

Margaret Schabas

Nature does nothing in vain

Man alone among living things knows that he has evolved. Man alone is able to decide what direction or directions he desires his own future evolution to follow, and can set about acquiring the knowledge he needs to achieve the desired results.

– Thomas Goudge, *Ascent of Life*

According to recent scientific findings, we are responsible for the elimination of three species every hour, a rate approaching that holocaust of species associated with the age of dinosaurs.¹ Secretary General of the United Nations Ban Ki Moon recently declared that “the global response to these challenges [of biodiversity] needs to move much more rapidly.”² But even if we could significantly reduce gas emissions and put a halt to global warming, biodiversity is

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likely to continue declining. It takes on average a million years for a species to branch off and distinguish itself; no new phyla have surfaced for over one hundred million years. Our phenomenological experience of biodiversity is thus almost exclusively one of decreasing numbers. Where Darwin once saw an entangled riverbank teeming with life, our vision of the earth’s future landscape is as desolate as the moon.

But perhaps such worries are unwarranted? Insofar as evolutionary theory commits us to some degree of interspecific competition, it seems counterproductive to preserve and prolong the life of each and every species. Who is to say that two million species is not preferable to twenty? Moreover, why not strive to preserve variation within a specific species, especially given that the taxonomic units themselves are so contested? Since subspecies are potential species, perhaps our attention is better placed there.

Numbers aside, there are many arguments in favor of preserving, if not enhancing, biodiversity. Some are consequentialist, appealing to values instru-

1 I wish to thank the following for comments and criticisms (with the usual disclaimer): Emma Spary, Loïc Charles, Staffan Müller-Wille, Lorraine Daston, and John Beatty.

2 *International Herald Tribune*, May 23, 2007.

mental to the welfare of *Homo sapiens*, such as the medical potential of tropical plants. Other arguments are deontic, appealing to intrinsic values, such as the beauty of the wilderness or the sanctity of life. None are entirely persuasive, however, for the simple reason that they assume we can, in some meaningful sense, alter the pace of the evolutionary process and thus ensure greater longevity either for humans or for other species. Implicit in these arguments is the belief that we can step outside of a realm called 'Nature': that human agency can be partitioned and treated as a separate sphere that does not follow the same deterministic chains found in the biological realm.

My objective here is to make sense of that assumption, and to take an approach quite different from those who subscribe to the movement known as deep ecology. While deep ecologists wish to level man with nature and to steer us away from anthropocentric values, they overlook the fact that their concept of nature is itself replete with social concepts that are in turn steeped in natural discourse. To put it another way, what remains underexamined is the sense in which ecology itself embodies a complicated amalgam of the social and the natural.

'Nature' has long held the promise of a realm separate from human influence. To commune with 'nature' mandates just such a distinction. A sharp contrast could be drawn between the lush vegetation of the Jamaican forest and the cement buildings of the South Bronx. But just as the cement harks from bauxite mines found in the Jamaican interior, the nearby forest receives rain laced with acid from distant cement factories. There is, arguably, no place in the sub-lunar region immune from human agency. As Bruno Latour provocatively re-

marked, the ozone layer is a political object.

Any effort to single out what is meant by 'nature,' let alone demarcate its part in 'the environment' is most likely futile. 'Nature,' as David Hume warned us in 1740, is one of the most ambiguous and equivocal words in the English language. It is the repository of anything and everything. But one possible means to acquire at least a feeble hold on its set of meanings is to look at distinctions drawn by specific sciences and to examine them as they have evolved over time. We have perhaps no other means of access, since we lack the view from nowhere and must thus be content with our own contingent historical reach. So let me propose here, for the sake of argument, that the 'natural realm' be understood as the sum of physical phenomena studied by natural scientists at a given point in time. Let me contrast this with the 'social realm,' taken to be the sum of social phenomena as studied by social scientists.

What I will argue, from my standpoint as a historian and philosopher of science, is that the natural and social realms were much more closely conjoined in scientific discourse a couple of centuries back; hence, the separate domains that currently exist are of relatively recent origin. Furthermore, insofar as these two realms – the natural and the social – have become increasingly distinct and disentangled, at least at the conceptual level, I will propose that if we can 'step out of nature' and alter the rate of extinction, the motivation for this will come from our understanding of the social realm.

The case for distinct sciences goes back at least to Aristotle, who argued that the observable features of our world could be partitioned into distinct clusters,

plants, stars, etc. Approaching environmental studies with Aristotelian eyes already creates confusion, since the phenomena are part natural, part social. Even if one were to take a very simplistic definition of nature – that nature is what is left over after one subtracts human agency – the latter itself is part natural and part social. One central challenge for environmental studies, then, is to sort out what it means to view us partly as biological creatures, one species among many, and partly as social creatures bent on enhancing our welfare. Since the boundary between the natural and the social has a history that possesses a range of meanings – some contradictory – we must negotiate the distinction between us as objects and as agents. It is not self-evident.

The study of biodiversity, or ecology more generally, tends to fall under the purview of natural scientists. Yet the very term *ecology* bears witness to the conflation of the natural and the social. In 1866 Ernst Haeckel coined *oecologie* to replace the *oeconomy of nature*, a term that gained currency in the latter half of the seventeenth century and received considerable enrichment in the hands of Carl Linnaeus, Charles Lyell, and Charles Darwin. The term *oeconomia*, as expounded upon by Xenophon and Aristotle, pertained to the wise management of a household and, at its broadest reach, the doctrine of virtue ethics. And while commerce and trade were extensive in antiquity, and their analysis subsumed under discussions of household management, there was no concept of an economy per se. In the early modern period, economic discourse shifted focus to the crown as steward of a national or provincial household. Frugality, foresight, and prudence were the traits to cultivate in place of the prodigality and impetuosity of medieval princes. Still, it did not

correspond to what we commonly call ‘the economy’ at present: a separate human arena for the production, distribution, and consumption of goods and services. Instead, *oeconomia* also came to denote order more generally. The term was used in a variety of contexts in the eighteenth century: the animal oeconomy, the oeconomy of the body, even the oeconomy of the stars.

The oeconomy of nature treated God as the supreme director, planner, and provider of nature’s larder. In his popular tract *Oeconomia naturae* (1749), Linnaeus attended to the proportions of predator to prey, taking into account rates of propagation, distribution, and longevity. God had established perfect ratios across the entire organic realm, thus ensuring the provision of food for each of his offspring. Supply met demand and the market cleared, so to speak. Nevertheless, a wide array of hazards, such as an earthquake or a particularly dry season, could disrupt the balance. Linnaeus thus formulated more elaborate mechanisms to restore equilibrium, appealing to insects to expand their numbers and swoop in, like police, to restore law and order.

Until Linnaeus, the term *oeconomia* was mostly employed in the Aristotelian sense of household management. Linnaeus was the first to offer a nascent concept of an economy, of multiple producers and consumers in a state of exchange such that ends and means were aligned. Linnaeus’s oeconomy of nature included not only plants and animals (including humans), but also the earth’s crust and atmosphere, since organisms decay and excrete vapors. His account devised an early version of the hydrological cycle. It had been a given since antiquity that matter (the four elements), while constantly in flux, was conserved within the sublunar region. Linnaeus

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brought additional order to this totality by embedding organisms in an intricate system of exchange and equilibrium: “We see Nature resemble a well-regulated state in which every individual has his proper employment and subsistence, and a proper gradation of offices and officers is appointed to correct and restrain every detrimental excess.”

Although Linnaeus subscribed to the Biblical account of creation, he attempted to fill in more of the story whereby long ago the individual pairs of each species had multiplied, migrated, and distributed themselves around the globe. In his view, the oeconomy of nature was completely full of life, with no waste or void. Needless to say, God would not tolerate the extinction of any one of his creations, nor admit of novelty, since this would imply that the original plan was less than perfect. Goethe, while director of the *Finanzverwaltung* for Weimar in the 1770s, echoed such sentiments when he declared that “nature is the perfect oeconomy.” She did not waste her currency nor act in vain.

Charles Lyell, writing in the early 1830s and in full possession of the concept of extinction, was far more inclined to see imperfection in the oeconomy of nature. His equilibrium was a dynamical one, and he identified a much longer list of mechanisms that restored a balance. Geological depositions or volcanic eruptions necessarily meant both the migration of organisms and ongoing extinction, which in turn, he speculated, meant that new species were forged to fill the gaps. Still, Lyell adhered to a belief in a fixed quantity of life and thus believed that the entry and exit of species sustained a balance.

Darwin’s *Origin of Species* (1859) is replete with references to the oeconomy of nature, and his intellectual debts to Linnaeus and Lyell on this are explicit and

well documented. But the term acquired a new and significant set of meanings. Darwin discerned that speciation meant that the aggregate quantity of life could increase, as distinct varieties came to seize upon unoccupied stations in the oeconomy. Darwin supported this insight with an experiment. Taking two equal plots of land – one planted with one grass, the other with distinct genera of grasses – he found that the harvest yielded a much greater biomass in the latter case, suggesting that nature was not a zero-sum game. Frequent extinctions also implied that nature was not full. Diversification meant that human populations could grow in tandem with other organisms, not in spite of them. There were, in short, gains from trade such that the oeconomy of nature could expand indefinitely.

Haeckel’s clever move to cover up the economic roots of this discourse ran its course. With the advent of game theoretical models, ecologists are rediscovering their economic heritage. They now model foraging behavior as a market, complete with an interest rate. Similarly, economists are embracing their biological roots, not just in the form of mainstream environmental economics or the more dissenting eco-economics, but also with game theoretic accounts that employ evolutionary models.

Economics thus comes in the back door as well as the front. It is critical to the understanding of ecology as a mode of inquiry, not only because nature itself is understood in terms of efficiency and scarcity – an economy – but also because the trope of stewardship runs deeply through the discourse. Clearly, to sort out the role of human agency on the question of biodiversity is inherently an economic problem, if understood as the management of scarce resources between alternative ends. We

have become the stewards of nature, now itself understood more as a competitive marketplace than a storehouse. Yet another debate that brings in economics (and will not be expanded upon here) is over the very value or worth of nature taken as whole, an estimation that implicitly underwrites all of ecological theory.³

We have already seen that Linnaeus had a well-developed theory of an economy, arguably more thought-out than anyone else's at the time. He also wrote extensively on political economy and promoted its place in the Swedish universities and academies. In his eyes, economic welfare was inextricably linked to botany since only the proper management and hence knowledge of plants could free us from want, waste, or famine: "The pillar for all economics is to know the great economy of nature."

By the 1750s economic discourse was widely pursued; François Quesnay, David Hume, and Adam Smith were the three most prominent contributors. Each one had sustained interests in the natural sciences, and viewed economic theory as part of a more general search for natural regularities. Quesnay was explicit in his search for a natural order in the study of wealth. A renowned physician at Versailles, he contributed to metaphysics and physiology, notably a treatise entitled *Essai physique sur l'économie animale* (1736). In the late 1750s, he forged a set of economic ideas that came to be known as physiocracy, or 'rule of nature.' His celebrated series of

3 For an excellent overview of this question, see Matt Price, "Economics, Ecology, and the Value of Nature," in Lorraine Daston and Fernando Vidal, eds., *The Moral Authority of Nature* (Chicago: The University of Chicago Press, 2004), 182–206.

tableau économique (1758–1767) exploited numerous physiological and mechanical analogies between the body politic and the human body, most famously the circulation of wealth that mimicked the circulation of blood. But his analysis went much beyond the level of analogical trade. Inspired by the iatromechanical ideas of Descartes and Borelli, the physiology of Boerhaave and Hales, and the metaphysics of Malebranche, physiocracy was self-consciously and explicitly a branch of natural philosophy.

More fundamentally, for Quesnay, only nature could produce wealth, via the gifts of rain, sunlight, and soil in the agrarian sector. For every seed planted in the spring we reap two in the fall. "We strictly owe the net product of the soil, to Providence, and to the beneficence of the Creator, to his rain that beats down and changes it to gold." Manufacturing, by contrast, was sterile. It merely transformed leather into shoes but produced no genuine wealth or net product.

As preposterous as this sounds to our ears, it contains a kernel of truth. To acquire genuine wealth as a species we must extract something from outside our sphere; and thus, to put it figuratively, it is only through nature's gifts that we can truly augment our physical wealth. The labor used to make shoes must in turn be fed, and that grain can only genuinely enhance our well-being if we, at the end of the day, get something from nothing. Quesnay himself expanded his sphere of nature's gifts to include mining, fishing, and lumbering. His thoughts on these sectors remained incomplete, but a charitable reading might permit his argument to segue toward the industrial era that lurked on the horizon.

The contributions to political economy by Hume and Smith are legendary, but less well known are their respective

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and sustained interests in natural history. Hume clearly knew the extant arguments regarding the adaptation of species for his *Dialogues Concerning Natural Religion* (drafted in the late 1740s), but he also injected these ideas into his essays on economic topics, his *Political Discourses* (1752). This is manifest in the broad temporal brushstrokes by which he paints the ebb and flow of wealth, its migration from one region to another, and in the emphasis on self-equilibrating mechanisms. Hume draws numerous analogies between economic phenomena and plants and animals, suggesting too that his mind, like Linnaeus, was prone to seeing these as part of one seamless web. He emphasized the migration of economic opportunity and maintained that the causal path was unidirectional. Once commerce has flourished in one region, it will necessarily decline due to high wages. The capital will flow to another region, and enhance commercial flourishing elsewhere.

Hume's economic essays are the first ones to portray us as one species among others. We are, he claims, more like apes than angels; our efforts to acquire wealth and our faculties of reason are not fundamentally different from that of other animals high up in the chain of being. There is evidence that Hume came under the sway of the protoevolutionary thought of the French savants Maupertuis, Tremblay, and Buffon, precisely as he was working on his economic essays. Certainly, and like so many of his contemporaries, he contemplated the salient fact of a much-expanded history to the earth.

Smith also read natural history for much of his career, and was particularly interested, starting in the 1740s, in the work of Linnaeus. His 1756 *Letter to the Edinburgh Review* ferried the ideas of Réamur and Buffon over to Scotland.

Again, numerous elements of natural-historical modes of thinking are present in his political economy, including the processes of equilibration and adaptation of means and ends. He begins his account by asserting that we are one species among many, and share the same tendency toward geometric rates of reproduction. But one of our distinctive traits is the propensity to truck, barter, and exchange – one not observed, he claims, in other animals. This inclination unleashed a long and expansive process of trade and commerce; and as markets grew, so too did the process of specialization by trade and the division of labor more generally. Smith's natural-historical account of commerce is couched in epigenetic terms. Our wealth expands without any planning or intentionality. An array of mechanisms enables the stock of human characteristics – such as frugality or courage, prudence or trust – to expand and contract, and thus fuel commercial ends. As Smith conjectured, in the commercial era each and every one of us is, in some sense, becoming more and more a merchant. However, one of the underexamined features of the economics of both Hume and Smith is the extent to which they focus on the evolution of commerce as the unfolding of institutions and the enhancement of certain habits and customs.

There were thus many points of contact between economics and biology long before the famous epiphany experienced by Darwin upon reading Malthus. As Karl Marx observed in an 1862 letter to Engels, Darwin had simply read classical political economy into the world of plants and animals. Subsequent historians of science, Robert Young most notably, have expanded on the strong similarities, but what has not been ful-

ly acknowledged is the extent to which pre-Malthusian political economy was itself saturated with biological concepts, a discourse that, in turn, was indebted to notions of *oeconomia*. This is exemplified by the robust adherence to the concept of *laissez faire*, which emerged in the late seventeenth century with the writings of Boisguilbert and was widely endorsed right up to the twentieth century. An appeal to a providential order – letting nature take its course – implies that markets were seen as seamlessly joined to physical nature.

As a concept of an economy came to the fore in the first part of the nineteenth century, it shed some of its ties with physical nature and acquired a fair degree of autonomy. John Stuart Mill was the first major economist to propose that human agency be treated as the proximate cause of economic phenomena, that economics must therefore be a mental and not a material science. This in turn fed readily into the very profound shift from a labor to a utility theory of value, with the advent of the neo-classical theory of economics circa 1870. Wealth acquired a plasticity that freed it from material constraints; it was defined in purely mental terms, as the maximization of utility. It was no longer beholden to the bounty of the annual harvest or Malthusian population pressures.

Appeals to ‘the economy,’ now commonplace, are de facto appeals to a separate social realm or sphere, one in which human agency and hence the mind serves as the proximate cause. As John Searle has argued in his *Construction of Social Reality* (1995), collective intentionality serves as the bridge between natural and social phenomena. The world is made of microscopic particles organized by force fields, and we organisms who have acquired consciousness have created distinct objects that themselves

are organized, such as monetary systems. From a God’s-eye view, Searle argues, there are no social properties in the world. We *Homo sapiens* engage in certain activities, banking for example, but the God’s-eye view sees money simply as organized physical particles (mostly now in the form of electric currents). There is nothing distinctive about them, nothing that connects those particles to, say, the price charts of a marketplace or the interest rate.

Social facts are objective to us humans, as Durkheim once lobbied, in the sense that we are powerless to remove them single-handedly. They – money, language, kinship systems – came into existence at a distant point in time, usually under the cloak of anonymity. And while social facts can evolve over time, and the proximate cause of such evolution is purportedly human agency, the forces at work are always collective. The chairman of the Federal Reserve Bank may appear to adjust the interest rate and hence the money stock, but the result can only come about through the set of market forces and activities that are by their very nature collective. With the advent of fiat money, money became so deeply woven into the fabric of society that, as economist Duncan Foley observes, it has “a reality as unyielding to an individual’s will as any natural phenomenon.” This too helps to capture the sense in which money is the result of *collective* intentionality; a given currency would cease to function as money if everyone thought it was not.

Searle (and Durkheim before him) also helps us to see that social reality is “weightless and invisible.” Social objects or facts subsist indistinguishably from the natural landscape, such that, as Searle cautions, it is harder to see objects as just natural phenomena. What does he mean by this? It is difficult to

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strip off any object or set of relations from human intentionality, to reach the basic ontology of a world of physical particles in fields of force. Social facts and objects necessarily intrude. As this brief survey of eighteenth-century political economy has disclosed, wealth, money, and trade were part and parcel of the natural order – indeed the direct issuance of nature, and not humankind. To see economic phenomena as coalescing into ‘the economy’ requires conceptual work.

One might well ask what this tells us about nature. At first glance, it seems that we can easily subtract the social; simply look for cases of collective intentionality and by-products such as money that have patterns of evolution that lie outside the physical. Of course, there is an obvious connection; intentions are mental states that current science maps onto neurological states, which in turn could be reduced to molecular or even quantum mechanical states. The trouble is that we have not gotten very far with the reductionist program, and some philosophers – John Dupré for example – make compelling arguments to abandon the project altogether as not only unattainable but also undesirable. Searle has revived the Durkheimian view that the social has patterns that are quite distinct and detached from the natural. “Collective intentionality is a biologically primitive phenomenon that cannot be reduced or eliminated.”⁴

Searle’s efforts are part of a much longer tradition to identify properties that are purportedly unique to us humans. What is novel about Searle’s approach is that he includes other social animals, hyenas and wolves for example, since there is firm empirical support that they

behave as the result of collective intentionality. What they don’t have is a symbolic representation of the social facts, or a set of rules that codify the social order – what Searle calls institutional facts. It remains an open question if other animals might acquire this subset of social facts, especially since they depend on the existence of language.

Findings over the past fifty or so years have ruled out a number of attributes that were once thought to belong uniquely to us. Many animals use tools, some use language, some mate for life, some use systems of exchange, and some are self-aware. Moreover, whatever scientific knowledge we have might be placed on a continuum with the sorts of knowledge other animals use. Knowledge can be viewed as just another kind of tool that enables a given species to play the evolutionary game.

And yet, as Thomas Goudge discerned in the opening epithet, we are the only species that knows about biological evolution. We are also very likely to remain in this unique position. True, we could convey this fact with sign language to some higher primates, but it is unlikely that we could do so with any sophistication. To comprehend the theory of evolution really takes several years, at least if one is to gain some understanding of the specific mechanisms and weigh in on the debates over the concept of fitness or the rate of speciation.

As a historian and philosopher of science, I would submit that we are most likely to revise the specific mechanisms and analytical units of our evolutionary theory in the coming centuries. There are still significant debates over the basic conceptual foundations, the definition and number of species, or the definition and efficacy of a gene. But the basic narrative is far more robust, and likely to withstand major conceptual shifts of the

⁴ John Searle, *The Construction of Social Reality* (New York: Free Press, 1995), 24.

internal content. Insofar as we come upon and justify the theory of evolution from a number of disparate lines of inquiry – embryology, paleontology, biogeography, to name but a few – it is highly likely that the main thesis is warranted, namely, that we are descended from other organisms and are thus kin to most if not all living forms.

What does the fact of our knowing this entail? Are there special obligations that come with this knowledge, or with any knowledge for that matter? Most readers of this essay have some expertise, but does it follow that one must thereby use that expertise to serve any or every possible cry for help? Does knowing evolutionary biology entail that we must ensure the greatest longevity for the greatest number, and does this include other species as well as our own? There are no clear answers to any of these questions. It seems wiser not to succumb to the naturalistic fallacy, but perhaps the frequency with which the fallacy is committed is itself part and parcel of our evolutionary myopia.

One could look at it this way, in the same spirit captured by Goudge's opening statement: given that we stumbled upon the theory of biological evolution, the product of many contingent lines of inquiry, exploration, excavation, and acquisition, and given that this theory helps us to embrace all the more our own contingency, it is a privilege to use this knowledge – and the privilege is part of what gives our lives some meaning. Just as we value a longer life rather than a shorter one, we ought to do our best for the entire evolutionary schema since no other species can.

But if so, how far is that reach? If Peter Singer's arguments are found compelling, we must resist being speciest, and take into account all sentient beings. And insofar as they are dependent

on an elaborate food chain that includes plants, meteorological processes, soil deposition, etc., it seems we would be hard-pressed to draw any boundaries. Why bald eagles but not cold viruses?

Let me put it another way. If no species knew about the evolutionary process, then no species could intentionally speed it up or slow it down. Indeed, the notion of a pace to evolution would make no sense. The wide variation by which species come into being or are rendered extinct is just what it is, a play of many actors. But it is only when one of those actors knows that it is a play that the acting becomes self-reflexive and we have an 'economy of nature' or an emergent social realm. And it may be partly for this reason that we have sought to distinguish the social realm from the natural at much the same time that we came up with the theory of evolution. To continue the metaphor, one conceptual breakthrough was a dress rehearsal for the other. My bold historical conjecture would suggest we view Smith and Linnaeus, and, later on, Mill and Darwin, as two sides of the same coin. In sum, we have managed to commence an understanding of the evolutionary narrative at roughly the same time we became self-reflexive about our self-reflexivity. Moreover, if the evolutionary narrative is more or less correct, then our ability to be self-reflexive in this manner might be viewed as a salient adaptive trait. It may well be that our belief, warranted or unwarranted, in the operations of a separate social sphere such as the economy, allows us to believe, again with or without warrant, that we might exit nature and turn the tap of biodiversity.

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