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To say that capital is ecodestructive is to claim that, under its regime, large swathes of the natural world are becoming undone. However troubling, this is straightforward enough. But we have also said in a number of places that it is "anti-ecological," which is not quite the same thing. The latter term introduces a new notion, that the word, ecology, signifies something to be valued in our relationship within nature, and that capital does not simply degrade one portion of nature or another, but violates the whole sense of the universe. Obviously, this obliges us to say a thing or two about what that sense might be, and, in a more general way, what it means to talk about nature.

The notion of nature is as elusive as any concept in the repertoire of thought. Nature palpably exists irrespective of what we say about it. And yet nature only exists *for us* insofar as we say anything about it. All propositions about nature, from the most esoteric investigations into cosmology, to the regulations for dumping waste, to the writings of ideologues left, right and center – including, to be sure, the thoughts written down here – are mediated by language, which, besides being an imperfect mirror of reality, is densely social and historical. Practically speaking, then, there are two layers of our imprint upon nature: first, the natural world has been substantively rearranged by human influence, to the extent that one would be hard-pressed to find any configuration of matter on the surface of the earth, and a good ways above and below it, that has not been altered by our species-activity;¹ and, second, that all propositions about the natural world are, first of all, social utterances. When we speak, or become aware, of something called "nature", we are apprehending something that also has a history, at the least, because the ways of speaking about it are social practices, and also, in the

great majority of instances of interest to us, because the "natural" entity has itself received a human, historical imprint.

The term ecology and its various meanings also has a history, in this case conditioned by the gathering crisis that bears its name.² It stands to reason that when the integrity of the natural world is under ever-growing threat, the notions used to account for that integrity and its disintegration will come into prominence. In the century-and-a-quarter since it appeared on the intellectual landscape, ecology has managed to acquire a great deal of signification. As used here, the term has a fourfold meaning:

1. A technical discipline within the natural science of biology devoted to the study of the interrelationships between living creatures and their environment. Here the crucial variables are usually the populations of diverse life-forms as they interact with the rest of nature, & each other.
- An object singled out for ecological study, that is, not populations as such but locations within the totality of the earth. We can talk of this as a more or less definite place, as, for example, the ecology of a local pond or of the Amazon basin – which at a certain scale may take the name of a bioregion. Or we may think of it as a subset of the natural world with certain internal relations, like the atmosphere, or the endocrine system of higher animals. Here the object in question has systemic properties, i.e. is a structure of interrelating elements defined both spatially and temporally; hence the name ecosystem, to define a principal object of our study. Ecosystems are bounded but also interrelated with each other (as, for example, the endocrine system is related to the circulatory system, or the oceans to the atmosphere). In fact, there is no such thing as an ecosystem-in-itself; all are interconnected, in ways that concern us greatly. We use the term ecosphere, to refer to the world regarded according to the principles of ecology, in other words, it is the earth as seen "ecosystemically." And from a still higher level of abstraction, we can think of nature itself as the integral of all ecosystems. This notion, of an integral, means

also that we think of "wholes" composed of parts but distinct from the sum of those parts. In philosophical language, we are not developing a hierarchical systems-theory, but a dialectic of emergence.

- A dimension of the human world. This is essential, unless we take the nonsensical position that humanity is outside of nature. Needless to say, developing a social view of ecology may not be to every natural scientist's taste. And in any case it requires us to extend our method by introducing dimensions peculiar to the human world, such as language, meaning, and history. These attributes give us our identity as a natural species. Once we begin looking at things this way, moreover, there is no reason not to talk of the ecology of cities, of neighborhoods, of families, or, indeed, of minds.³
- Since values are uniquely human phenomena, we logically extend the scope by taking into account ethical positions with ecological content; and since an ethical position is a guiding orientation for action in the world, we talk of ecological politics as well. It is in this latter sense that we indict capital as "anti-ecological," just as the indictment of its "ecodestructiveness" refers to the second, ecosystemic, sense of the term. What it may mean to ethically act ecologically, or to hold "ecocentric" values, which is the term we will use here, is a problem integrating all dimensions of ecology, and the solution of which, to be termed "ecosocialism," is the aim of this study.

Ecological thinking concerns relationships, and the structures and flows between them. At one level, this is mere common sense; at another, it turns what we take to be reality upside down and commits us to a world-view and philosophy of nature very much at odds with the dominant system. Nature as such vastly exceeds the phenomena of life; yet life may be justly regarded as being at the same time both a special case of nature, and, in a way we only dimly surmise, as a potential of nature – something that nature generates under specific circumstances.⁴ Life is unitary, in the sense that the basic molecular architectures of humans,

redwoods and slime molds all indicate a common ancestor. Yet life is also inconceivably – to our dim awareness – multiform, in a profusion that has arisen over 3.5 billion years through ceaseless interactions between living creatures, and with their non-living surroundings. It follows that all ecosystems that contain living beings also relate to the rest of nature, whether this be other creatures, the immediate surroundings of the earth's macro-physical environment, i.e. the "environment," or the molecular, atomic, or subatomic realms, or the extension of nature into the cosmos. A slender, filamentous connection throughout the great reaches of nature, to be sure, and scarcely likely to ever be fully comprehended by our science, but existent so long as we take the relatedness of elements within nature with full seriousness. From this standpoint we think of nature as the integral of all ecosystems, extending in every direction and beyond the limits of the planet. Talking of integrals means talking in terms of organisms, and of Wholes – in other words, the systematic introduction of an ecological vision commits us to positing reality as an interconnected web whose numberless nodes are integrated into holistic beings of ever-exfoliating wonder – or would be so, until capital got hold of them.

What is life?

The boundary between the living and the non-living is not sharp, which is to be expected if life is a potential form of being hatched by nature. Nature is formative, that is, it has the dynamic potential to generate particular nodes of existence; and life represents a way-station of its formateness. Were nature a diffuse continuum with no differentiation among its parameters, such as pertained at the moment of the "Big Bang," and will return at the extended moment of its "heat death," then there would be nothing at all, no particularized aggregation, no allocating of time and space, of dust, of energetic differentials, of galaxies, stars, planets around stars, seas and land on the planet, rocks on the land, pools of water, concatenations of chemicals in the air and in the waters, cycles of temperature and light – in short,

none of the differentiation that is the lot of the cosmos in the eons between its alpha and omega points. So the category of existence is occupied by the "some-things" that exist. These comprise beings insofar as they internalize their existence, that is, make their "is-ness" part of themselves. In this way, everything has being insofar as it is not other-things. This "being of beings" relates to and to a degree incorporates the other-things, making them internal to itself even as they become objects. Beings are temporal; they evolve as they come in and out of existence, and with their evolution comes a fuller internalization. In other words, a motion of inwardness toward subjectivity accompanies a more highly differentiated objective existence. In one line of development, this eventually results in the emergence of consciousness and mind. What we call "development" takes place on a terrain of being, and through greater subject-object differentiation – whether expressed in terms of the maturation of a child or as the evolution of life.

Life manifests a kind of being that self-sustains and replicates – that propagates its own form, through the presenting of definite individuals along with the capacity of said individuals to reproduce. But nature is not only formative, it is also dissipative of form, – indeed, were it not, form itself could not exist. Thus it is that, for our universe, there is a trajectory between alpha and omega points, between an undifferentiated moment of origin and an end – unimaginably distant⁵ – at which all beings cease to exist because differentiation itself has ended. The passage of this great loop is registered in the famous laws of thermodynamics, although not accounted for by them. The First Law expresses the insight of ancient natural philosophy, as in the Epicurean doctrine that "nothing comes of nothing"; it holds that matter and energy are conserved in physical systems. The Second Law surpasses this by introducing the notion of form and the dissipation of form. If "entropy" is a logarithmic measure of the probabilistic disorder of a given physical system, the Second Law states that for such a system, whether it be the air in a room, a living body, or the earth as a whole, so long as neither energy nor

entropy
- form
- energy
- matter

matter is added to said system – that is, so long as the system is “closed” – then its entropy will rise with time. An increase in the randomness of its elements, or from the other side, a loss of form, will therefore emerge in the absence of the input of energy. More, the direction of this change defines “time’s arrow.” Thus an ice cube melts, “with time,” in a glass of water, replacing a relatively improbable state with a more probable one – that is, one corresponding to a greater number of system possibilities in what physicists call phase-space.⁶ Similarly, when we die, the exquisite combination of molecules that has existed in this living form is returned to the great flux of the universe. It is living form that maintains that exquisiteness – to which we, as self-reflective living creatures, respond aesthetically.

There are a number of themes here that need a bit of unpacking. First, we understand life to stand in a degree of tension with the universe that gave it existence. The universe, or nature, has within itself to give birth to life, as a “natural” potential of the cosmos. But at the same time, and through the workings of the same nature in its Second Law, life stands against certain laws of the universe. Life must be . . . and life cannot remain. Poised between these poles, life must continually struggle for its existence; if it does not, it passes into death.

In the current orthodoxy the term “struggle” is endowed with Hobbesian and Social Darwinian meanings: struggle is the war of all against all, and the survival of the fittest in a regime of continual mutual aggression. This notion was not Darwin’s, and it is not only ideologically distorted, but factually wrong. By no means do all creatures behave this way. In fact, no creature, not even the “king of the jungle,” endures wholly through predation; while for the simplest creatures, those microscopic cellular beings on which the entire biosphere rests, the Social Darwinian notion is without meaning. As the British paleontologist Richard Fortey points out, the first “sustainable” systems, the mat creatures, or “stromatolites,” whose lineage goes back 3 billion years to the Precambrian (roughly 2.4 billion years before the emergence of more complex multicellular organisms) and that

still endure in certain protected locales, are composed of layers of prokaryotic bacteria, the topmost, “thin as a sheet of paper,” doing photosynthesis, the lower layers breaking down the waste products of the upper by fermentation, the whole given structure and nutrient by trapped grains of minerals. “It was a sustainable system, an ecosystem in miniature. If this truly reflected the state of the nascent biological world it is clear that cooperation and coexistence were a part of life close to its inception. Existence at base can be thought of as reciprocal rather than competitive

... These humble structures are the birth of ecology.”

Given that for the considerable majority of the time life has been on earth, it existed as static mats of microorganisms undergoing biochemical exchange with the rest of nature, the meaning of “struggle” includes forms of cooperation as well as competition and predation, and indeed, the former would be more fundamental than the latter. The stromatolites had no organs, they gathered not, nor did they hunt, nor were they hunted, and for a period longer than the so-called higher life has existed. Yet they lived and had “ecologies.” For the stromatolites – and, at bottom, ourselves – to struggle means therefore to engage in transfers of matter and energy required to sustain a certain formal organization in relation to the Second Law. Dead, the numberless atoms of our substance are essentially unchanged; their mutual positioning (including the positioning into more complex molecules), however, is drastically rearranged. The absence of life signals a reorganization in the direction of randomness and disorganization, mainly carried out in this epoch through the agency of other living beings who rebuild their substance from the elements of the old.

Life, then, is what sustains organization: to be exact, organization at low entropy. The ensemble of energetic and formal processes required for this constitutes the specific life activity of a given creature or species. The hunting, gathering, etc., of “higher” organisms is a more elaborate way of proceeding down the path, grounded in the necessities of a more elaborate formal structure. Each creature must extract energy in order to struggle,

so as to maintain its form, which is to say, to endure. And this means that each creature is insufficient in itself, for insofar as it individuates, it also separates, and that from which it is separated is therefore related to it, connected yet different. Those who do not come together so, are the non-existent.

All living beings have internal and external relations of parts to wholes. This quality, that life must exist in relation to other life and to nature as a whole if it is to contend with the Second Law, defines the notion of ecosystem, and on a far deeper level than that of a mere collection of bodies. Ecosystems constitute places of "putting together." They are the sites where creatures interact in ways potentially conducive to their emergence and sustenance. Ecosystems are the loci of nature's formativity, active ensembles where being comes into existence. Ecology in the larger sense is the discourse of such ensembles, and is built into the fabric of terrestrial life, from the infinitesimal microorganism to the ecosystems now being destabilized.⁸

Life emerges on this planet – we may set aside the question of alternate life on other planets – owing to a fortuitous set of circumstances within the range of cosmic possibility. Here nature originates life, which then, through struggle and in its ecosystemic places, proceeds to evolve. But evolution is conditioned at every step by the flux of ecosystems. Life's own activity, played out in ecosystems (along with other natural influences, e.g. meteorites, solar flares, etc.) is what prods living beings along, changing the terms of the struggle for existence and leading to evolutionary development. Ecology, therefore, is integrally tied to evolution – one may say that any given ecosystem is a synchronic slice through evolutionary time. Life is defined anti-entropically, insofar as its chief feature is the sustenance and creation of form. Living systems display degrees of order incomprehensible to the crude mind. Whether we look at the obvious proportions and symmetries of organisms or, more impressively still, the fine molecular structure wherein each atom seems to be positioned as in a tiny workshop, it would seem that life not only disobeys but positively flouts the Second Law. This is exactly what the

struggle for existence is about. Dead, the corpse of a once-alive creature very quickly falls into line with the principle of rising entropy. The work of life, and the intricate dance of energy and form that goes into it, is essentially an enterprise to stave off and reverse the Second Law. Far from refuting the Second Law, then, life affirms its power by struggling against it.⁹

The struggle of life against entropy does not deny the Second Law, because living creatures are anything but closed systems. Whether they convert ambient sunlight into usable form through photosynthesis in the plant kingdom, or eat the products of this activity in the substance of animals, life is constantly taking in low-entropy energy to sustain its form. A considerable degree of evolved biochemical activity consists of the capacity of living beings to capture energy in small packets, principally of high-energy phosphate bonds, so that the fine structure of life's workshop can proceed. Here, in the astounding nano-factories of the cell, the principle permitting the emergence of life in the first place is institutionalized: reactants are held together, energy is transformed into small and usable amounts, and the whole tiny architecture is repeated trillions of times over, as life builds and propagates itself.

Through it all, the net entropic pattern remains very much in line with the Second Law: insofar as life can be put in the position of a (relatively) closed system, it will increase the entropy of the totality comprised by itself and its surround. For the earth as a whole, it is not so clear. It is very likely the case that life's capacity to draw down the energy of the sun (and to a lesser extent, that of more immediately gravitational sources like tides and geothermal hot spots) has so overridden the constraints of closed systems as to have produced, at least until quite recently, when the ecological crisis has reversed the pattern, an actual decrease of entropy on the planet. At least, that is the way I would regard the "Gaia" principle, according to which the earth itself is a super-organism, with the capacity to self-regulate and even to exhibit signs of a kind of consciousness.¹⁰ It would seem to be the case that whatever Gaian tendencies are evinced by the

global ecosystem are manifestations of the cumulative effects of evolution upon the planet, made possible by the genius of life to subject the globe to its ordering effects. In this scheme, the "closed" system is the earth + space, with respect to which the overall increase in entropy is accounted for by harmless re-radiation of degraded solar energy into the latter. Meanwhile, organic evolution achieved for the earth as a whole what the life process does for individual beings, namely, an increase in order and dynamic form.

If ecology is the readout of life's formal organization at any point in time, then evolution is its forward temporal motion. Therefore, the ecological state of things at any moment is like a snapshot of evolution about to happen. This should not be interpreted, however, as a teleologically ordered process, pulled from beyond by God – or, in the more ideologically understood sense, that evolution awaits its fulfillment in an equilibrium under the guidance of the current ruling class or master race. The notion of formativeness in nature requires, rather, a more dynamic reading. For if ecology were ever in a steady state, then there would be no pressure to evolve, and nothing of the beauty and intricacy of living form. It is lack, and conflict, and the ceaseless interaction between living beings and their surround, that condition the evolution of life. Equilibrium as such is not a property of life, while generally speaking, those functions within which a kind of balance obtains are better thought of as a metastable equipoising, i.e. the "holding together" of elements in creative formation. Heraclitus seized the root of things when he posited ceaseless motion, with its absencing and presencing, as the way of the universe.¹¹

Therefore, when we talk of the "stability" of ecosystems, we do not imply a static condition, or even one of simple equilibrium. We mean, rather, a state of being with an irreducible indeterminacy, within which one might say, "life goes on-ward": evolving new (though not "higher") species, and introducing those formal shapes and dynamic processes into the ecosphere that comprise its work on earth. Since it is in the nature of ecosystems to move

and evolve, we do better to evoke their integrity than their stability. The notion of integrity includes stability as a rate of change and emergence compatible with the working of any ecosystem. Even at its "climax," the forest continues to evolve. At the physiological level, the immune system is stable if it is capable of changing by introducing new antibodies to meet new contingencies. Ditto for the circulatory system, which has to keep maintaining its existent vessels, and extending new ones into traumatized areas.

To speak of the integrity of something means recognizing that it exists as the integral of its parts. In a word, it is a Whole. Preserving ecological integrity is a matter, therefore, of preserving Wholes, and fostering their emergence and development. I say, fostering, meaning that in the human world we have a choice as to whether to do this or not – a choice that depends in part on whether we value the integrity of ecosystems. As to why we should do, one might say that our own survival depends on it, but also and necessarily, because to value this way means to fulfill our own nature, to find its integrity as well. The ordering effects of life on earth are not merely a matter of overcoming entropy. They also result in those entities and patterns that we find beautiful – and this sense of beauty is no indulgence, but the participation in that nature from which being arises. If we wonder at the beauty and elegance of nature, then, we are nature appreciating itself, and our wonderment is part of the form of nature itself. We have the choice as to whether to try to foster the continuance of life. By choosing "no," that is, choosing to continue on with the way of life that leads to ecological disintegration, we are also choosing against ourselves. And this leads us to ask, just who we are.

On human being

A natural creature, beyond doubt, the same basic set of molecules, including DNA, the same submission to the entropy principle, the same fundamental ground plan, caught up in evolutionary time and dependence upon ecosystems. Like all natural creatures, the human being has an imprint. The bat has sonar,

the whale special capacities for diving (and its kind of sonar), the bee its quantum dance, the venus flytrap its signature form of carnivorousness. Each creature in nature has its "nature," its way of being, its point of insertion into the ecosystemic manifold, its peculiar mode of struggling. We regard "human nature," or "hummingbird nature," or "bee nature," or "maple tree nature," in this light – both holistically, as the species-specific way of struggle in an ecosystemic world conditioned by the entropy principle; and also at a more concrete level, as the ensemble of powers, potentials and capacities that enable this way to be expressed. There is nothing mystical about the fact of particular species-nature; it is simple logic. To be is to struggle, and each point of difference in being is a different mode of struggling. In this way, living forms arise and take their place in ecosystemic manifolds, each in their way, better, each *as* their way.

The notion of human nature is often unpopular with people of progressive persuasion, who see in it a system of essentialist chains: men *are* in essence like this (e.g. from Mars); women *are* like that (from Venus); blacks are this way; and Chicanos that way, etc. – always with the more or less unstated proviso that in a stable social order they will remain that way, generally at a subaltern rank. Nature – and human nature – in this view are essences, false reductions of what humanity is, and therefore a fetter on what it can be. But this point of view, however well-intentioned, is mistaken. Essentialism is undoubtedly wrong, both morally and philosophically, because it imputes to the object a thing-like inertia that violates its range of potential being; it is, we might say, a kind of reification. But there is no *a priori* reason to place the blame for essentialism on the idea of nature. The categories of nature need not inherently limit human freedom and potential, although they can be used in this way – and always will be drawn upon as such by ideologues of authority and repression. They need not, in other words, conflate humans with other creatures, any more than they reduce elephants to hummingbirds. The idea of social or cultural determination is often opposed to determination by nature, as though the former had a built-in

reassurance of freedom. But there is no reason why this need be so. Essentialist views, say of blacks and Latinos, can just as well be expressed in culturalist as in racist terms. Classically, racism is a biological essentialism, the object being considered an (inferior) subspecies of the human type. But this essence can just as well be transferred onto ethnicities or other cultural structures, where it becomes the "culture of poverty," or the "black family," or, as the latest wrinkle has it, the culture of believing one's group to be racially oppressed, all of which allegedly traps the groups in question into a universe of self-defeating social assumptions.¹²

In any case, the notion of human nature is necessary for any in-depth appreciation of the ecological crisis; and its lack is a sign of the crisis itself. In the absence of such a view, humanity is severed from the remainder of nature, and a genuinely ecological view is replaced by mere environmentalism. If we have no nature, then nature is always outside us, a mere grab-bag of resources and instrumental possibilities. Nor can the ties linking humanity and nature be given as a set of physical transfers between people and their "environment." Creatures struggle as organismic totalities, that is, full beings who act in the ecosystemic world and are acted upon by the world, not as leaky bags of dull matter.

All creatures co-evolve with their surround, in the course of which they actively transform their surround. Nature gives rise to form, and living creatures are trans-forming forms. That is why to talk of environment instead of ecologies violates the nature of things. Life actively changes the world, from other creatures to the very configuration of the rocks and the composition of the air. The atmosphere we breathe was made by living creatures, and so was the soil. The form of every creature is determined by other creatures.

Humans are also trans-forming, but with a core difference that defines human nature: we have evolved the inwardness, potentially inherent for all beings, into a subjectivity, or self, which has the capacity for an *imagination* – an internally represented world – and we act upon and transform reality through this imagination. I do not mean that we live only in the imagination,

as that would be tantamount to not living at all, nor that the imaginary world is more important than the world it represents; but only that the capacity to represent the world internally, to work it over in thought, and to remember and anticipate it as well as to actually inhabit it, is what makes us human. The specifically human is a whole motion, encompassing inner and outer worlds and mutually transforming both. The signature of human nature lies in this motion as a whole, while the various powers that comprise our nature are the components necessary for this motion to occur. These powers and their various substrata all evolve ecosystemically, just like the rest of nature, with the highly important distinction that a co-evolving human sphere, mediated by the imaginary world, arises alongside the sphere of non-human existents – alongside of, then interpenetrated with, colonizing of, and, in the time of ecological crisis, destructive of the non-human order. Still, we never escape nature and do not become just as we please. Everyone has to eat, pass urine, to rest and sleep; everyone gets sick, and everyone will die. Our lives remain conditioned by the realities of nature, from quantum flows, to coarse Newtonian mechanics, to the hegemony of the entropy principle. No matter how ingeniously we may fashion nature – including the manipulation of the genome and the creating of new kinds of life – we are still doing no more than learning its laws so that we may use them for human purpose. Nor, it must be emphasized, does this remarkable capacity make us the high point or end point of evolution, for every creature standing at the end of its line of evolution is, with respect to the genealogy of nature, as high as any other. However, it does give us a kind of power such as no other creature has remotely possessed, and, with this power, various delusions and opportunities.

Teasing apart some of the threads of human nature, we find the following.

- An ensemble of somatic elements, rapidly evolving owing to the marked selection advantage conferred by human nature: a relatively huge brain, elaborate voice-box, opposable thumb,

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upright posture, and the like, providing the material substratum of specifically human ways of being.

- Of special importance was the emergence of language as the specific human mode of communicating and representing the world. This involved "hard wiring" of the evolving brain, coordination with the evolving speech apparatus, and, decisively, integration with evolving forms of sociality, the result being that the powers of individuals could be combined.
- Human sociality implies society, as a kind of super-body, with a culture, transmissible through generations as a shared system of meanings. Society and its culture become the locus of that parallel, imagined universe which comprises the human order in its varying relationships to nature.
- The boundary of the super-body with pre-existing nature is made by means of technology. Tools are extensions of the body, as well as transfer points of the body into material nature, and of nature into the body. Technology is always socially determined and the bearer of meanings constructed through language. It is not a collection of tools but a fabric of social relations, certain threads of which are nature transformed into tools for the transforming of nature.
- Human being entails a new order of subjectivity. All beings, we have observed, possess a potential interiority implied by their difference with other beings – the fact that they are something and not others. Human nature appears as that development within which this interiority acquires internal structure through the particular forms taken by our consciousness under the influence of language. All creatures are present to each other. Language involves re-presentation: a sphere of interiority arises where what is presented is presented back – re-presented – owing to its significance with language. Hence the real is, so to speak, doubled. This re-presenting is formative of the imaginative space of subjectivity. The imagined world is just as much a part of human ecology, as are chemical messengers for dog ecology or moth ecology.
- As this space of interior representation attains identity, it

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becomes a *self*. Its form is given by a degree of consciousness of itself, clothed by language with the words, "I" (as the subject phase) and "me" (as the object phase). The radically augmented power of the human species is generated here, in the space where the world is created within the self, which then defines a social collectivity that acts upon the world.

An ensemble of relations is involved here – not just intelligence, and the practical skills, but desire as well, which conditions and drives the practical intelligence. This arises from the radical formlessness of human instinctual structures, which is reshaped according to culture. Correlated with this are the processes of separation and individuation that occur out of the matrix of childhood. Culture implies intergenerational transmission, which rests upon the facts of childhood, something no other species remotely undergoes.¹³

The sociality of humans is unique – though neither more nor less so than that of bees, coyotes, baboons, dolphins, etc. It cannot be reduced to that of any other social animal, no matter how many amusing parallels may be found. This is because of the centrality of the self in human existence, and also because this self is always and necessarily a social product, formed through language and mutual recognition between the developing person and others. This foundation gives the human self a permanently dialectical quality – that is, it is formed in and lives through a set of contradictions that arise as the self is formed in mutual recognition of others, and, later, in contradiction between individual interest and social bond. The mark of the other is always upon the self, and so is its aloneness and fear of solitude, facts that are to loom large in our relation to nature.¹⁴

The unique relation of human being to desire, along with the dialectics of the self and recognition, mean also that sexuality and gender play a uniquely powerful role in human existence compared with all other creatures. The significance of this for the ecological crisis will be explored in the next chapter.

There is an inescapable tension between humanity and nature. From one side, a fully embodied creature, obeying all the laws of the universe; from the other, a stubborn, proud and will-full creature who distinguishes the self from nature and even chooses to protest the natural. We can say it is a facet of human nature to *quarrel with nature and even to reject the purely natural given*. This notion may serve to signify human nature as a whole. It appears in phenomena as ubiquitous as the need to cook food, and to adorn the body, and as fundamental as technology – for each tool, as an extension of the body, is also a kind of protest against the limits of the natural body. And it marks the deepest stratum of our psyche as we relate to the ends of life. Every creature fights for life; but only a creature defined by selfhood will ponder death, fear death, deny death, or develop religion as a reaction to the perceived limits of existence. Thus, one of the most distinctive features of humanity in the archeological record is funerary evidence. Even the simplest trace of a burial condenses all that is specifically human: an awareness of death, that is, of the finitude of the self; a protest against death, care for the person who died, along with grief and sense of loss; the technologies of burial; and as a condition for the whole ensemble, society and culture. Nothing of the sort obtains for other creatures.¹⁵

Defining human nature as a tension with nature enables us to avoid essentialist positions that confine the human being in a prescriptive straitjacket. It allows for the quirkiness of human beings, and our playfulness, and aesthetic side. It also says something about human creativity, as the restless need to remake the world and to make other worlds, and about the sense of beauty that uniquely marks the species. And it does this while yet rooting us in nature and allowing for the immense range of ecological modes of being that characterize us, including those leading to and potentially leading out of the ecological crisis.

The general function we have been describing may be identified as *production*, as the term for what human beings do, as part of nature, to express the formativity of nature by mediating it through the human world. When we produce, we transform

nature. We use the term "labor" to express in a general way the human propensity to produce, being careful to distinguish this meaning from the degraded (or "alienated") sense of toil that characterizes the products of domination, as we discuss below. Similarly, an economy enters the picture when production is socially organized, and there is a division of labor, and a wide exchange of what is produced, so that human powers are more elaborately expressed.

Both social production and consumption are direct extensions of human nature, in that each transforms nature through an engagement with the imagination and the ensemble of human powers. Production – and the human capacity of labor – is, as Marx insisted, a matter of looking ahead: every object which gets made exists in the imagination before it does so in reality. Every commodity is defined by its *use-value*, and this, too, is necessarily a function of need, which in turn is a function of want, which in turn can be a function of desire. No purely mechanical or utilitarian accounting can give a sense of the use-values of commodities, and, therefore, of the economy itself: the imagination needs to be invoked.¹⁶

But we are not done with human nature. There are other, more complex qualities to be noted.

- The emptiness that always shadows the self and the peculiar set of powers conferred by human nature creates for humanity a capacity not seen elsewhere in nature, namely, a reaching beyond itself, along with the potential – by no means expressed in all instances – of achieving a universal perspective, and of reaching toward the Whole. Broadly speaking, this refers to our spiritual life, the forms taken by which, or lack thereof, enter into the ecological crisis.¹⁷

- In addition, we recognize that the peculiar position of the self, poised as it is between the form-dissolving entropy principle and the looking-forward of production, leads to a special, socially conditioned temporality specific to each society, and produced in its myth and narrative. Human nature, by reject-

ing the given and making its world, configures an account of itself according to time: it produces *history*.¹⁸ We have said something already about the special temporal conditions of capitalism, with its speed-up and binding of time. However, every society has a special temporality, wrought from the arrow conferred by the entropy principle, and manifesting the tension with nature that will always be an aspect of human being.

- All of the powers of humanity, spiritual and practical, are available for addressing the social order and have the potential for transforming it. The extremity of social transformation we call revolution. If nothing in nature stands still, how much more so is this the case for human beings and society! All things pass, and, for us, the relevant question is whether the capitalist order will pass away before it causes humanity to pass away. But capital cannot pass away of itself; it has to be ushered out, through a conscious transformation into an ecologically rational society.

Ecosystemic integrity and disintegration

Ecosystemic boundaries provide structural scaffolding for what is within an organism (the "organs" and other internal ecosystems – nervous, endocrine, immune, etc.), as well as the point of differentiation between ecosystems. The nature of the ties between organisms in a particular ecosystem is given by the specific activity of each being, and is never singular. Trees in a forest are linked through the myriad of creatures who relate to them as food, shelter, nesting place, etc., as well as through their access to water, air, sunlight; and also directly between each other, through a subterranean network of fungi, root hairs, and the like that effectively link all the trees into a superorganism.

Existing systems theories, including informational theories, tend to posit a mechanical and crudely hierarchical set of relations between ecosystemic elements. This leads to hopeless contradictions in the relations between humanity and nature, which

have prevented the emergence of an integral view; for the human relation to nature is immensely subtle and dialectical – i.e. proceeding from negation – and cannot be neatly or hierarchically packaged. So long as mechanistic reduction holds sway, the set of ecosystems will be put together essentially like a motorcar, with each system being a part like the starter, the tires, etc. What is needed is recognition of the fact that the formative power of life introduces a radically different element, which we here simply call the Whole, and is manifest in the dynamic fluidity that obtains within and between ecosystems. Elements of living ecosystems do not exist as separable parts; they also exist in relation to the Whole, which is formative and non-reducible to any of its parts, and which plays a role in determining them, and cannot exist without them. What is individual exists in relation to the Whole, therefore, and this relationship must be included in any concrete account of things. Our very being is given this way, which for humans, endowed as we are with deep interiority, appears as *spirit*. The Whole is the formative notion of the ecosystem: it is a kind of *logos* that constitutes the intelligence of the ecosystem, which intelligence is drawn upon by individual beings within the ecosystem and, in our case, eventuates in consciousness. When we, or any other creature, are truly thinking, we are thinking in respect to the Whole; there is a sense in which it can also be said that the Whole is thinking through us.

The boundary-processes between elements in an ecosystem determine its integrity. These processes are as varied as life-forms themselves, and cannot be reduced to any common property beyond the interplay between formative power and the constraints of entropy and other fundamental physical laws. Yet we can say that the integrity, or "health" of an ecosystem is a function of how these boundary processes, of whatever kind, relate organisms to each other internally, to other ecosystems externally, and to the Whole. The integrity of an ecosystem can be expressed in relational terms; we might say that it depends upon the degree of differentiation between its elements, where this term describes a state of being that preserves both individuality and connected-

ness. From another angle, to the extent that organismic beings recognize one another, they are both distinct and connected: they become themselves through active relation to the other. In this usage, recognition need not imply any defined subjective element. It is rather any mutual signalling that preserves both connection and individuality. Nor does differentiation always imply harmony or equilibrium. It can allow for interactions between organisms that result in the death of one or more of them; but a death, nevertheless, that provides for the preservation of the Whole.¹⁹ The ecosystem consists of the comings and goings of all its constituents; this ceaseless motion builds up the Whole, within which, therefore, the death of individuals is just as important as their particular lives.

If differentiation is the key to understanding ecosystemic integrity, what makes for ecosystemic disintegration? Here we introduce a formal process that interrupts the dialectic of individuality and connectedness, and leads to the separation of elements, or, from another angle, of their splitting. What splits apart the elements of an ecosystem, either from each other, or, what amounts to the same thing, from the Whole, will impede the development of that Whole, block the evolution of new forms, and eventually destroy the individuals within it. Splitting entails a breakdown of recognition. Whatever fragments an ecosystem, separating its constituents and depriving them of the range of their mutual interactions, will block the formation of the Whole, and to that degree impoverish the development of the organisms within that whole, cause a deterioration of their internal state and even, perhaps, lead to their extinction.

This can be viewed in terms of physical separation – the so-called "island effect" by which ecosystems sink below the size that permits the optimal interaction of their organismic elements²⁰ – but also as the introduction of disruptive elements into the ecosystem, either new organisms ("pests" and pathogens), or new substances that block the life-processes and so annihilate ecosystemic existence. The introduction of methyl isocyanate into Bhopal was an example of splitting as annihilation: it

literally split apart bodily integrity. A similar discussion could be resumed at a more subtle level for pollutants that have been inserted into the biosphere – as, for example, by organochlorines that mimic hormones and fragment the integrity of the endocrine ecosystem.²¹ The same, however, applies to capital, which separates the producer from the means of production, as well as through the effects of money, to be discussed below. All of these modalities introduce self-perpetuating splits into ecosystems, which eventually disintegrate them. What is split away leads not to a renewal of being but to emptiness and withering, physically but also subjectively, as when traumatic memories are split-off, or parts of the self become alien. From the other side, the appropriation of split-off parts of the self, accompanied by the letting-go (as against the splitting off) of desires, is a sign of the development of the human being, and the core gesture of healing.

The ecological crisis is a great and proliferating set of ecosystemic splits, both natural and human, subjective as well as objective – a fraying of the fabric of the ecosphere. But what was frayed can also be mended, the way a broken arm can be mended. Here the break in the bone splits apart the functional unity of the limb, which the healer mends by figuring out how to hold together the broken parts so that nature's reintegrative process can resume. So it is with damaged ecosystems: ways must be found to restore and hold together elements to create a flourishing ecosystemic boundedness. There are important homologies to this in the ordinary functioning of nature, for example, the structural dynamics of the cell, where small packets of energy are deployed through the exquisite arrangement of ribosomes in mitochondria, "holding together" the intricate array of molecules so that the synthesis of low-entropy compounds – and structures composed of these – can go forward. It is not too far-fetched to claim that these conditions formally reproduce those attending the origins of life itself. Another example, in which I should hope every human participates, is the holding of children, the animate communication with them, and, then, necessarily, the letting go

when the child is capable of moving on her own. This is the way individuality and connectedness become integrated in a human life. The great intricacies of raising children are variations on this simple theme; they amount to the provision of safe spaces in which an entropically unlikely interaction of elements can take place. Nothing fancy, yet more than three billion years of evolution enter into it.

It is important to recall in this time of despair that humanity, the greatest pest in nature, is not necessarily pestilential. All production – our giving form to nature – is an ensemble of order and disorder, and an entropic gamble. By "producing production" ecologically, we bring the odds of that production in the direction of ecosystemic integrity. The artist's fury to rearrange the given is akin to the gardener's tearing of the soil. "The cut worm forges the plough." wrote Blake, knowing that destruction and production are conjoined sides of a dialectic.

Gardening, taken at large, can vary from a crude appropriation of capitalist consumerism (pesticides, heavy equipment, etc.), to inspired modes of "organic" intervention, including the practice of "permaculture," which engages a conscious effort to design gardens as full ecosystems.²² All good gardening consists of differentiating a pre-existent given by the holding-together of disparate elements (seeds, water, good soil, compost, mulch, light, etc.) so that ecosystem development can occur. Conscious preparation is necessary, along with culturally transmitted knowledge. Thus gardening is a social process, enhanced to the degree that a fully realized association enters the picture. In fact, a community garden is an excellent model of a pathway toward an ecological society, as we will discuss later on.

The whole of history enters into each garden plot, and is perennially reopened there. These filaments extend back to the origins of humankind, and reveal the authentic core of our nature – which is to creatively intervene in nature. Long before the neolithic revolution had opened a path toward hierarchical society, humanity had learned to read the book of nature and to follow its generative way. It was a hard learning, whose lesson is lost in a facile

romanticization of "first peoples." For the very first humans were by no means always kind to nature, nor should we expect this of them. Marauding bands of archaic peoples, for example, were quite likely the exterminators of mastodons, along with many other species. And why not? Why should the powers of collective action and technology afforded by human being not have gone haywire again and again under the circumstances of paleolithic existence, just as they have since? There is no surprise in that. The wonder is, rather, that at least some of the same creatures learned from their mistakes, learned to care for nature, and to divine the essentials of an ecocentric way of being.

If we look back to those forms of production that are not only precapitalist but essentially pre-market (in that the elements of private property, money, and exchange are peripheral), we find humanity capable of the whole range of ecological relations, creative as well as wanton. The latter is written in many extinctions and false starts, while the former may be summarized as follows: That under original conditions, the human being is not merely capable of living in "harmony with nature"; more fundamentally, an unalienated human intelligence is itself capable of fostering the evolution of nature even as it itself evolves. In this sense, what we call "nature" is to some degree a human product itself, so that ecology and history have a common root. If evolution is mediated by the activity of creatures through ecosystems, should not the consciously transformative activity that is the human trademark, also be an evolutionary force?

Consider the Amazon basin, a hotly contested zone of the ecological crisis. It is recognized that an immense proportion of living species – including innumerable as yet undiscovered by us, along with many that are extremely useful – are found in this great womb. What accounts for this prodigious diversity? There is no single "efficient cause," in the sense derived for the ecological crisis as a whole; but there are distinct efficient causal patterns, a major one of which involves human intervention. The principal mode of species diversification is known as "allopatric speciation," briefly, the divergent paths taken by common gene pools

as the creatures bearing those genes are separated and undergo divergent development under varying ecosystemic conditions. The famous example is the varied evolution of finches in the Galapagos Islands, discovered by Darwin. As different populations from the stem species moved to different islands, they ceased interbreeding and divergences began to appear under the different island conditions – which had been further changed by species activity – until eventually new species appeared.

In the hot and moist Amazon basin, the immense, varied yet relatively unbroken terrain, some 6 million square kilometers in area, creates an exponentially greater gene pool for the purposes of recombination. However, the very unbrokenness of the terrain can be seen to work against the project of speciation. For despite the great range of soils and habitats, there are few islands, or mountain ranges, or insurpassable bodies of water to provide the ecosystemic differentiation to allow allopatric speciation to "naturally" take its course. One would think, rather, that the oceanic scale of the rain forest would cause related gene pools to constantly intermix, thereby inhibiting the profusion of new species. Such reckoning omits, however, to take into account a creature able to create new ecosystems and demarcate them from others in a fluid and shifting way. More, this creature, left to its own devices, will for a few millennia live in small communities and as a result build a great number of micro-ecosystems.²³ The indigenous peoples of the Amazon not only created new ecosystems, they deliberately made these in a way that encouraged diversity of species, as by planting different configurations of trees that would attract varying patterns of game species. Moreover, they engaged, like many Indians of the Americas, in the controlled burning of the landscape. Utterly unlike the mass burnings by alienated and desperate workers and peasants that have been destroying the rain forest for the past two generations, this kind of burning is conducted in small batches, at carefully controlled times and rates, and by the individuals who directly inhabit the land. As Susanna Hecht and Alex Cockburn comment for the Kayapó (who at the height of their society tended an

area roughly the size of France), the burning "is coupled with activities that compensate for its potentially destructive effects."²⁴ The result is actual enhancement of fertility (necessary given the peculiar conditions of the rain forest) and the provision of micro-ecosystems for rapid speciation.

Here humanity writes with its labor on the surface of the Amazon basin to bring forth new and richly varying life-forms. Far from being a congenital enemy of nature, then, humans can be a part of nature that catalyses nature's own exuberance. This ecologically creative activity is reserved, however, for those whose human ecology is closely configured to the varying natural ecologies with which it interacts, so that the combined human-natural ecosystem is integral and differentiated rather than disintegrated and split. It needs be realized that this kind of behavior requires that the earth not be treated as private property, or, what comes to the same thing, that the labor which undertakes it is freely differentiated, or as we will be calling it, freely associated. It is under such "original" conditions that human intelligence and consciousness learned to take an eccentric form. This way of being creates people who differentiate nature and know the individual plant species one by one,²⁵ who live in the small, collectively managed communities that provide an immense range of opportunities for allopatric speciation, and who develop the existentially alive culture whose lessons are ours to learn.²⁶

6 | Capital and the domination of nature

The pathology of a cancer upon nature

What is the root of capital's wanton ecodestructivity? One way of seeing this is in terms of an economy geared to run on the basis of unceasing accumulation. Thus, each unit of capital must, as the saying goes, "grow or die"; and each capitalist must constantly search to expand markets and profits or lose his position in the hierarchy. Under such a regime the economic dimension consumes all else, nature is continually devalued in the search for profit along an expanding frontier, and the ecological crisis follows inevitably.

This reasoning is, I believe, valid, and necessary for grasping how capital becomes the efficient cause of the crisis. But it is incomplete, and fails to clear up the mystery of what capital *is*, and, consequently, what is to be done about it. For example, it is a commonly held opinion that capitalism is an innate and therefore inevitable outcome for the human species. If this is the case, then the necessary path of human evolution travels from the Olduvai Gorge to the New York stock exchange, and to think of a world beyond capital is mere baying at the moon.

It takes only a brief reflection to demolish the received understanding. Capital is self-evidently a possible outcome given the potentials of human nature, but despite all the efforts of ideologues to argue for its natural inevitability, no more than this. For if capital were natural, why has it only occupied the last 500 years of a record that goes back for hundreds of thousands? More to the point, why did it have to be imposed through violence wherever it set down its rule? And most importantly, why does it have to be continually maintained through violence, and continuously reimposed on each generation through an enormous apparatus of indoctrination? Why not just let children be the way they want