

“Nature Does Nothing in Vain: Self-Reflexivity as an Adaptive Trait”

Margaret Schabas, The University of British Columbia

(Please do not quote or cite without permission from the author; this essay is a draft and was commissioned for a generalist periodical i.e. non-specialists in history of economics.)

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. Secretary general of the United Nations Ban Ki Moon, has recently declared that “the global response to these challenges [of biodiversity] needs to move much more rapidly” (International Herald Tribune, May 23 2007). Even if we could significantly reduce gas emissions and put a halt to global warming, worries about declining biodiversity are likely to persist. 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 exclusively one of elimination and declining numbers. Where Darwin once saw an entangled riverbank teeming with life, we see our future landscape as desolate as the moon.

But perhaps such worries are unwarranted? Insofar as evolutionary theory commits us to some degree of inter-specific 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 given species, especially when the taxonomic units themselves are so contested?

Numbers aside, there are nonetheless many arguments in favor of preserving if not enhancing biodiversity. Some are consequentialist, appealing to values instrumental to the welfare of homo sapiens, such as the medical potential of tropical plants. Others arguments are deontic, appealing to intrinsic values, the beauty of the wilderness or the sanctity of life for example. 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 insure 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. What remains under-examined 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 in the Jamaican interior, the nearby forests receive rain laced with acid from distant cement factories. There is, arguably, no place in the sublunar region immune from human agency. As Bruno Latour provocatively remarked, 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. There is 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.

One aim, then, is to demarcate the natural and the social via the prism of the natural and the social sciences. What I will argue, from my standpoint as a historian and philosopher of science, is that these were much more closely conjoined a couple of centuries back and hence the separate domains that currently exist are of relatively recent origin. To put it another way, the two realms have become increasingly distinct and disentangled, at least at the conceptual level, such that if we can ‘step out of nature’ and alter the rate of extinction, the motivation for this will come from our understanding of a ‘social realm’ and self-reflexivity more specifically.

The case for distinct sciences goes back at least to Aristotle, who argued that the phenomena themselves are partitioned into distinct clusters; hence, there is a need for a science of meteorology as much as for zoology, astronomy, or politics. Approaching environmental studies with Aristotelean eyes already raises 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 among many species and partly as economic creatures bent on enhancing our welfare.

The study of biodiversity, or ecology more generally, tends to fall under the purview of natural scientists. Yet even the term *ecology* bears witness to the conflation of the natural and the social. *Oecologie* was coined in 1866 by Ernst Haeckel 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, there was no concept of an economy per se. In the early modern period, economic discourse shifted the 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. *Oeconomie* also came to denote order; 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 insuring the provision of food for each of his offspring. Supply met demand and the market cleared, so to speak. Nevertheless, the balance could be disrupted by a wide array of hazards, such as the migration of one species or a particularly dry season. Linnaeus thus formulated more elaborate mechanisms to restore equilibrium, appealing to insects to expand their numbers and swoop in like the police to restore law and order.

Until Linnaeus, the term *oeconomie* was mostly employed in the Aristotelean 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. He also wrote extensively on political economy, and promoted its place in the Swedish universities and academies. 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."

Linnaeus' oeconomy of nature included not only plants and animals (including humans), but also the earth's crust and atmosphere, since creatures decay and excrete vapors. His account devised a nascent 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 brought additional order to this totality by imbedding organisms and the elements 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. Such sentiments were echoed by Goethe, while director of the Finanzverwaltung for Weimar in the 1770s, 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 on-going extinction, which in turn, he speculated, meant that new species were forged to fill the gaps. 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 oecology. 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 oecology of nature could expand indefinitely.

Haeckel's clever and explicitly political move to cover up the economic roots of this discourse ran their course. But with the advent of game theoretical models, ecologists are rediscovering their economic heritage. Foraging behavior is now modeled 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 comes in the backdoor 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. One indication of this is that cost-benefit analysis looms large. Yet another debate that brings in economics (and not to be expanded upon here), is the very value or worth of nature that underwrites ecological theory and the pursuit of biodiversity more specifically.¹

Economics was once a natural science, at least in the hands of Linnaeus who had the most detailed and well-developed sense of an economy in the mid-eighteenth century. This was not because the subject was underdeveloped. By the 1750s, there were several chairs of political economy in universities across Europe, notably in Italy, Germany, and Sweden. France had several schools of thought, *les Colbertistes*, the circle of Vincent de Gournay, and not least, '*les Économistes*' or physiocrats. Other major contributors, Rousseau, Voltaire, Melon, Galiani, and Genovesi, again to name just a small sample, lend weight to the view that political economy was a developed branch of knowledge by the middle of the eighteenth century. But there was no full-blown concept an economy to parallel the one Linnaeus articulated. The various treatises, essays, and broadsides attended to the concept of wealth, to money and trade but did not see a distinct realm of an economy nor refer to one as such.

François Quesnay, David Hume, and Adam Smith were three leading contributors to economic discourse in the eighteenth century. Each one had sustained interests in the natural sciences, and viewed his economic theory as part of a more general search for natural order. Hume announced that politics (by which he meant political economy) might be elevated into a science as precise as mathematics; Quesnay was explicit in his search for a natural order in the study of wealth, and Smith wrote on the history and philosophy of science as a means of coming to terms with the question of epistemic progress. Each one grounded their study of wealth and related phenomena in the natural world and drew upon their respective knowledge of natural philosophy.

Quesnay was a physician and contributed to metaphysics and physiology, notably a treatise entitled *Essai physique sur l'oeconomie animale* (1736). In the late 1750s he forged a school that engaged economic ideas and that came to be known as physiocracy or 'rule of nature'. His celebrated series of *tableau economique* (1758-67) exploited numerous physiological and mechanical analogies between the body politic and the human body; wealth and money circulated much like the blood in the body, but also had mechanisms like a clock. Quesnay's economic analysis drew upon the iatromechanical ideas of Descartes and Borelli, the physiology of Boerhaave and Hales, and the metaphysics of Malebranche. It 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, there is a kernel of truth. To acquire genuine wealth as a species we must extract something 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 thought remained incomplete on these sectors, but a charitable reading might permit his argument to spill into the unbound Prometheus that lurked on the horizon.

The contributions to political economy by Hume and Smith are legendary, but less well known are their respective and sustained interests in natural history. David Hume clearly knew the extant arguments regarding the adaptation of species for his celebrated *Dialogues Concerning Natural Religion* but he also injected these modes of thinking drawn from natural history into his essays on economic topics. This is manifest in the broad temporal brush strokes 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 the commercial flourishing anew.

Hume's economic essays are the first ones to take a broad historical sweep and to portray us as one species among others. We are, he claims, more like apes than angels; our efforts to acquire wealth and 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 proto-evolutionary thought of the French savants, Maupertuis, Tremblay, and Buffon. Certainly, he read the work of Buffon and like so many of his contemporaries, 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 1750s, in the work of Linnaeus. His 1756 *Letter to the Edinburgh Review* ferried the ideas of Réamur and Buffon over to Scotland. Again, there are numerous elements of natural historical modes of thinking in his political economy, including the processes of equilibration and adaptation that he may well have gleaned from his studies of natural history. Smith's treatment of moral sentiments was physiological and his analysis of sympathy between persons owed much to the Edinburgh medical researchers, Cullen, Gregory, and Monro who treated the transmission of feelings in terms of fluids or electric processes in the nervous system.

Adam Smith, above all, imbedded his account of the wealth of nations in the natural order. His interests ranged from astronomy to chemistry to botany, and they were sustained throughout his life. We are one species among many, and share the same propensity toward geometric rates of reproduction. But one of our distinctive traits is the propensity to truck, barter, and exchange, one not observed in say dogs. This unleashed a long and expansive process of trade, 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.

There were thus many points of contact between economics and biology long before the famous epiphany announced by Darwin (and Wallace) upon reading Malthusian political economy. In 1862, Karl Marx observed in a letter to Engels that Darwin (whom he much admired) had read classical political economy into the world of plants and animals, an idea expanded upon by Robert Young's *Darwin's Metaphor: Nature's Place in Victorian Culture* (1985). But what appears to have escaped Marx and Young is the extent to which the discourse on political economy that preceded Malthus was itself saturated with biological concepts, and that discourse, in turn, was indebted to ancient notions of *oekonomia*. 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--suggests 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 also 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 and that they must therefore be seen as mental and not material. This in turn fed readily into the very profound shift from a labor to a utility theory of value. Wealth in the neoclassical theory that commenced in the 1870s was no longer subject to the agrarian sector, or demographic cycles. As the maximization of utility it acquired a plasticity that freed it from material constraints.

Nevertheless, the economic and the natural continued to tango. In 1923, Henry Ludwell Moore, a professor of economics at Columbia University, advanced the hypothesis that the business cycle was caused by the phases of Venus. In reaction to Moore, Irving Fisher, an economist at Yale University, advocated the view that the business cycle was nothing more than 'the dance of the dollar,' by which he meant a purely financial process. And a decade later, John Maynard Keynes treated business cycles as much more deeply rooted in the productivity of capital, which in turn was

linked to demand for money, an ‘animal passion’. Such examples could be easily multiplied but the point to grasp here is that economic phenomena can be easily joined or embedded in natural (physical or biological) processes, some far-fetched, some not.

Appeals to ‘the economy,’ now commonplace, are de facto appeals to a separate social realm or sphere. As John Searle has argued in his *Construction of Social Reality* (1995), the most significant divide between natural and social phenomena consists in our collective intentionality. 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 would be no social properties in the world. We, homo sapiens, would engage in certain activities, banking for example, but the God’s eye view would see money as just organized physical particles (mostly now in the form of electric currents).

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, it is always collective.

Searle (and Durkheim before him) also helps us to see that social reality is “weightless and invisible.” Social objects or facts reside 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 hard to 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 our Cook’s tour through eighteenth-century political economy disclosed, wealth, money and trade were part and parcel of the natural order, indeed the direct issuance of nature, not humankind.

What is novel about Searle’s approach is that he includes other social animals, hyenas and wolves for example, though this again just makes things more difficult since we now have the social spilling easily into what was traditionally considered the natural. Still, his insight that it is collective intentionality, the ability to play an orchestral piece as an ensemble for example, that separates individual actions (practicing the part alone in one’s studio) and events in physical nature from the truly social.

With the advent of fiat money, money for which there is no physical substitute, money gained considerable independence from human agency. It 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.” He shares with Searle the sense in which money is the result of collective intentionality; money is a placeholder for a network of practices, buying, borrowing, etc., but it also exists because it is self-referential; money would cease to function as money if everyone thought it was not.

What does this tell us about nature, one might well ask? At first glance, it seems that we can easily subtract the social; simply look for cases of collective intentionality and the byproducts such as money that have patterns of evolution that lie outside the physical. Of course, there is a distinct connection; intentions are mental states that current science believes map 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 there are some philosophers, John Dupré at Exeter University, for example, who make compelling arguments to abandon the project altogether as not only unreachable but also undesirable. Searle has revived the Durkheimian view that the social has patterns that are quite distinct and detached from the natural. Given the huge intellectual divides that tend to predominate in universities of our era, it seems improbable that the two will be joined anytime soon. To put it another way, there seems little point in putting experts on the interest rate in the same laboratory as high energy physicists.

But once again, things are not quite that simple. Historically, the two have been more closely conjoined. Economics, the social science that has the most clear and distinct tradition reaching back to antiquity, was much more closely enmeshed with the natural sciences in the eighteenth and nineteenth centuries than one might suppose given current divides. There is nothing to preclude a drift back to a more unified account of things, nor reason to suppose that our current commitments to a social realm are warranted.

Searle's efforts are part of a longer tradition to identify properties that are purportedly unique to us humans. One strength is that he accepts our kinship with other animals, especially those who partake in some form of collective intentionality. One important difference still remains. We are the only species that knows about biological evolution, and we are with all probability 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. Moreover, even if we did impart the basic gist of the theory to another species via some system of sign language, those particular animals are even less likely to be in a position of preservation, since they would be displaced from their normal habitat and thus unlikely to be part of a large enough population.

As a historian and philosopher of science, I would submit that we are most likely to revise the specific mechanisms and 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, the meaning of fitness, the rate of speciation, or the concept of a gene. But the basic narrative is far more robust, and in that 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 we are descended from other organisms and are thus kin to most if not all living forms.

What does this entail? Are there special obligations that come with this knowledge, or with any knowledge for that matter? Most readers of this have some expertise but does it follow that one must thereby serve every possible cry for help? Does it entail that we must insure the greatest longevity for the greatest number, and does this include other species as well as our own? It seems wiser not to succumb to the naturalistic fallacy, but perhaps even that is a piece of evolutionary myopia leading us astray?

Knowing what we do, we ought to do our best for the entire evolutionary schema. And if so, how far is that reach? If Peter Singer's arguments are found compelling, we

must resist being speciesist, 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.

Given this historical argument, that economics was much more akin to a natural science in its content than is currently the case, a couple of conclusions might be drawn. One is that there are likely to be vestiges of this earlier period of inquiry still tacitly at work, such that the current scientific stances are not as pure and distinct as might be thought at first glance. The other is that because it was possible to think of economic questions as part of physical nature, we might wish to be more agnostic about the correctness of our current viewpoint. In other words, without wishing to turn the clock back, it may be worth reopening the possibility of studying phenomena that are much more enmeshed with the physical world, for economists to break down some of the barriers they have erected between the social and the natural.

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 it may be for this reason that we have sought to distinguish the social realm from the natural at much the same time, historically, that we came up with the theory of evolution, roughly 1750 to 1900. Pitting Mill against Darwin, the claim could even be located in a much smaller span of time, the 1840s and 50s, and one could see both men as products of a secular industrialized world. In sum, we have managed to commence an understanding of our self-reflexivity just as we commence our understanding of evolution. And if the evolutionary narrative is more or less correct, then our ability to be self-reflexive in this manner can be viewed as a salient adaptive trait. In sum, it may well be our command of a separate social sphere, the economy for example, that allows us to exit nature and turn the tap of biodiversity.

ⁱ 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 and London: The University of Chicago Press.