans and all of the “just so” stories we tell ourselves about the human transition to agriculture and the ordering of economic life might need to be reexamined; I also raise the disturbing question of determinism in the formation of the economic superorganism.

Part I enters into rather esoteric debates in evolutionary biology not as an academic exercise but because it is impossible to carry out the nuanced discussion entertained here without the benefit of some investment in the technicalities of evolutionary theory particularly as it pertains to the formation of groups and the evolution of sociality and cooperation. This section raises two important questions pertinent to evolutionary theory: What role does evolution play in the formation of economic systems? Where do those economic systems lie in the matrix of evolution? I am led in this discussion to ask whether humans are crossing an evolutionary threshold as they engage

in the mass extermination—the sixth extinction—of other species on the planet and human population and the manifestations of human material life overwhelm Earth. Part I consists of three chapters.

Chapter 1, “Agriculture and the Evolution of the Economic Superorganism,” taps into evolutionary theory to understand the formation of the agricultural system in light of the fact that agriculture is not the exclusive domain of humans. Insect and human agriculturalists (species that could not be more different on an individual level) were collectively reconfigured in a very similar way around agriculture and through similar evolutionary processes. With this in mind chapter 1 engages the literature surrounding the evolution of cooperation and uses this approach to bring the light of the universal to our understanding of the agricultural system—what I have also labeled the “economic superorganism.”

All species that engage an agricultural system become cooperative in a universal way: a structure and dynamic to cooperation emerge through a division of labor that centers on the focal point of cultivation (energy production). Powerful feedback loops develop between division of labor, population, and energy production. This chapter leads us to ask whether this collective configuration is rightly viewed as a powerful whole in the matrix of evolution. It is also clear that the agricultural system moved humans inexorably away from a fluid interchange with the rhythm and dynamic of the more-than-human world in the day-to-day provisioning of economic life. Their material life is refocused within an emergent solipsistic collective system. A duality between humans and Earth takes form as well as a foundational change in the expression of human cooperation.

Chapter 2, “Agri-culture?,” expands the discussion of human cooperation as it pertains to the formation of an agricultural system. This chapter makes the case that it is not accurate (in the case of humans) to see the formation of the agricultural system and its ultra-cooperation simply as a vestige of the evolution of the human capacity for culture. Cooperation, as it takes form in the agricultural system through the division of labor, is not adequately captured by culture. The division of labor is characteristic of species life and not the exclusive domain of humans, and it is universally extended in agricultural species. It plays a central role in the formation of the economic superorganism creating a profound interdependence around a central focal point of food production (cultivation) regardless of the species. Humans are unique in their capacity for culture, but it is possible that culture has created opacity in our understanding of more universal aspects of cooperation that form through a division of labor. This chapter

challenges the belief that economic order is merely a vestige of culture, and it raises the possibility of a determinism in economic life that is intended to disturb the reader.

Chapter 3, “The Division of Labor,” enters the intersection of evolutionary processes and economic formation in more detail in order to demonstrate that the engagement of agriculture involved the coevolution of all species involved. The emphasis here is on the way the humans and insect cultivators were changed in the process. Cooperation forged through a division of labor around the focal point of cultivation reconfigured the agricultural group helping to make it an integrated whole. The division of labor around the focal point of food production is viewed as an emergent characteristic of the agricultural system—it provides a core structural stanchion to the formation of the economic superorganism. Here culture serves as a mechanism to engage the division of labor in humans just as mutation and selection are the mechanisms used by insect agriculturalists.

The second section of the book (Part II), “Bitter Harvest,” navigates the distance from the universal to the specific, more fully accounting for the particularities of the human transition to agriculture. This section of the book integrates the complexity of evolutionary processes, culture and ingenuity, chance circumstances, and the power of the universal system into whole cloth; that is, into an integrated economic system (an economic superorganism) that began with grain agriculture. Humans became a self-referential and profoundly interdependent species of expansion and surplus with agriculture—just as their insect counterparts had—but did so with their own imprint and their own history. The particular coevolutionary dynamic between annual grains and humans and the human propensity for institutional life is elaborated and integrated with the universal characteristics of the economic superorganism (division of labor, population growth, and energy production) to create the particular tapestry of the human economic superorganism. The reticulated and self-reinforcing nature of grain agriculture as an integrated economic system becomes clearer as does the duality it establishes between humans and Earth.

Part II offers a reinterpretation of agriculture, not as an inevitable trajectory toward civilization and progress but as a problematic turning point in the evolutionary history of humans. I recognize that agriculture brought humans civilization—a benefit mostly to the few that flourished in the many advantages of being on the receiving end of its surplus. My homage is to the majority of humans who were enslaved directly and indirectly in relentless sweat, toil, and alienation in their daily lives through the agricultural

system; to the Earth disrupted, interrupted, and temporarily diminished in its established cycles and complex ecologies; and to the foundational and sacred connection between humans and the more-than-human world that was undermined by the emergence of the economic superorganism. The transition to agriculture created an economic system where humans were no longer in community with Earth. Part II consists of two chapters.

Chapter 4, “The Tapestry of the Universal and the Particular” weaves a tapestry of the universal and the particular in the human transition to grain agriculture. It becomes clear in this chapter how the coevolution of humans and annual grains gave rise to the universal system and how that system was extended by unique human attributes. An extensive exploration of coevolution is undertaken in this chapter. Chapter 4 also introduces the institutional and cultural trappings of surplus (hierarchy, patriarchy, slavery, markets, debt, money, taxes), and the human capacity for inventiveness and explores the way they extend the expansionary and self-referential tendencies of the agricultural system. Among the institutional elaborations of the agricultural system the economic institutions stand out (markets, expanding trading networks, debt, money, taxes, property rights). And these institutional embellishments take on a life of their own.

Chapter 5, “A Species Out of Context” is a phrase borrowed from Wes Jackson to describe agriculture as “the fall.” This chapter explicates the fall through an elaboration of its effect on humans (both individually and collectively) and their relationship to Earth. The agricultural system altered the expression of human life—the relationship to the more-than-human world—and it changed the material dynamic of humans on Earth. The inclinations of the agricultural system are brought into focus: surplus, interdependence, duality, collapse.

Hunting and gathering as an economic system is juxtaposed with the agricultural system to highlight the contextual nature of the human relationship to the more-than-human world and the profound change that agriculture entailed. With agriculture humans were no longer the nonexpansionary, minimalist species embedded in the rhythm and dynamic of the more-than-human world that they had been for the vast sweep of their history. Instead humans had become an expansionary, accumulative species, embroiled in an economic system with powerful feedback loops, making the system a thing unto itself and inclining it to ecological overshoot. A dramatic change in the expression of human life on Earth took place with the transition to agriculture that was not centered in the human genome; yet one can argue that *Homo sapiens* became *Homo sapiens agriculturii*,

members of the particular human economic superorganism that enslaved many, thwarted human expression, all but undermined individual autonomy, and established a structural duality between humans and Earth that had not previously existed.

The third section of the book (Part III), “Apogee,” highlights the final and dramatic expression of the economic superorganism that takes form in capitalism. It is a whole system with its own integrity, but it is also the legacy of the agricultural system. In this sense it is appropriate to see capitalism as a system within a system. Capitalism changed the form of surplus and expansion but not the fact of their existence; it altered human-to-human relationships in material life but did not change the fact of enhanced material interdependence (or the presence of hierarchy). Finally, capitalism drove the wedge of duality between humans and the more-than-human world ever deeper, but it did not create that duality.

Yet capitalism is its own whole, and once it is fertilized with the industrial revolution, the duality between humans and Earth that began with agriculture takes on a most pernicious form. An expansionary and self-referential system is now freed from energy constraints, and the potential for crises embodied in its institutional structure becomes ever more formidable as the system matures around fossil fuel, as does the potential for ecological overshoot. The paradox presented by the economic system is formidable; growth is required for jobs and fighting stagnation, and degrowth is required for staying within biophysical limits. The profound duality of capitalism resides not only in the economic system but is reflected in the economic thinking of the past 250 years. Part III consists of two chapters.

Chapter 6, “Capitalism: A System within a System,” provides a detailed discussion of the formation of capitalism and helps the reader understand the particular ways that human capacities for institutional life and inventiveness elaborated surplus and intermingled with universal processes and forces to form this particular variant of the agricultural system. The combination of capitalism (a particular institutional embellishment of surplus) and the industrial revolution (a technological innovation that created a seemingly infinite supply of energy) bring the trajectory of the economic superorganism to its apogee. Capitalism is both a supra-material system (disconnected from Earth), and a material system (profoundly connected to Earth). This is the paradox and duality we now confront. An economic system is always material, but capitalism functions as a supra-material system where economic variables interact as if disconnected from the Earth. Internal crises—that



is to say crises internal to the system (an interruption of the circular flow of income and spending, for example), dominate the economic landscape.

Chapter 7, “In Search of a Deep Ecology of Economic Order,” critically assesses economic thought in light of the rise of the economic superorganism and its present form. Over the past 250 years the ideas of the great economists (the “unearthly philosophers” I call them) have orbited the supra-material aspect of the economy, and any connection to the Earth has existed at the margins of their analyses. Ironically a discipline erected to understand material life is removed from an analysis of the material dimensions of economic life. In time a new group of economic thinkers, those intent on reconnecting the economy to Earth, has entered economic discourse (I refer to them as the “earthly” philosophers). Yet even among this group the importance of fully appreciating the long arc of history has remained elusive, and so too a clear focus on the challenge and complexity of the twilight of the legacy of the agricultural system. The challenge is to move to a deeply ecological economic system where humans take their place as one of many species that inhabit Earth and to engage in more humility and reflection when approaching the economic superorganism.

The final section of the book, “Epilogue,” consists of only one chapter. “Languishing in the Twilight of the Apogee” offers a final reflection on the odd evolutionary history of humans where they find themselves at once an economic superorganism and a Pleistocene species. Humans are now caught up in contradiction and stand at a divide in their evolutionary history and also with regard to the fate of Earth, its wild impulse, and its self-willed otherness. History tells us that our levers of change (culture, institutional life, inventiveness) generally work with a system, not against it. It is therefore essential to focus on what we intend with them, especially in the twilight of the apogee of the economic superorganism. The cumulative nature of the past ten thousand years is upon us, and in this we are simply forced to face the prospect of slipping down the other side of the divide, taking an irrevocable turn as *Homo sapiens agriculturii* and finishing the sixth mass extinction.

I add here a “Glossary of Terms” for easier navigation of *Bitter Harvest*.

## Glossary of Terms

**Agriculture:** In this book agriculture refers specifically to annual grain cultivation in the case of humans and fungi cultivation in the case of insects.

**Autocatalytic:** This is a term borrowed from chemistry. Here it simply means that the feedback variables of the agricultural system (population increase, cultivation, division of labor) react with one another in an expansionary dynamic.

**Capitalism:** The contemporary and institutionalized form of the economic superorganism.

**Duality:** Duality is used in this book to refer primarily to the rise of the economic superorganism in humans and to place that system in reference to its relationship with the Earth. When duality develops, the system tends toward ecological breakdown as humans are no longer embedded in economic life in the rhythm and dynamic of the more-than-human world. Duality becomes so exaggerated with capitalism that it is a system that is simultaneously two things—a supra-material system functioning in a self-referential way apart from Earth and, at the same time, a material system with profound demands and impacts on the ecologies of Earth.

**Earthly philosophers:** Those economic thinkers that focus on reconnecting the economic system to its biophysical foundations.

**Economic superorganism:** The economic system put in motion with the practice of grain agriculture in humans and fungi production with certain insect species. The system is a configuration of powerful feedback loops especially between cultivation, population, and division of labor. These feedback loops enhance and reinforce each other, creating interdependence and expansion. The agricultural system is an economic superorganism but later this system itself evolves in the case of humans to take the form of global capitalism.

***Homo sapiens agriculturii:*** This is my terminology, as I know of no one else that uses it. It is meant as a reference to humans who become members of an economic superorganism in order to reinforce the idea that humans became something distinctively different when they became organized around the agricultural system. It is possible the transition to agriculture was a major evolutionary transition for the species that engaged in this mode of production.

**Paradox:** When I refer to paradox I am referring specifically to the circumstances of the present where the duality of the economic system is so

pronounced that the system requires growth for jobs, and degrowth for containment within the ecological boundaries of Earth. There is no easy resolution to this situation.

**Self-referential:** The use of this term is simply meant to convey that the agricultural system functions as a system. It is another way of saying an economic superorganism forms around agriculture or that agriculture involves an autocatalytic dynamic. Referring to the agricultural system as “self-referential” is meant to reinforce the idea that it is an insular system with feedback loops particular to it.

**Unearthly philosophers:** Those economic thinkers who attempt to describe the economic system in its supra-material form: that is, in the way it functions as a system removed from its material roots.