

# **Ecological Nature: A Non-Dualistic Concept for Rethinking Humankind's Place in the World**

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## **Abstract**

This paper puts forward a concept of naturalness as an alternative to the wilderness concept, which has been criticized for problematically situating human beings outside the natural world and thus conceptually foreclosing the possibility of humans living in harmony with nature. After examining and finding inadequate two concepts of naturalness dominant in the work of environmental ethicists, namely the natural as opposed to the supernatural and the natural as opposed to the anthropogenic, the paper delineates a concept of ecological naturalness, which links naturalness to ecological normality and ecosystem health. Tracing the historical roots of this concept back to classical Aristotelian philosophy, the paper shows that a contemporary ecological version of it actually underpins the intuitive views of many current-day environmentalists and ecologists. The paper concludes that the concept of ecological naturalness is better suited than the wilderness concept to support efforts at enabling humans to inhabit the earth's ecosystems in ecologically sustainable ways.

## **1. Introduction**

In a series of papers, J. Baird Callicott (1991; 1992; 1994; 2000) criticizes the *wilderness* concept of nature and the associated approach to environmentalism which focuses on the preservation of areas of land free of human intervention. As he notes, this concept rests on a human/nature dualism which defines the natural in opposition to the *cultural* and the *artefactual*, and thus in principle places humans outside the natural realm. This makes it conceptually impossible for humans to intervene in nature

without denaturing it. Callicott rejects this concept of naturalness for two general kinds of reasons. First, because it is socio-politically oppressive, as it is frequently applied to areas where some aboriginal human groups have lived, and so ethnocentrically situates the members of these groups on the “nature” side of the nature/culture divide, implying a denial that they are cultural beings too.<sup>1</sup> When it informs conservation practices, this view leads to the creation of nature preserves, which frequently requires the eviction of native populations inhabiting the designated areas (Callicott 2000, 359–361).<sup>2</sup> Second, Callicott argues that the concept of wilderness is tied to an outdated Christian and Cartesian mind/matter dualism, which sets humans apart from nature on the grounds that their immortal soul distinguishes them from purely material beings. This dualism is incompatible with the Darwinian discovery that we are part of nature insofar as we are the result of the same evolutionary processes as all other living beings.<sup>3</sup> In the context of ecology, this dualistic view has often undergirded the increasingly questioned assumption that nature, in the absence of human intervention, exists in an unperturbed state of equilibrium (a *balance of nature*). As Callicott remarks, this assumption tends to downplay the omnipresence of change and perturbations in the ecological world.<sup>4</sup>

Contrary to many other criticism of the wilderness concept (e. g., Vogel 2003; Ereshefsky 2007; O’Neill, Holland, and Light 2008, chap. 8) however, Callicott’s critique does not culminate in an overall rejection of the notion of naturalness. Rather, he contends that wilderness, the *modern* concept of nature, must be replaced by a new concept of naturalness. Drawing insight from the picture of nature sketched by contemporary ecological theory, he argues that this new concept of nature should be more *holistic* and *dynamic* than the prevailing one. By *holistic*, Callicott means that the natural world functions like an integrated system where “[d]eliberately changing one component of an ecosystem will often cause unanticipated and unwelcome side-effects throughout the whole;” and by *dynamic*, he means that it is “constantly changing and ultimately evolving,” and that “[c]hange at every frequency—diurnal,

meteorological, climatic, geological, astronomical—is inevitable and natural.” (Callicott 1992, 18) Associated with this concept of nature is the notion of *ecosystem health*, which, Callicott suggests, provides “objective standards for evaluating anthropogenic change in nature,” and for designating “some changes imposed on nature to be objectively good and others objectively bad” (Callicott 1992, 20). Thus, unlike the wilderness concept, Callicott’s concept of nature does not exclude humans *in principle*, but nor does it include all forms of human intervention as equally harmonious with nature. On the one hand, Callicott acknowledges that “the cultural component in human behavior is so greatly developed as to have become more a difference of kind than of degree” (Callicott 1991, 351), and that “[m]ost anthropogenic change [to nature] is certainly not okay. Indeed, most of what we do in and to nature is destructive.” (Callicott 1994, 177) On the other hand, he nuances this assertion with his affirmation that humans can be “well tuned and symbiotically integrated with other contemporaneous evolutionary phenomena, with coral reefs and tropical forests, as well as the opposite” (Callicott 1991, 351).

I am very sympathetic to Callicott’s quest for a concept of naturalness which moves beyond the dualistic idea of wilderness. The concept he envisions appears able to reconcile two accurate but apparently conflicting ideas: the Darwinian observation that *homo sapiens* is as much part of the natural world as all other living beings, and the intuition that our species, thanks to its highly developed intellectual powers and capacity for cultural transmission of knowledge, is nevertheless somewhat different from other living beings. Accounting for this last intuition is essential from an environmental standpoint, as these special characteristics of our species appear to be largely responsible for its formidable potential for ecological destructiveness. But this intuition conflicts somewhat with the emphasis on our natural evolutionary origin, and the commitment of ecocentrism to conceive us as “plain members and citizens” rather than as the external “conqueror” of the ecological world (Leopold 1949, 204).<sup>5</sup>

In spite of Callicott's explanations, however, it remains unclear what exactly this alternative concept of naturalness amounts to. Most environmental philosophers who have written on the ethical relevance of the notion of naturalness adopt J. S. Mill's (1874) twofold disambiguation of the term (e. g., Vogel 2003; O'Neill, Holland, and Light 2008, chap. 8). According to Mill, in one of its senses, "nature" refers to "the sum of all phenomena, together with the causes which produce them; including not only all that happens, but all that is capable of happening; the unused capabilities of causes being as much a part of the idea of Nature as those which take effect." (Mill 1874, 5) This concept includes as natural anything that happens in the physical world, and thus conceives "nature" in opposition to the *supernatural*. In another sense, Mill notes, "natural" means "what takes place without the agency, or without the voluntary and intentional agency, of man." (Mill 1874, 8) In this second sense, *natural* is opposed to *artificial*. Mill's second concept of nature as contrasted with the artificial clearly resonates with the concept of wilderness, which Callicott opposes. But if the concept of nature he envisions entails Mill's first sense, then his assertion that humans are part of nature becomes trivial. That humans are part of nature in the sense that they are not *supernatural* beings seems to follow logically from Callicott's Darwinian criticism of the Cartesian mind/matter dualism. But such an assertion supposes that, as all human actions are part of the physical world, they are all equally natural; and this does not seem to be what Callicott wants to support. These observations indicate that Callicott's concept of naturalness must be one that Mill and his followers did not envisage.

It is important to elucidate the meaning of Callicott's concept of nature not only to better understand his views, but also because this concept can, I think, shed light on the intuitive way in which many environmentalists appeal to the notion of naturalness as a criterion for adequate human interaction with the ecological world. Hence, in what follows, I want to reconstruct a concept of *ecological naturalness* which presumably underpins Callicott's and many environmentalists' conservation ethics, and show its

historical continuity with a third notion of naturalness that was overlooked by Mill and most contemporary environmental philosophers. The concept I will propose links the idea of naturalness to that of biological or ecological *normality*.

In order to achieve this reconstruction, I will first highlight some essential aspects of Callicott's conservation philosophy, with a special focus on the normative role played by the idea of nature in it. Then, drawing on very informative work by the historian of philosophy Lorraine Daston, I will excavate an overlooked notion of *organic nature* present in pre-modern natural philosophy, which, I think, can help illuminate Callicott's implicit notion of naturalness. Finally, I will introduce a concept of *ecological naturalness* that shares essential features with that pre-modern concept, and show how it clarifies the meaning of the normative appeals to the natural involved in Callicott's ecocentric conservation philosophy and how it plays a more or less explicit role in the science of ecology and current environmental discourse.<sup>6</sup>

## **2. Nature according to Callicott's Conservation Principles**

Callicott's ecocentrism is directly inspired by Leopold's "Land Ethic," which assigns moral considerability to ecological wholes such as biotic communities, ecosystems and the biosphere. From the moral maxim of Leopold's "Land Ethic"—"[a] thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise" (Leopold 1949, 224–225)—Callicott derives two main principles of action: 1) the principle of *mimicry of the scales of natural change*, and 2) the principle of *harmony with nature*.<sup>7</sup> Although this has been largely overlooked in discussions of environmental ethics, these two principles involve appeals to naturalness reminiscent of those of classical ethicists, mainly Aristotelians and Stoics, who based their ethics on the general maxim that humans must *follow nature*, and whose modern successors were the main target of Mill's

anti-naturalist arguments.<sup>8</sup> As we shall see, those two principles remain key components of Callicott's conservation ethics even though he has advocated that some theoretical changes which occurred in ecology from the 50's onward require that some revisions be made to Leopold's maxim.

## 2.1 The principle of eco-mimicry

For Leopold, the best way for humans to preserve the stability and integrity of ecological systems was by intervening in and transforming them only in ways that are consonant with the pace of evolutionary change. In Leopold's view, change, in the form of evolution, is a normal feature of the natural world, and therefore not all human ecological impacts should be deemed ecologically problematic. As he observed, "[e]volutionary changes are [...] usually slow and local," whereas technology enables humans "to make changes of unprecedented violence, rapidity, and scope" (Leopold 1949, 217). From this observation, Leopold reasoned that if anthropogenic modifications of nature were soft, slow and local instead of violent, rapid and wide-ranging, then these changes would essentially mimic the normal scale of natural change, and they should therefore be as benign as the naturally occurring ones. Leopold thus saw in *eco-mimicry* a sound principle to guide human-nature interaction.

As Callicott has remarked, however, Leopold's principle of mimicry of *evolutionary* change was apparently informed by a view of the ecological world, often referred to as the "balance of nature" image of ecology, which many ecologists have recently criticized for not being responsive enough to nature's inherent variability (Botkin 1990; Pickett, Parker, and Fiedler 1992; Pickett and Ostfeld 1995; Callicott 1996a; 2002a; 2003; 2013, sections 1.16 and 3.16; Cooper 2003, chap. 3). This variability, in the view of those ecologists, results in part from the regular occurrence of disturbances (e.g. hurricanes, floods, forest fires) in the ecological world, which significantly contribute to the structuring and functioning of ecological systems (Pickett and White 1985; Pickett, Wu, and Cadenasso 1999; White

2006). To be sure, Leopold explicitly rejected the validity of the “balance of nature” image (see Leopold 1939, 267; 1949, 214), like his contemporary Charles Elton (1930, 17) whom historians take to have had much influence on him (and vice versa) (see e. g. Meine 1988, 283–284). Yet, his contention that natural changes are “usually slow” suggests that he did not consider the important role of disturbances in the ecological world, and so his views were, at least in this respect, espousing the “balance of nature” image.<sup>9</sup> Some leading critics of the “balance of nature” propose the alternative image of a “flux of nature” which, in their view, is more reflexive of the inherent dynamism found in the ecological world (Pickett, Parker, and Fiedler 1992; Pickett and Ostfeld 1995; White 2006). In Callicott’s reading, what this new metaphor is meant to acknowledge is, in essence, that natural change occurs not only at an *evolutionary*, but also at an *ecological* time-scale. As he observes:

In the course of time, ecological succession is continually reset by one or another natural disturbance. Paleocological studies reveal, moreover, that species composition within successional seres—the structure, in other words, of biotic communities—has changed over time. Fluctuations in climate drive migrations of glaciers, forests, deserts, and grasslands. Exotic species, with or without human help, invade new environments and in the course of time become naturalized citizens. (Callicott 1991, 354)<sup>10</sup>

Acknowledging this more dynamic *flux-of-nature* picture of the ecological world, while remaining conscious that it “can be a dangerous metaphor [which] may suggest to the thoughtless or the greedy that since flux is a fundamental part of the natural world, any human flux is justifiable” (Pickett and Ostfeld 1995, 273), Callicott (1996a, 136–137) emphasizes an important dissimilarity between natural processes of change and many anthropogenic changes:

Intense disturbances, such as tornadoes, occur at small, widely distributed spatial scales. And spatially broadcast disturbances, such as droughts, occur less frequently. And most disturbances at whatever level of intensity and scale are stochastic (random) and chaotic (unpredictable). The problem with anthropogenic perturbations such as industrial forestry and agriculture, exurban development, drift net fishing, and such is that they are far more frequent, wide-spread, and regularly occurring than are nonanthropogenic perturbations.<sup>11</sup>

In the light of these observations, he undertakes to update Leopold’s principle of eco-mimicry:

Leopold also acknowledged the existence of natural *change*, including changes in ecosystem processes, but he seems to have thought of *natural* change primarily on a very slow evolutionary temporal scale. But even so, he thereby incorporates the concept of inherent environmental change and the crucial norm of scale into the land ethic. In light of more recent developments in ecology, we can add norms of scale to the land ethic for both climatic and ecological dynamics [...] for purposes of land-ethically evaluating anthropogenic changes in nature. One hesitates to edit Leopold's elegant prose, but as a stab at formulating a dynamized summary moral maxim for the land ethic, I will hazard the following: *A thing is right when it tends to preserve the beauty of the biotic community and to disturb it only at normal spatial and temporal scales. It is wrong when it tends otherwise.* (Callicott 2013, 97, italics original)<sup>12</sup>

This updated ecocentric maxim remains consistent with Leopold's essential reasoning that humans can intervene in nature benignly if they mimic the scale of natural change.

## 2.2 The principle of harmony with nature

Leopold first introduced the principle of harmony with nature in response to his loss of confidence in the standard approach to forest conservation which focuses on the maximization of a target resource useful for humans (see Callicott 2003, 579–580). In a lecture to a joint meeting of forest professionals and ecologists, Leopold stated:

The emergence of ecology has placed the economic biologist in a peculiar dilemma: with one hand he points out the accumulated findings of his search for utility, or lack of utility, in this or that species; with the other he lifts the veil from a biota so complex, so conditioned by interwoven cooperations and competitions, that *no man can say where utility begins or ends.* (Leopold 1992, 266–267; quoted in Callicott 2003, 580, italics mine)

This observation led him to think of conservation as a state of “harmony between humans and land” (Leopold 1949, 207), and to start implementing this approach, in collaboration with Wisconsin farmers. Callicott takes up this idea of harmony with nature (see Callicott 1990, 328–331; 1996b, 150–154; 2003, 578–582), and explains that the metaphoric notion of “harmony” must be understood in terms of the ecological concept of *symbiosis*. Symbiosis is an ecological interaction where two living beings are interdependent, and, in its *mutualistic* form, a symbiotic relation is a form of ecological cooperation,



reciprocally beneficial to all interacting entities (Peacock 2011, 226). Accordingly, in Callicott's view, humans can fashion a win-win rather than a zero-sum relationship with the ecosystems on which they depend (Callicott 1990, 330; 1991, 357) and seek to achieve "a mutually beneficial and enhancing integration of the human economy with the economy of nature" (Callicott 1990, 329–330). In Callicott's view, human activities are symbiotic with ecosystems if they do not compromise the latter's *health* (Callicott and Mumford 1997, 35–36).<sup>13</sup> Hence, the notion of harmony or symbiosis with nature is directly tied to that of *ecosystem health* developed in the 1990s by the ecologists and economists Robert Costanza and David Rapport (Rapport et al. 1998; Costanza, Norton, and Haskell 1992), and anticipated in Aldo Leopold's concept of *land health* (Leopold 1999).

### 2.3 Nature in Callicott and Mill

As I mentioned in the introduction, Mill and most environmental philosophers focus their discussions on two concepts of nature. These two concepts can be summarized as:

- Nature<sub>1</sub>: "Nature" as opposed to the *supernatural* (or the *miraculous*), including all that happens or can happen according to the fundamental laws of physics.
- Nature<sub>2</sub>: "Nature" as opposed to the *artificial* (human voluntary actions), including only what happens independently of voluntary human agency.

Nature<sub>1</sub> is clearly too trivial to be the concept involved in Callicott's principles of eco-mimicry and harmony with nature. Logically there can be no human ecological intervention that does not mimic or that is not in harmony with nature in this sense. As the laws of nature are necessary and therefore admit no exceptions (for instance no massive object can escape the law of gravity), therefore anything humans do must be in accordance with nature<sub>1</sub>.<sup>14</sup>

It appears plausible, at first sight, to interpret the principle of eco-mimicry as invoking nature<sub>2</sub>. The main idea of this principle seems to be that if human interventions in ecological systems mimic the scale of changes occurring without human agency (that is, occurring naturally<sub>2</sub>), then they should be benign. There are however two problems with such a reading. First, it appears to be in tension with Callicott's critique of the wilderness concept of nature and his commitment to the Darwinian idea that humans are part of nature. As Shrader-Frechette (1990, 188) has objected, one would require an explanation of why the *scale* of change makes a significant difference: "Nor can the criterion be merely that it is wrong for humans to do quickly (e.g., cause lake eutrophication) what nature does more slowly. One would need an argument (given neither by Callicott nor Leopold) that accelerating ecosystemic changes is bad, even if the changes themselves are natural." This, in itself, does not rule out the nature<sub>2</sub> reading of Callicott's eco-mimicry principle, but a charitable interpretation demands that some alternate understanding at least be explored. Another problem with this interpretation is that Callicott's application of the principle does not include *all* natural<sub>2</sub> perturbations as subject to benign mimicry by humans. For instance, as he states, mass extinctions occur naturally<sub>2</sub>, but it remains wrong for us to cause one:

Episodes of mass extinction have occurred in the past, though none of those has been attributed to a biological agent. Such events are, however, abnormal. Normally, speciation out paces extinction—which is the reason why biodiversity has increased over time. So, what is land-ethically wrong with current anthropogenic species extinction? Species extinction is not unnatural. On the contrary, species extinction—anthropogenic or otherwise—is perfectly natural. But the current rate of extinction is wildly abnormal. (Callicott 1996a, 136)<sup>15</sup>

This passage stresses an important proviso of Callicott's eco-mimicry principle: what can benignly be mimicked is the *normal* scale of natural change (see the above quote p. 8). Though Callicott himself does not emphasize this, I think that such appeals to ecological normality are a cornerstone of his conservation ethics. He applies a similar reasoning to the cases of anthropogenic global warming (Callicott 1996a, 136; Callicott 2002a, 102), coastal development, forest fires and the release of pulse

water in a dammed river (Callicott 2013, 95–96).<sup>16</sup> Thus Callicott’s eco-mimicry norm is not so much an appeal to the natural<sub>2</sub> as an appeal to what could be called *ecological normality*.

An implicit appeal to ecological normality also underlies Callicott’s principle of harmony with nature. This principle cannot be read as invoking nature<sub>2</sub>. As nature<sub>2</sub> is defined in opposition to human agency, harmony with it is logically impossible, since by definition any human intervention in an ecological system introduces artificiality into the system and thereby reduces its naturalness. The conceptual link between harmony with nature and ecological normality becomes evident if we consider Callicott’s (1995, 362) “working definition” of ecosystem health as “a condition of *normality* in the linked processes and functions that compose ecosystems.”<sup>17</sup>

Thus, I contend, the appeals to nature in Callicott’s conservation principles involve a concept of naturalness distinct from both of Mill’s, and one which is conceptually tied to an idea of *ecological normality*. In Section 3, I will discuss a similar concept of nature related to normality as articulated in ancient and early-modern philosophy.<sup>18</sup>

### **3. Nature and Normality in Pre-Modern Philosophy**

#### **3.1 A concept of organic nature**

Originally, the Greek “*physis*” meant “growth” and its Latin equivalent “*natura*” meant “birth” (Coates 1998, 23; Naddaf 2005, 12), and so “nature” had a strong conceptual tie to *life*. This aliveness of nature is reflected, for instance, in Thales’ view of the world as a living organism, or in the Pythagorean view of the universe as animate, ensouled and intelligent (Collingwood 1960, 31; Hughes 1994, 55). The most detailed articulation of this type of organic view of nature is found in Aristotle’s philosophy. In *Metaphysics Δ*, Aristotle identifies seven uses of “nature”: (1) origin or birth, (2) the seed of a thing’s growth, (3) the source of movement in natural objects, (4) primitive matter, (5) the essence or form of

natural things, (6) essence or form in general, (7) the essence of things which have a source of movement in themselves (Collingwood 1960, 81). All of these uses except (4) refer to a life-related idea of nature. For modern mechanists, in contrast, the laws of movement were fundamental properties of *matter* (Aristotle's fourth use of "nature"), and so, strictly speaking, nature *just was* matter. This is explicit in this statement by Descartes: "Take it then, first, that by 'Nature' here I do not mean some deity or other sort of imaginary power. Rather, I use the word to signify matter itself, in so far as I am considering it taken together with the totality of qualities I have attributed to it." (Descartes 1998, 25) Accordingly, for Moderns, the laws of nature were *necessary*, that is, absolutely unchanging, and they were sufficient to explain all natural phenomena (even complex organic ones). Thus, the Moderns' default concept of "nature" was Mill's nature<sub>1</sub>. To the contrary, for ancient philosophers, nature, as the source of the movement of natural beings, was, at least conceptually, distinct from matter. Nature was an active principle in complex beings, which was responsible for their organization and their characteristic movement. Its regularities were not as stable as those of modern physics, and hence, natural entities could sometimes display *unnatural* behaviors (for example in the case of anomalous growths and monstrosities). Thus the modern concept of nature<sub>1</sub> and the ancient concept of organic nature refer to a range of phenomena that are distinct in two respects: their degree of *complexity* and their *modal status*. Nature<sub>1</sub> depicts nature at its least complex, that is basic matter and its necessary laws, while organic nature denotes nature as *organized* and displaying *non-necessary* regularities.

This characterization is consistent with a distinction identified in medieval and early modern thought by Lorraine Daston (1991, 97–100; 1998, 154–156) between the natural in contrast with the *supernatural* (which is equivalent to Mill's nature<sub>1</sub>) and the natural in contrast with what she calls the *preternatural* (which I will refer to as *nature*<sub>3</sub>). In a work co-authored with Katherine Park, she formulates the distinction between the modern *nature*<sub>1</sub> and the ancient *nature*<sub>3</sub> in terms of modal status.

She observes that neither Aristotle nor later Aristotelians conceived nature as governed by immutable laws:

[N]either Aristotle nor his medieval commentators thought of nature in the post-seventeenth-century sense, as governed by unbreakable laws. Although scholastic philosophers sometimes used the word "law" (*lex*) in referring to the natural order, they almost always explicated it in the sense of "rule" (*regula*): medieval natural philosophers thought of nature as regular in her actions (rather than inexorable), governed by what were often referred to as habits (*habitus*), inclinations (*indinationes*), or intentions (*intentiones*). Like any artisan, nature aimed at a certain uniform standard, but occasionally, for better or worse, she missed the mark, resulting in an "accidental" production, such as a baby with six fingers. (Daston and Park 1998, 120)<sup>19</sup>

As Daston reports, these strange occurrences were often called "errors" of nature (Daston 1991, 111; 1998, 157), and she cites as examples of them "monstrous births, rains of blood and wheat, giants and dwarfs, earthquakes, prodigious sleepers" (Daston 1994, 42); and "[i]n addition to monsters, strange weather, figured stones, petrifying springs, the occult virtues of plants and minerals, and myriad other deviations from the ordinary course of nature" (Daston 1998, 154). Thus, nature<sub>3</sub>, in contrast with nature<sub>1</sub>, does not include as natural everything that happens in the physical world, but only what happens *normally*. A passage from Aristotle on the naturalness of *monsters* can serve to illustrate the interplay between nature<sub>1</sub> and nature<sub>3</sub> in his thought:

For the monstrosity belongs to the class of things contrary to nature, not any and every kind of nature, but nature taken as what holds for the most part [nature<sub>3</sub>]; nothing can happen contrary to nature considered as eternal and necessary [nature<sub>1</sub>], but only in those cases where things generally happen in a certain way [i.e. in a natural<sub>3</sub>] but may also happen in another way [i.e. in a non-natural<sub>3</sub> though natural<sub>1</sub> way]. (*Generation of Animals* IV, 4, 770b 10ff)<sup>20</sup>

Daston and Park also discuss how the distinction between nature<sub>1</sub> and nature<sub>3</sub> is articulated by Aquinas:

[...] Aquinas distinguished between three types of physical occurrences. The first was natural in the sense used by Aristotle: "that which is always or that which is for the most part." But this natural order of things could be violated in either of two ways: 1) by chance, accidental, or otherwise unforeseeable events (the man with six fingers); or 2) by miracles, performed directly by God without mobilizing secondary causes. We will call this last category of phenomena supernatural; miraculous events were naturally impossible, "above nature." The intermediate category,

however, which we will call the preternatural — from Aquinas’ repeated phrase “*praeter naturae ordinem*”— was made up of unusual occurrences that nonetheless depended on secondary causes alone and required no suspension of God’s ordinary providence. (Daston and Park 1998, 121)<sup>21</sup>

This passage identifies two different cases of interruptions of the course of nature: *supernatural* events, that is, suspensions of the necessary laws of nature<sub>1</sub>; and *preternatural* events, that is, breaches of the usual or normal course of nature<sub>3</sub>, which, although they are unnatural<sub>3</sub>, are not, for all that, supernatural.

As seen in Daston’s discussion, references to nature<sub>3</sub> frequently use the language of *normality*. As its regularities admit exceptions, what is *natural* as opposed to *preternatural* is what conforms to the *ordinary* or *normal* course of events in the organic world (broadly construed as the world of complex organized entities), as opposed to the necessary course imposed by the *laws* of nature<sub>1</sub>. At a more analytical level, normality can be understood either in *statistical* or *functional* terms (Siipi 2008, 88–89). Statistical normality is a purely descriptive notion, whereas functional normality involves a form of normativity. What is opposed to the functionally normal, thus, is not merely *rare*, but more pejoratively *dysfunctional*, *anomalous* or *abnormal*. Daston’s talk of “monsters” and “errors” in relation to the preternatural suggests that nature<sub>3</sub> is linked to a notion of *functional* rather than merely *statistical* normality.<sup>22</sup>

So to summarize, we now have at our disposal three concepts of naturalness:

- **Nature<sub>1</sub>:** The universe’s *primary matter* and *fundamental laws*, admitting no exceptions; opposed to the *supernatural* (or the *miraculous*).
- **Nature<sub>2</sub>:** What exists or happens independently of human agency; opposed to the *artificial* (human voluntary actions).
- **Nature<sub>3</sub>:** The organic world (broadly construed) and its functionally normal behavior, regularities admitting exceptions; opposed to the anomalous or the *preternatural*.

In section 3.2, I will demonstrate how Aristotelian ethics, the most prevalent form of naturalistic ethics, rests on a version of the concept of  $natural_3$  (and not on any of Mill's  $natural_1$  and  $natural_2$  concepts), but also identify another version of the concept which is directly tied to ecological thinking.

### 3.2 Specific natures in Aristotelian ethics

In a more recent work, Daston (2010) expands her analysis of  $nature_3$ , and divides it into two categories, which, she maintains, are recurrent from Ancient thought to the present: *specific* and *local* natures. *Specific* natures refer to the essences or kinds of entities, that is, “to what makes an object be itself, in a recognizable and distinct way, to its ontological identity card: what makes gold is gold (and not copper for instance), what makes a bear is a bear (and not a trout).” She explains that “what is ‘specific’ in the term ‘specific natures’ derives from the word ‘species,’ first in the biological sense, but also in the wider sense of all genuine types, [...] the innate or spontaneous traits as opposed to those imposed by art or education.” (Daston 2010, 248)<sup>23</sup> By contrast, *local* natures, as she depicts them, are situated at a larger scale. They are the “characteristic combination of the flora and fauna, of the climate and geology which lend a landscape its physiognomy: the desert oasis, the tropical forest, the Mediterranean coast or the heights of the rocky mountains” (Daston 2010, 248–249). Daston adds that “[t]he modern science of ecology studies the way in which organisms and topography interact to create the specific local natures; but the order of local natures was noticed long before the birth of this science” (Daston 2010, 249).

Although the concept of naturalness proposed in this article is more in line with Daston's notion of *local*  $natures_3$ , it may first be informative to pay some attention to a very influential form of naturalistic ethics centered on the notion of *specific*  $natures_3$ , namely, Aristotelian ethics. For Aristotelians, the good of a being is the fulfillment of its essence, that is, its becoming a mature representative of its kind.<sup>24</sup> For

example, a rabbit is a *good* rabbit when it grows into the form of a mature representative of the species *rabbit* that is, into a normally functioning rabbit. Making an ethical use of this analysis, Aristotelians explain moral goodness (human virtue) in terms of the *goodness of its kind*. In *Nicomachean Ethics* (1097b25ff), Aristotle first establishes that the essence of humankind is *rationality*, and then argues that a man who does not act as a rational being (as opposed to a merely vegetal or animal being), is a bad or defective man, because he fails to act according to his nature.<sup>25</sup> Aristotle's use of the term "nature" (*physis*) in connection to human behavior is very complex, but the distinction between nature<sub>2</sub> and nature<sub>3</sub> is helpful in clarifying some of his most obscure statements. Consider this passage for instance: "[I]t is clear that none of the ethical virtues arise in us by nature, for no natural thing can be unnaturally trained. [...] Neither by nature, nor contrary to nature, then, do the virtues arise in us; but it is natural for us to acquire them, and we are made perfect by training." (*Nicomachean Ethics* 1103a18-26)<sup>26</sup> The correct way to interpret this puzzling passage, I think, is to take it that what Aristotle means is that virtues are natural<sub>3</sub> but do not come naturally<sub>2</sub>; that is, that they are *normal* features of human beings *qua* human beings, but that they cannot be achieved without some social training which makes them somehow artificial.

There have indeed been unfortunate applications of the Aristotelian ethical appeal to specific natures. A noteworthy case is that of conservative sexual ethics, which appeals to specific natures at the level of organs (rather than that of the human organism as Aristotle did), and condemns non-reproductive sexual practices (e.g., masturbation, homosexuality, contraception, bestiality) as vicious because *unnatural*, on the grounds that the natural function of sexual organs is reproduction. Aquinas formulates such condemnations in the *Summa Theologica* (II-II, 154), and Levin (2002) formulates a contemporary version of the argument.<sup>27</sup> Another noteworthy case is the appeal to woman's alleged specific nature in essentialist views of womanhood. These views assign normal social roles to males and



females and deem defective behaviors that deviate from these roles. These two cases illustrate a general problem with ethical appeals to *specific* natures, namely that they often lead to a “difference-is-defect” view, in which what differs from the social norm is abhorred as morally debased (Copp and Sobel 2004, 538), and this in turn is used to justify unfair social hierarchies.<sup>28</sup> Furthermore, contemporary biologists and philosophers of biology have been suspicious of the kind of essentialism involved in Daston’s depiction of *specific* natures (Mayr 1959; Hull 1965a; 1965b; Sober 1980). One of Darwin’s significant contributions to philosophical metaphysics, as they argue, is his dissolution of the Platonic and Aristotelian essentialist understanding of biological species.<sup>29</sup> Those dubious uses of Aristotelian naturalism and the criticism of biological essentialism are probably what have contributed the most to contemporary philosophers’ suspicion of Aristotelian ethical appeals to nature.<sup>30</sup> In section 4, I will show how the appeals to nature<sub>3</sub> involved in ecocentrism are different from the Aristotelian ones, and are grounded in a radically different understanding of organic nature.

## **4. A Concept of Ecological Nature**

### **4.1 From Aristotelian to ecological nature**

At the evolutionary level, deviations from the usual form of a species, what Daston calls *monstrosities*, cannot be considered as biologically abnormal. In fact, these monstrosities are what make evolution possible. Evolutionary theory states that species evolve through natural selection when mutations generate phenotypes which diverge from the usual form of their species, and so would be considered monstrous under an Aristotelian worldview, but which diverge in a way that increases their fitness. From an evolutionary standpoint, Aristotelian essences are just temporary clusters of traits relatively common to a population, which are adapted to the selective pressures of an environment. The forms of species are thus not the ultimate *ends* of nature, but contingent products of local environments, temporary *means* to adaptation. To borrow Daston’s terms, what evolutionary biology does is to show

the temporal and metaphysical priority of the order of *local* natures over that of *specific* natures. Darwinism views the forms of species as the products of adaptations to the climate, geology and other living beings of a place. Species are carved out through their ecological interactions, and the resulting forms are determined by their need to fit a viable ecological niche.

In light of this, I think that Callicott's ecocentric appeals to naturalness should be interpreted as involving the concept of *local* nature<sub>3</sub>, rather than Mill's nature<sub>1</sub> and nature<sub>2</sub>, or the Aristotelian *specific* nature<sub>3</sub>. As Daston notes (see section 3.2 above), *local* natures are the subject of the contemporary science of ecology. The science of ecology studies natural environments as complex and dynamic systems of interactions. It is not the flat nature (the malleable matter) of classical mechanists (nature<sub>1</sub>), with no inherent structure and directionality, and which can be rearranged at human will without further repercussions. It is a complex system of interactions with its own dynamic trends and feedbacks. Though these systems are perpetually changing at many levels and time-scales as the flux-of-nature view depicts, they are not, for all that, pure chaos (see Holling, Gunderson, and Ludwig 2002, 10–14, for a discussion of this systemic view of nature). Their patterns have some relative degree of regularity, similar to the contingent rules of Daston's nature<sub>3</sub>. The fact that life has persisted on earth for so long shows that these rules render ecosystems somehow self-maintaining, or at least not self-detrimental. This sort of normal ecosystem functioning is what the environmental crisis jeopardizes and what ecocentric ethical views like Leopold's and Callicott's are meant to preserve. Ecocentrism is meant to respond to the danger created when we humans irreparably disrupt the ecological order upon which the whole web of life depends. Thus, I would argue that ecocentrism, like Aristotelian ethics, appeals to a concept of nature<sub>3</sub> related to a notion of normality. It is not concerned, however, with the essences of living species, but rather with the ecological rules by which species can cohabitate harmoniously within their ecosystems. The ethical problem with which ecocentrism is concerned is that, although most

species spontaneously respect these rules, (for those who do not quickly damage their supporting ecosystem and thereby their own ecological niche and prospects for survival), humans in current industrial civilization appear to be the rule breakers par excellence. Hence, *ecological* “monstrosity,” to retain Daston’s term, is not the mere deviation of an individual from its species-form, but a species’s attempt at occupying an unsustainable ecological niche; and what ecocentrism deems natural and therefore good is for a species to live in harmony with its supporting ecosystem.

Interpreting Callicott’s two conservation principles as involving a concept of *local* or *ecological* nature<sub>3</sub> elucidates the relation between naturalness, ecological normality and ecosystem health in his conservation philosophy. If we interpret the principle of harmony with nature as one of harmony with *ecological* nature, as ecological naturalness simply means ecological normality, then this principle becomes one of harmony with normal ecological trends. Given the conceptual connection between ecological normality and ecosystem health, it follows logically that this principle demands that human activities remain consistent with ecosystem health. The principle of eco-mimicry, for its part, should be understood more as a *rule of thumb*, which is meant to help us achieve the goal of harmony with nature. It relies on the observation that, although change is a dominant feature of the ecological world, the changes that usually occur are generally, consonant with its healthy functioning. From this observation, it can be inferred that mimicking what is part of this normal course will most often lead to ecologically harmonious results.<sup>31</sup> This interpretation also saves Callicott’s principles from the conceptual paradoxes generated by Mill’s two concepts of naturalness. Unlike an injunction to live according to nature<sub>1</sub>, one that dictates living according to ecological nature<sub>3</sub> does not amount to the trivial prescription that humans should do anything that is physically possible, and so avoids the pitfall of including everything humans can possibly do as part of what is harmonious with or imitative of nature. And unlike nature<sub>2</sub>, it does not define naturalness in conceptual opposition to human agency and thus does not render the

principles of harmony with nature and eco-mimicry logically impossible or arbitrary. Human ecological interventions can be more or less in harmony with ecological nature<sub>3</sub> according to their degree of compatibility with ecosystem health, and mimicking ecological nature<sub>3</sub> is, as I have already noted a good practical strategy for acting according to the principle of harmony with ecological nature<sub>3</sub>.<sup>32</sup>

I conclude this section with a table summarizing the various concepts of naturalness I have discussed and their ethical uses:

<b>Nature<sub>1</sub></b> (natural as opposed to <i>supernatural</i> )		<i>No ethics possible</i> : Trivial norm demanding action in conformity with the laws of nature
<b>Nature<sub>2</sub></b> (natural as opposed to <i>artificial</i> )		<i>Wilderness environmental ethics</i> : Norm of preservation of areas untouched by humans
<b>Nature<sub>3</sub></b> (natural as opposed to <i>abnormal</i> )	<i>Specific natures</i>	<i>Aristotelian ethics</i> : Norm of living according to human (rational) nature
	<i>Local natures</i>	<i>Ecocentrism</i> : Norm of living according to the rules of normal ecological functioning

## 4.2 Ecological nature in contemporary parlance

It may be objected that my application of a concept of nature rooted in pre-modern philosophy to a contemporary philosophical project like Callicott’s imposes an anachronistic use of “nature” on contemporary language. In this section, I want to forestall such objections by presenting some evidence that a colloquial use of ecological nature<sub>3</sub> actually exists; and by tracing (very broadly) the historical transmission of the concept, from Aristotelian philosophy to contemporary ecology, through early modern biological and medical thought.

An obvious but important argument for the existence of colloquial uses of ecological nature<sub>3</sub> is the fact that “nature” is frequently used by people as synonymous with “the ecological world,” and “natural” as synonymous with “ecological.” Contrary to what many environmental philosophers assume, I think

that people's ideas of going out "into nature," rather than alluding to a notion of "going into a place unspoiled by human presence," means rather something more akin to "going to a place where a high density and complexity of ecological interactions occur." Such a place may indeed be a wilderness preserve, but it may also be a lush countryside or even an urban or suburban green space.

Likewise, people's depictions of activities or products as "natural" sometimes mean something more akin to "ecological" (natural<sub>3</sub>) than to "nonanthropogenic" (natural<sub>2</sub>). This occurs for instance in discussions of food and agricultural ethics, when people express disgust with the "unnaturalness" of industrial agricultural practices. People's revulsion towards industrial agriculture cannot plausibly be interpreted as a mere reaction to the fact that it involves human agency (and so is unnatural<sub>2</sub>). The alternative agricultural practices which are deemed more natural than industrial agriculture involve human agency as well, and sometimes involve even *more* human agency than their industrial counterparts (for instance, it is not clear that, overall, organic agriculture requires less human intervention than industrial agriculture). It seems plausible instead to interpret people's revulsion towards industrial agriculture as motivated by a perception that industrial agriculture is unnatural in the sense of unecological (unnatural<sub>3</sub>). Such an interpretation is consistent with the results of an empirical study by Verhoog et al. (2003) on how organic farmers and food customers view the naturalness of organic farming. According to Verhoog et al., Mill's concepts of natural<sub>1</sub> and natural<sub>2</sub> cannot appropriately account for the implicit views of the respondents in their study. They report their respondents as conceiving nature not "as a mechanistic material system but as a complex organic living whole" which has "a self-organizing capacity" (Verhoog et al. 2003, 36). Such a statement appears to contrast nature<sub>1</sub> (matter and its mechanistic laws) and nature<sub>3</sub> (complex and organic ecological nature). Moreover, Verhoog et al. report that their respondents "[a]ll realized that farming as such is a cultural activity in which human beings interfere in nature," but nevertheless thought that somehow organic

farming is “harmoniously integrated into nature” while conventional farming is not (Verhoog et al. 2003, 35). The respondents’ acknowledgement that farming is a cultural activity excludes nature<sub>2</sub> as a possible interpretation of their views, and their depiction of organic and industrial farming as more or less in harmony with nature excludes nature<sub>2</sub> and strongly suggests that nature<sub>3</sub> is the concept of naturalness they have in mind. From these responses, Verhoog et al. derive a notion of nature that denotes the “realm of living nature,” of what “lives and grows by itself” and that is opposed to the “chemical,” to techniques where life is “reduced to the molecular (physico-chemical) level” and to “synthetic substances” which can only be produced in the laboratory or the factory (Verhoog et al. 2003, 39). This, I think, indicates a distinction between what is part of the normal course of ecological nature and what is not, and hence an appeal to a concept of naturalness<sub>3</sub>.

An identification of “nature” with “the ecological world” can also be observed in the scientific writings of ecologists. Take for instance Odum’s (1971, 36) warning that: “Nature, with our intelligent help, can cope with man’s physiological needs and wastes, but she has no homeostatic mechanism to cope with bulldozers, concrete, and the kind of agroindustrial air, water, and soil pollution that will be hard to contain as long as the human population remains out of control.” In this passage, the nature that can either cope or not cope with our impact is indeed *the ecological world*, and can be neither nature<sub>1</sub> nor nature<sub>2</sub>. As I noted, nature<sub>1</sub> includes everything we do, and so can easily cope even with our worst forms of air, water and soil pollution; and nature<sub>2</sub> excludes us and our influence in principle, and so cannot cope with our impact at all. Moreover, the reference to homeostatic mechanisms indicates that the nature involved here exists at the level of complex systemic organization (nature<sub>3</sub>) rather than merely at the level of physics and its fundamental laws (nature<sub>1</sub>). An identification of “nature” and “the ecological world” is also observable in the debate between proponents of the *balance of nature* and the *flux of nature* views of ecological systems (as reported for example in Pickett and Ostfeld 1995). This

debate about the character of change in “nature” is concerned with change in the *ecological world*. It is not about change in the physical world in general (nature<sub>1</sub>); nor is it about change that can happen only independently of human agency (nature<sub>2</sub>), as both the proponents of the balance and the flux of nature views leave open the possibility that humans can act in harmony with nature (be it in balance or in flux). In addition to instances in the work of Odum and of Pickett and Ostfeld, examples of such contemporary usage can also be found, for instance, in Botkin’s (1990) discussion of various competing ways to characterize the complex structure of the ecological world as “perceptions of nature” and “views of nature,” and in Holling, Gunderson and Ludwig’s (2002, 10–14) references to “myths” or “caricatures” of “nature” to indicate various understandings of how the ecological world is structured. This contemporary use of “nature” to refer to the ecological world in ecological writings has antecedents in the older practice of seventeenth and eighteenth century naturalists who commonly spoke of the “*œconomy of nature*” to describe the complex and orderly interactions among living organisms studied nowadays by ecologists. The economy of “nature” to which those naturalists referred is neither that of basic physical particles (nature<sub>1</sub>), nor one which cannot involve human beings (nature<sub>2</sub>). It is an ecological system of interactions which includes humans and their economic activities (See Egerton 1973; Drouin 1987).

At a more abstract level, Helena Siipi (2008), who presents one of the most detailed analyses of the contemporary uses of “nature” and “natural,” discerns in discussions about bioethics and environmental ethics, a concept of naturalness as functional normality similar to the nature<sub>3</sub> concept identified by Daston. As she points out, according to this concept, an entity will be said to behave naturally if it achieves its normal function, that is, if it performs its biological role, or its normal contribution to the complex activity of a whole (Siipi 2008, 89). In this sense, for instance, a heart that pumps blood at a normal rate and pressure is said to behave naturally; and a heart which does not is said to behave

unnaturally. This way of speaking is reminiscent of Daston's Aristotelian concept of specific nature as applied to organs in bodies. But Siipi also notes that such a concept of naturalness as functionally normal is often applied to the relation of species with their ecosystem:

Functional abnormality is not limited to parts of individuals. Analogously to them, species (and even individuals) have been seen to have functions in evolutionarily evolved self-supporting ecosystems. According to this line of thought, a species (or even an individual) that fails to fulfill its purpose in an ecosystem is functionally abnormal and in that sense unnatural. (Siipi 2008, 89)<sup>33</sup>

Thomson (1991) elaborates a little more than Siipi on the similarity between naturalness as functional normality at the organismic and the ecological levels (the ecospheric level in this case):

The notion of "Gaia" is a contemporary version of this same [Aristotelian] world-view, with minor modifications. Lovelock thinks of the whole earth as itself like an organism in which each element plays some role in keeping the system operating. The forests, the oxygen, even the rocks perform functions which are defined in terms of the whole, much as the heart and lungs play functional roles in an animal body. The homeostasis of the whole Gaia system enables us to determine what the function of each of the parts should be. We can thereby establish norms for healthy and unhealthy functioning, for sick and well, for right and wrong. The *telos* of each element is made visible by looking at the totality. We can therefore declare certain human activities to be "anti-environmental," or wrong and we can determine how it is that we ought to act to rebalance the harmony of the earth as an organic whole.

What the Gaia hypothesis drops from Aristotle's conception is the notion of an eternal essence or form for each species. The earth as an organism developed historically over the past four billion years and created for itself the present harmony of Gaia; there is no eternal essence or norm which Gaia instantiates.

Instead of "anti-environmental" in this quote, Thompson could well have said "unnatural" or "unecological." The general idea here is that a species behaves abnormally (unnaturally<sub>3</sub>) when it disrupts the homeostasis of the global ecosystem.

Though it was somewhat marginalized by mechanistic philosophy during the seventeenth and eighteenth centuries, the natural<sub>3</sub> concept was not completely dormant during that period. The use of "natural" as "normal" was largely kept alive in medical theory, which was influenced by Galenic



medicine, in turn inspired by Hippocratic and Aristotelian biological views articulated around ideas of naturalness and balance. For instance, according to the Galenic physician Daniel Sennert (1572-1637):

Disease is most correctly defined as the inability of performing functions in a natural fashion [...] a constitution or disposition *praeter naturam*, that impairs activity [...] A disease is a disposition of the bodily parts that is defective and diverges from the natural state, whereby the persons are rendered incapable and unsuitable for performing the functions naturally (*actions naturales*). (Sennert quoted in King 1984, 133, italics original)<sup>34</sup>

This view implied a conception of medical intervention as a form of cooperation with the inner healing powers of the body, which naturally sought to reestablish its equilibrium. In the nineteenth century, the view that living beings have inner natures which regulate and maintain their normal functioning was reinterpreted by Claude Bernard, through his idea that living organisms maintain the relative stability of their *milieu intérieur* (inner environment) against the fluctuations of their outside environment (Cziko 2000, 51–55). This was a pivotal moment in the history of ideas about life and self-regulation, because Bernard’s theory succeeded in explaining the behaviors of living organisms in terms of physicochemical processes, without however dissolving their specificity as living beings. While inert matter passively reacts to outside influences, living entities have self-regulating mechanisms and so respond to disturbances in order to maintain the stability of their inner environment. Later cyberneticians coined the notion of “feedback mechanisms” to designate the regulating physicochemical processes identified by Bernard as typical to living bodies (Cziko 2000, chap. 5). Bernard’s theorizations thus somehow achieved a synthesis of Aristotelian and mechanistic philosophy, which afforded a place for a notion of naturalness<sub>3</sub> in the context of modern (post-Aristotelian) natural science.<sup>35</sup> In this context, the natural<sub>3</sub> consists in complex orderly phenomena generated by patterns of regulation and maintenance in the biological world. This, I think, explains why, as Nordenfelt (1987, 15) notes, two of the main ideas of the Galenic conception of health still influence contemporary thought about health: that “of a *balance*

between opposing elements or forces and, in particular, the idea of a *natural* or *normal* state of the living organism.” (italics original).<sup>36</sup>

The historical bridge between these views on health and ecological theories is Walter B. Cannon’s classic book *The Wisdom of the Body* (Cannon 1932), which coined the word “homeostasis” and further developed Bernard’s ideas. As noted by historians of ecology, the ideas developed in this book had an important influence on the thought of founders of ecology such as Eugene Odum and Aldo Leopold. As Joel Hagen (1992, 128) observes:

Eugene Odum began discussing these phenomena [those of stability and self-regulation] explicitly in terms of homeostasis. He had read Walter B. Cannon’s *The Wisdom of the Body* as a graduate student during the late 1930s, and he later used it as a required text in the physiology course that he taught at the University of Georgia. Cannon’s concept of homeostasis—the idea that organisms are capable of maintaining internal stability in a fluctuating environment—was directly applicable to Odum’s early research in physiological ecology.

Tracing the historical connection between Leopold’s notion of land health and Cannon’s ideas of regulation and homeostasis and Hippocratic medicine, Gregg Mitman (2005, 187) also remarks:

Three years after the publication of Cannon’s *The Wisdom of the Body*, Leopold, in a speech titled “Land Pathology,” drew upon a similar neo-Hippocratic discourse that equated the pathological with functional imbalance to craft a powerful message that he believed would resonate with his audience and hopefully awaken them to a new ethical relationship with the land. [...] In *A Sand County Almanac*, Leopold would flesh out these ideas of land health (the capacity of self-renewal) and land sickness (a symptom of disorganization) in ways that further revealed his debt to a Hippocratic model of disease that circulated among the biological disciplines well-disposed to a physiological conception of life.

Hence, when ecologists and ecologically-minded people use the terminology of naturalness<sub>3</sub> to refer to what is in harmony with the ecological world, their language evokes the historical connection between the more recent notions of feedback and regulation central to ecological theories and more ancient Hippocratic and Aristotelian notions of naturalness.

## 5. Conclusion

In the preceding sections, I showed, first, how appeals to nature in Callicott's conservation principles point to a concept of naturalness linked to normality, which was largely overlooked by J. S. Mill and his followers. I then noted that a similar concept of nature existed in pre-modern philosophy, where "nature" was conceptually tied to *life*, and was thought to have contingent regularities expressed in terms of rules of *normality* rather than necessary laws. I also showed how a version of that concept, that of *specific* natures, was central to Aristotelian ethics. And finally, I showed how evolutionary biology, though it may dissolve Aristotelian *specific* natures, leaves room for an ecological understanding of what Daston calls *local* natures, and which defines ecological normality as the ability of a species to live in accordance with Callicott's principle of harmony with nature. I illustrated how such a concept is often used by scholars in the ecological literature and by the lay public as well in discussions of environmental and agricultural ethics. And, finally I traced its travels through history from Aristotelian biology to contemporary ecological thinking.

In the introduction, I mentioned that the concept of nature underlying Callicott's conservation ethics is meant to account both for the Darwinian fact that we are part of nature, and the observation that our cultural abilities allow us to be a much more destructive ecological agent than other species. It is common to seek to reconcile these two ideas by appealing to a dualistic nature/culture opposition (using a concept of nature<sub>2</sub>), and by looking for solutions to our current ecological destructiveness in terms of how far back we must move on the scale of progress; that is, how far we must move away from culture and back to nature. This approach leads to various degrees of primitivism, which situate nature and civilization in a zero-sum game. Impressive and very convincing cases of aboriginal groups living in harmony with their ecological environment can reinforce an emphasis on the particular destructiveness of western civilization and the contrasting ecological benignity of many aboriginal groups. However,

interpreting this contrast in terms of a nature/culture opposition falls into the ethnocentric trap of implicitly characterizing aboriginal cultures as somehow *less* cultural, as if western civilization was the only conceivable form of accomplished culture. Callicott (1991, 356–357) reviews impressive cases where aboriginal groups had or still have ecologically benign interactions with the ecosystems which sustain them, not because they are unskilled and powerless, but rather because their culture is more ecologically mindful than that of current industrial civilization. These cases of culturally-informed harmonious human-nature interactions are an argument against an ethnocentric account based on a nature/culture opposition, for this dualistic opposition implies that, inevitably, the closer a cultural group is to nature, the less culturally advanced it will be.

The concept of ecological nature<sub>3</sub> I propose allows for comparisons between the ecological soundness of different cultures which do not fall into the nature/culture trap. Ways of life that are more in harmony with nature are not so because they are less cultural or more primitive, but rather because they are *differently* cultural. Alienation from the ecological world is not inherent to the notion of culture. Being alienated from nature is a question of the *content* of a culture, not about its being a culture *per se*. Culture, the typically human mode of adaptation, which allows us to compensate for the traits and abilities that our biological evolution did not equip us with, can give rise to more or less eco-friendly practices. The recognition that, in the last few centuries, the world's dominant culture has propagated an ecologically unsound way of life does not obviate the possibility of better cultural alternatives.

In Aldo Leopold's vision, as "the ethical sequence" section of "The Land Ethic" makes clear, the adoption of a harmonious relationship with the land constitutes moral *progress* (see Leopold 1949, 202–203). It is about going forward, not backward. But it is about going forward in another direction than the one pursued heretofore by modern civilization and it represents a radical shift from the received notion of progress understood as the gradual isolation of humans from nature. Ethics is part of culture, and

therefore any ethical project vests some hope in the ability of culture to change us for the better. Leopold's vision thus embodies the hope that, even in "advanced" societies, culture can be a route to healthy ecological behavior. As Callicott (1991, 351) notes: "Precisely because the works of man are largely cultural they are capable of being rapidly reformed. Other animals cannot change what they do in and to their biotic communities, at least not very rapidly, and perhaps not ever consciously and deliberately. We can, since our economic behaviors are determined more by our cultures than by our genes." Callicott is quick to emphasize that this does not mean that the solution that will work for us today will be identical or even similar to those that worked for the aboriginal groups mentioned above. As he reminds us: "The human-nature relationship is an ongoing, evolving, one. We can, I am confident, work out our own, post-modern, technologically sophisticated, scientifically informed, sustainable civilization just as in times past the Minoans in the Mediterranean, the vernacular agriculturists of Western Europe, and the Incas in the Andes worked out theirs." (Callicott 1991, 357) Of course, the theoretical possibility of our achieving such a symbiotic civilization is, by itself, no guarantee that we will actually succeed in doing so, and the challenge is enormous. But it is only if we stop seeing ourselves and our cultural products as hopelessly alien and injurious to nature that we can start reflecting on the kind of cultural shift that could help us live better in our home, the ecological world.

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<sup>1</sup> See Callicott (1991, 351–353; 1992, 18; 1994, 175–176; 2000, 356–361).

<sup>2</sup> See also Ramachandra Guha (1989) and Marcus Colchester (2003, chap. 4).

<sup>3</sup> See Callicott (1991, 349–350; 1992, 17–18; 1994, 177–178; 2000, 367–369).

<sup>4</sup> See Callicott (1991, 354; 1992, 18; 1994, 176; 2000, 367).

<sup>5</sup> Watson (1983, 251–252) discusses this tension.

<sup>6</sup> Holmes Rolston (1986, chap. 2; 1988, chap. 1) and David L. Thompson (1991) have noted the existence of a concept of naturalness akin to the one I will propose, but did not develop it.

<sup>7</sup> Those two principles are not formulated as explicitly in Callicott's writings as I present them here, but I think they accurately synthesize the conservation ethics he elaborates and defends in multiple writings.

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<sup>8</sup> To my knowledge, the only place where this connection between Callicott's conservation ethics and traditional ethical naturalism has been made explicitly is in C. L. H. Traina (1997). More generally, associations between traditional naturalistic ethics and ethical principles inspired by ecology have been made by William French (2008), Thompson (1991), and William Frankena (1979). These authors make passing allusions to such an association but do not elaborate on it.

<sup>9</sup> Determining whether a particular author subscribes to the "balance of nature" view of ecology is not straightforward because ecologists and environmental philosophers have used the phrase "balance of nature" to refer to a variety of distinct ideas, e. g. Frederic Clements's (1916; 1936) climax-oriented view of ecological succession (McIntosh 1985, 82; Botkin 1990, 51–54, 97–99; Callicott 2002a, 91–94; 2002b, 410–411; 2003, 582–583; 2011, 305–307), Charles Elton's (1958) and Robert MacArthur's (1955) diversity-stability hypothesis (Sagoff 1985, 107–110; Callicott 1996a, 119; 2003, 585), A. J. Nicholson's (1933; 1954) view that ecological populations are controlled mainly by density-dependent factors (Cooper 2003, chap. 3), and Charles Darwin's (1859) and Jack Sepkoski's (1978) idea that the number of species in the biological world reaches an equilibrium where speciation and extinction offset each other (Cuddington and Ruse 2004). For example, Elton voiced his rejection of the "balance of nature" idea, but seems nevertheless to have subscribed to a "population regulation" version of it (as indicated by the fact that, despite his explicit rejection of the "balance of nature" idea, Elton is still committed to the search of the factors by which populations regulate their numbers, see Elton 1930, chap. 2). Similarly, Leopold may have rejected some version of the "balance of nature" idea while accepting some others. Determining which version(s) of the idea he rejected and which ones he (implicitly) acknowledged would require some finer exegetical analysis which lies beyond the scope of this article.

<sup>10</sup> See also Callicott (2002b, 411–412; 2003, 585–589).

<sup>11</sup> See also Callicott (2002a, 103; 2002b, 417–418; 2003, 590; 2011, 320–321).

<sup>12</sup> See Callicott (1996a, 138; 2002a, 104) for previous versions of his reformulation of Leopold's maxim. The main difference between the 2013 version of the reformulation and Callicott's previous ones consists in the reintroduction of the reference to the *beauty* of the biotic community included in Leopold's initial formulation. Callicott (2013, 96–97) suggests that, as Leopold used it, the notion of the beauty of the biotic community means something equivalent to what he understood by "land health" (see Nelson 2009, 284, for similar observations). As Callicott also notes, this latter notion in many ways anticipates the more contemporary concept of *ecosystem health*, to which I will return below.

<sup>13</sup> See also Callicott (1996b, 154–157).

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<sup>14</sup> As remarked by an anonymous referee, this understanding of the laws of nature as necessary and admitting no exceptions has been famously criticized by Nancy Cartwright (1989; 1999). Cartwright argues that statements about the laws of nature do not depict necessary *regularities*, but rather *capacities* which may or may not be expressed depending on whether the appropriate conditions are present. Under such a scheme, the nature<sub>1</sub> concept which defines the natural as anything that happens or can happen according to the fundamental laws of physics should be understood to include anything that can happen in accordance with the inherent capacities of basic physical particles.

<sup>15</sup> See also Callicott (2002a, 102).

<sup>16</sup> See Ereshefsky (2007, 62–63) for a further argument that Callicott’s discussion of extinctions is incompatible with an approach to environmentalism focused on nature<sub>2</sub>.

<sup>17</sup> Italics mine, see also Callicott, Crowder and Mumford (1999, 27).

<sup>18</sup> Interestingly, John O’Neill, Alan Holland, and Andrew Light (2008, 127) find in Hume (1978, III.i.ii, p. 474) a concept of naturalness related to normality. They decide not to explore it, although they acknowledge that “there may be more to the concept than is often assumed.”

<sup>19</sup> For similar ideas, see Ian MacLean (2008, 34–36).

<sup>20</sup> Quoted from Jonathan Barnes (1991, 1:1660).

<sup>21</sup> See also Daston (1991, 97–100).

<sup>22</sup> For a full discussion of the concept of biological or functional normality in contrast to statistical normality, see Robert Wachbroit (1994).

<sup>23</sup> I have translated into English the quotations from this text which was published in French. For a podcast of Daston’s English-language lecture on which this publication was based, see Daston (2009).

<sup>24</sup> My summary of the appeal to nature in Aristotle’s ethical philosophy relies mostly on D. S. Hutchinson (1986, chap. 2).

<sup>25</sup> I deliberately retain Aristotle’s androcentric formulations to remain faithful to his text’s ambiguity about gender.

<sup>26</sup> Quoted from Hutchinson (1986, 32–33).

<sup>27</sup> For responses to such arguments, see John Corvino (1997, 6–7; 2002, 244–247).

<sup>28</sup> In fairness to Aristotelians, appeals to specific natures need not lead to such discriminatory views. For instance, when developing their neo-Aristotelian virtue ethics, Philippa Foot (2003, 30–31) and Rosalind Hursthouse (1999, chap. 9) explicitly distance themselves from these views.



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<sup>29</sup> Note however that some historians of biology (e. g. Winsor 2006; Wilkins 2009) have criticized Mayr and Hull's account of the history of biological essentialism.

<sup>30</sup> Note moreover that the standard reading of Aristotle's essentialism as incompatible with Darwinian biology has been challenged (see Walsh 2006; Wilkins 2010). Thus, Aristotelian ethical naturalism may raise fewer metaphysical problems than is often assumed. In any event, my goal in this section is not to assess the plausibility of Aristotelian ethics but to situate ecocentrism with respect to it.

<sup>31</sup> On the logical dependence of the principle of eco-mimicry on that of harmony with nature, see Callicott (2002b).

<sup>32</sup> As I delineated it, the concept of ecological nature<sub>3</sub> is intimately linked with the notions of ecological function and ecosystem health. Those two notions would indeed require some in-depth philosophical analysis which goes beyond what I can provide in the present article (see Callicott 1995; McShane 2004; Odenbaugh 2010; and Nunes-Neto, Moreno, and El-Hani 2014 for relevant discussions). Nonetheless, here are some brief indications of how I think those notions should be approached. In agreement with many philosophers of ecology who have dealt with the topic (e. g. Odenbaugh 2010; Nunes-Neto, Moreno, and El-Hani 2014), I do not think that the notions of ecological function and ecosystem health can be appropriately elucidated in terms of what philosophers of biology commonly call the *etiological* or *selected effect* theory of function (Wright 1973; Millikan 1989; Neander 1991). This is so because this theory defines a biological function as an effect of a biological trait which explains why that trait was preserved under natural selection operating on its bearer's ancestors, whereas contemporary ecologists do not typically conceive of ecosystems as units of natural selection (at least in the orthodox sense). Elsewhere (see Dussault 2015; Dussault and Bouchard forthcoming), I develop an account of ecological functions as contributions to the maintenance and resilience of ecological systems inspired from Christopher Boorse's (1976; 2002) goal-contribution and John Bigelow et Robert Pargetter's (1987) evolutionary forward-looking accounts of biological functions; and an account of ecosystem health which builds conceptual bridges between Boorse's (1977; 2002; 2014) analysis of health as the normal functioning of a biological entity and Robert Costanza's threefold definition of the health of an ecosystem in terms of its *vigor*, *organization* and *resilience* (see Costanza 1992; Costanza and Mageau 1999). The present article's presentation of a concept of ecological nature should therefore be conceived as part of a broader philosophical project aimed at elaborating and defending a functional approach to environmental conservation grounded in ecocentric ethical principles.

<sup>33</sup> See Siipi (2011, 339–340) for a discussion.

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<sup>34</sup> Note in this passage the use of the term “preternatural” which Daston uses to refer to the natural<sub>3</sub> (see section 3.1).

<sup>35</sup> See E. F. Adolph (1961) for a detailed history of the notion of natural regulation which traces its origin to ancient Hippocratic medicine, and Georges Canguilhem (2012) on the theoretical acquaintance between the physiological notions of regulation and feedback and the idea of nature in Hippocratic medicine.

<sup>36</sup> For instance, the contemporary philosopher of medicine Christopher Boorse links the notion of normality which underlies contemporary medicine to a notion of naturalness: “The root idea of this account [of health] is that the normal is the natural. The state of an organism is theoretically healthy, i.e. free of disease, insofar as its mode of functioning conforms to the natural design of that kind of organism.” (Boorse 1975, 57)