

Taxonomic Chauvinism, No More! Antidotes from Hume, Darwin, and Biocultural Ethics

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The culture of global society commonly associates the word *animal* with *vertebrates*. Paradoxically, most of animal diversity is composed of small organisms that remain invisible in the global culture and are underrepresented in philosophy, science, and education. Twenty-first century science has revealed that many invertebrates have consciousness and the capacity to feel pain. These discoveries urge animal ethicists to be more inclusive and to reevaluate the participation of invertebrates in the moral community. Science also has warned of the disappearance of small animal co-inhabitants that is occurring in the midst of the sixth mass extinction. This “invisible extinction” compels environmental philosophers to make visible invertebrates, whose existence is precious in itself and for the functioning of ecosystems on which biodiversity and human societies depend. With a biocultural approach that integrates the biophysical and cultural dimensions of biodiversity, I investigate the roots of taxonomic chauvinism associated with the under-representation and subordination of invertebrates in modern philosophy and science. The bad news is the confirmation of a marked *vertebratism* in animal imagery. The good news is that David Hume, Charles Darwin, and biocultural ethics provide conceptual foundations for cultivating an appreciation of the small co-inhabitants with whom we share our local habitats and the global biosphere.

INTRODUCTION

To confront the current socioenvironmental crisis, a powerful shift in philosophy is required to include mental images representative of the entirety of animals and living beings, from whales to bacteria and viruses. At the beginning of the third millennium, when we are witnessing a sixth mass extinction interwoven with

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global climate change and growing problems of socio-environmental justice and degradation of human health and well-being, it is paradoxical (and problematic) that most philosophers have not properly considered the exuberant diversity of living beings with whom we co-inhabit the biosphere. Instead, affected by a kind of taxonomic-evolutionary narcissism, they have focused their attention on only a few types of animals. For instance, animal ethicists have extended the moral community beyond our species *Homo sapiens*. However, in its prevailing forms, animal ethics should be called *mammalian-* or *vertebrate-ethics*, because it has focused on these groups that comprise less than one percent or only three percent of all animal species, respectively. This taxonomic bias,¹ favoring mammals or vertebrates, carries a serious limitation because it gives moral consideration solely to our closest evolutionary relatives, thus excluding the vast majority of animals on our planet: the invertebrates. This is a very limited vision of the diversity of living beings, which is associated with nothing less than taxonomic chauvinism.

In order to widen the spectrum of mental images to represent animal life in its actual diversity, philosophy needs “conceptual antidotes”² that can unlock the prevailing animal imagery from its vertebratism.³ This taxonomic bias not only affects moral consideration but is widespread in global culture. Currently, in scientific research, formal and non-formal education, and biodiversity conservation, warm-blooded vertebrates are over-represented while cold-blooded vertebrates and invertebrates are under-represented.⁴ This raises a problem for the moral

¹ The term *taxonomic* refers here to *biological taxonomy*: the theory and practice of classifying organisms or taxa. The modern scientific structure of the biological classification originated with “Linnaean taxonomy,” which is based on the identification of taxa (group of organisms that share attributes). Taxa are classified within a hierarchical system that includes seven main categories, organized in the following sequence from the most general to the most specific taxonomic rank: Domain, Kingdom, Phylum, Class, Order, Family, Genus, and Species. From Aristotle to Linnaeus and Darwin, the names of biological taxa were treated as if they were defined by sets of organismal attributes, that is, material attributes of organisms (or their parts), including their morphology, physiology, behavior, ecology, genetics, and biochemistry. Contemporary scientists seek to develop a taxonomic system that reflects evolutionary-phylogenetic relationships. This contemporary approach requires explicitly distinguishing between taxa and names of taxa. In this essay, I develop my analyses based on the names of taxa included in philosophical, scientific, conservation, and educational works. For a review of the differences between *taxa* and *names of taxa*, and of the differences between traditional and phylogenetic schools of biological taxonomy, see Kevin De Queiroz, “Phylogenetic Definitions and Taxonomic Philosophy,” *Biology and Philosophy* 7 (1992): 295–313.

² I use the term *conceptual antidote* in analogy with a medicinal antidote. For example, the *Amazonian curare* paralyzes the body by blocking motor neuron receptors and the antidotes unblock these receptors, thus the person can breathe and move again. *Vertebratism* paralyzes the philosophical imaginary about animals and the *conceptual antidotes* will metaphorically unlock the imaginary, and thus the spectrum of mental representations of animals will capture the diversity of their life forms.

³ The term *vertebratism* was coined by entomologist Simon R. Leather in “Institutional Vertebratism Threatens UK Food Security,” *Trends in Ecology and Evolution* 24 (2009): 413.

⁴ See Simon R. Leather, “Institutional Vertebratism Hampers Insect Conservation Generally; Not Just Saproxyllic Beetle Conservation,” *Animal Conservation* 16 (2013): 379–80; Michael J. Wilson, Elena S. Ivanova, and Sergei E. Spiridonov, “Born to be Wild—Don’t Forget the Invertebrates,”

consideration of animals, since most animals are “invisible” in the cultural imaginary. As Aldo Leopold warned, “we can be ethical only in relation to something we can see, feel, understand, love, or otherwise have faith in.”⁵ The “invisibility” of the vast diversity of animals in the symbolic universe and material culture is a symptom, as well as a driver, of a pernicious process that is spreading rapidly in global society: *biocultural homogenization*.⁶

Biocultural homogenization processes have intensified through the reduction of the number of biological species that have concentrated the interest of philosophy, culture, and economy in Europe since modernity and colonialism.⁷ Subsequently, the globalization of this subset of *animal species of interest* has catalyzed a reduction of species in biophysical, linguistic, and cultural habitats, which have become increasingly homogeneous in the different regions of the world. Consequently, citizens of global society recurrently encounter a small group of animal species that are found both in their urban and rural habitats, as well as in their cultural representations (including digital images).⁸ In this scenario of biocultural homogenization, it is urgent to overcome the taxonomic

“How Prevalent Are Invertebrates in Human-Animal Scholarship? Scoping Study of Anthrozoös and Society and Animals,” *Society and Animals* 27 (2019): 656–77; Lisa Jean Moore and Rhoda M. Wilkie, “Introduction to the Silent Majority: Invertebrates in Human-Animal Studies,” *Society and Animals* 27 (2019): 653–55.

⁵ Aldo Leopold, *A Sand County Almanac* (First edition New York: Oxford University Press, 1949. Reprint, New York: Ballantine Books, 1970), p. 251.

⁶ I coined the term *biocultural homogenization* to identify, and criticize, the complex positive feedback processes that involve intertwined losses of native biological and cultural diversity at local, regional, and global scales. Biocultural homogenization is a driver and a product of the massive replacement of biota and native cultures by a few species and mental imageries and life-habits that are ubiquitous in global culture. This replacement disrupts co-evolutionary interrelationships between local cultures and biota. *Biocultural* indicates a combination of interrelated biological and cultural factors; *homogenization* means the generation of uniformity. I maintain that a globally homogeneous cultural mindset (including its animal imaginary), life-habit and language favors the construction of globally homogeneous biophysical and cultural habitats; vice versa, globally homogeneous urban and rural habitats reinforce globally homogeneous life-habits and mindsets. See Ricardo Rozzi “Biocultural ethics: From Biocultural Homogenization toward Biocultural Conservation,” in Rozzi et al., eds., *Linking Ecology and Ethics for a Changing World: Values, Philosophy, and Action*, Ecology and Ethics Book Series, vol. 1 (Dordrecht: Springer, 2013), pp. 9–32.

⁷ See Bernd Lenzner, Franz Essl, and Hanno Seebens, “The Changing Role of Europe in Past and Future Alien Species Displacement,” in Ricardo Rozzi et al., eds., *From Biocultural Homogenization to Biocultural Conservation*, Ecology and Ethics Book Series, vol. 3 (Dordrecht: Springer, 2018), pp. 125–35.

⁸ Biocultural homogenization reduces the biophysical and symbolic-linguistic dimensions of biocultural diversity to an increasingly smaller number of animal species with which increasingly homogeneous co-inhabitation relationships are configured throughout the planet. This drastically limits the spectrum of possibilities for cultivating relationships of respect and care with the vast diversity of animals. See Ricardo Rozzi “Biocultural Homogenization: A Wicked Problem in the Anthropocene,” in Rozzi et al., *From Biocultural Homogenization to Biocultural Conservation*, pp. 21–24.

bias for two complementary reasons, which respectively appeal to (1) animal ethicists and to (2) environmental philosophers.

(1) In the field of *animal ethics* it is necessary to counter the vertebrate-centric taxonomic bias in light of discoveries of neurobiology and ethology in the twenty-first century that compel us to reconsider the current exclusion of invertebrates (or their great majority) from the moral community.⁹ Animal ethics was established in the 1970s, and fifty years later it largely continues focusing on vertebrates.¹⁰ However, there has been a radical change in the scientific evidence with respect to that available at the end of the twentieth century, which determined the inclusion in the moral community of only some vertebrates, based on utilitarian or deontological justifications.

Utilitarian theorists have emphasized the capacity to feel pain and pleasure.¹¹ Under this criterion, the dichotomy between vertebrates and invertebrates has been fractured because it has been demonstrated that lacking vertebrae does not imply lacking a nervous system nor nociceptors; i.e., receptors for detecting potentially harmful mechanical, thermal, and chemical stimuli.¹² Nociceptors, which appeared very early in animal evolution,¹³ are present in mollusks and arthropods. Consequently, these invertebrates exhibit emotional responses and pain avoidance behaviors that indicate they are sentient.¹⁴

⁹ It is encouraging to read recent discussions of the moral status of invertebrates based on new evidence about their mental, sentient, and behavioral capacities. See, for instance, Robert Francescotti, "Animal Mind and Animal Ethics: An Introduction," *The Journal of Ethics* 11 (2007): 239–52.

¹⁰ See Cass R. Sunstein and Martha C. Nussbaum, eds., *Animal Rights: Current Debates and New Directions*. (New York: Oxford University Press, 2004).

¹¹ See Clare Palmer, "Contested Frameworks in Environmental Ethics," in *Linking Ecology and Ethics for a Changing World: Values, Philosophy, and Action* (Dordrecht: Springer, 2013), pp. 191–206.

¹² See Paul L.R. Andrews, "Laboratory Invertebrates: Only Spineless, or Spineless and Painless," *ILAR Journal* 52 (2011): 121–25; Robert W. Elwood, "Pain and Suffering in Invertebrates?" *ILAR Journal* 52 (2011): 175–84.

¹³ Brian D. Burrell, "Comparative Biology of Pain: What Invertebrates Can Tell us About How Nociception Works," *Journal of Neurophysiology* 117 (2017): 1461–73.

¹⁴ In the mid-20th century, the first invertebrates in which sentient capacity was demonstrated were cephalopods. These mollusks have a centralized nervous system with a brain and cerebral cortex, which have been described in analogy with higher vertebrates. Cephalopods have a high level of cognition and a great capacity for learning. For example, their emotional responses and escape behaviors in the face of a stinging sea anemone suggest that they may experience pain. For these reasons, among invertebrates, cephalopods have received greater legal consideration regarding their handling in scientific laboratories. See Jennifer A. Mather, "Animal Suffering: An Invertebrate Perspective," *Journal of Applied Animal Welfare Science* 4 (2001): 151–56. Other mollusks and crustaceans also learn to avoid harmful stimuli from electric shocks, and display behavioral changes that suggest sentient capacity. See Amanda J. Watkins et al., "Lobster Attack Induces Sensitization in the Sea Hare, *Aplysia californica*," *Journal of Neuroscience* 30 (2010): 11028–11031; Barry Magee and Robert W. Elwood, "Shock Avoidance by Discrimination Learning in the Shore Crab (*Carcinus maenas*) is Consistent With a Key Criterion for Pain," *Journal of Experimental Biology* 216, no. 3 (2013): 353–58.

Deontological theorists have emphasized cognitive abilities, emotion, and intentionality. They have ascribed these attributes exclusively, or primarily, to mammals.¹⁵ Until the end of the twentieth century, attention processes, emotional states, and metacognition were thought to correspond to phenomena that were the exclusive domain of vertebrates. However, we now know that at least one invertebrate clade, the insects, has a capacity for the most basic aspect of *consciousness*: subjective experience.¹⁶ The brain structures that support subjective experience in vertebrates and insects are very different from each other, but in both cases these structures evolved early in their phylogenetic histories, and the origins of consciousness can be traced to the Cambrian, over five-hundred million years ago.¹⁷ Today, we also know that pollinating insects (e.g., flies, bees, and bumblebees) have the above attributes and exhibit complex social learning, for example, in the communication and variation of flight routes and the sequence of visits to the flowers where they feed.¹⁸ Regarding memory capacity and its relationship with sleep, biochemical and physiological mechanisms that are common to vertebrate and invertebrate species have recently been discovered.¹⁹ Among mollusks, marine snails and cephalopods exhibit synaptic plasticity associated with memory and learning, and communication dynamics between animals of the same species for camouflage or ambush signals.²⁰ Among arthropods, *auditory memory* is present in species of crickets that recall their partners' courtship songs; *visual memory* has been recorded in species of bees and bumblebees that remember and communicate the location of flowering plants.²¹ This new empirical evidence should inspire deontologists to expand the taxonomic circle of animals that are part of the moral community.

From the point of view of biocultural ethics, it also is essential to acknowledge that invertebrates have a cardiovascular system that transports oxygen to cells where respiration occurs in mitochondria in the same way as in vertebrates. More broadly, the cellular respiration processes of animals are also common to plants and all living things that possess mitochondria (eukaryotes).²² It is notable that in

¹⁵ See Sunstein and Nussbaum, *Animal Rights: Current Debates and New Directions*.

¹⁶ Andrew B. Barron and Colin Klein, "What Insects Can Tell Us About the Origins of Consciousness," *Proceedings of the National Academy of Sciences* 113 (2016): 4900–08.

¹⁷ *Ibid.*

¹⁸ The development of computing and artificial intelligence has enabled a reevaluation of insect behaviors that solve tasks nominally similar to those performed by vertebrates with larger brains. Additionally, alternative pathways for parallel processing of information and thought have been identified in invertebrates. See Clint J. Perry, Andrew B. Barron, and Lars Chittka, "The Frontiers of Insect Cognition," *Current Opinion in Behavioral Sciences* 16 (2017): 111–18.

¹⁹ Albrecht P. Vorster and Jan Born, "Sleep and Memory in Mammals, Birds and Invertebrates," *Neuroscience and Biobehavioral Reviews* 50 (2015): 103–19.

²⁰ See Euan R. Brown and Stefania Piscopo, "Synaptic Plasticity in Cephalopods; More than Just Learning and Memory?," *Invertebrate Neuroscience* 13 (2013): 35–44.

²¹ See Vivek Nityananda, "Attention-like Processes in Insects" *Proceedings of the Royal Society B: Biological Sciences* 283 (2016): 20161986 (<http://doi.org/10.1098/rspb.2016.1986>).

²² See Ricardo Rozzi, Francisca Massardo, and Alexandria Poole, "The '3Hs' (Habitats, Habits,

the late eighteenth century, the founder of utilitarianism, Jeremy Bentham, drew attention to the fact that this basic life pulse is common to all living things, including vertebrate and invertebrate animals.²³

(2) In the field of *environmental philosophy*, overcoming the vertebrate-centric taxonomic bias is urgently required to effectively confront the sixth mass extinction.²⁴ Meanwhile, the alarming extinction of invertebrates remains “invisible” to global culture whose animal imagery remains vertebrate-centered.²⁵ Visualizing the extinction of invertebrates is hindered because that these animals are little known, even to science. During the past two decades, 15,000 new invertebrate species have been described each year.²⁶ Furthermore, marine, freshwater, and terrestrial invertebrates are underrepresented on the IUCN Red Lists of Threatened Species. As a result, probably thousands of species are going extinct without even being known to have existed.²⁷ The invisible daily extinction of invertebrates, along with mosses, fungi, bacteria, and other little-perceived organisms, is generating a new era, called the *Necrocene*.²⁸ During this era the massive extinction of these small co-inhabitants will become visible to global society because of the devastating effects

Co-In-Habitants) of the Biocultural Ethic: A ‘Philosophical Lens’ to Address Global Changes in the Anthropocene,” in Luca Valera and Juan C. Castilla, eds, *Global Changes: Ethics, Politics and Environment in the Contemporary Technological World* (Dordrecht: Springer), pp. 153–70.

²³ Jeremy Bentham affirmed that “the day may come, when the rest of the animal creation may acquire those rights which never could have been withholden from them but by the hand of tyranny. . . . The time will come when humanity will extend its mantle over everything which breathes.” *An Introduction to the Principles of Morals and Legislation* (New York: Prometheus Books, 1988), p. 98. With this vision, the founder of utilitarian ethics aspired to extend the moral community to all living beings. However, until today the utilitarian school has remained focused on considering the capacity to feel pain and pleasure of a few animals.

²⁴ Among environmental philosophers, in the early 1980s, J. Baird Callicott noted, and criticized, the individual-centered approach of animal ethicists, and instead advocated a Leopoldian environmental ethic that demands moral consideration for the entire biotic community. See J. Baird Callicott, “Animal liberation: A Triangular Affair,” *Environmental Ethics* 2 (1980): 311–38. Today, Chilean philosopher Sandra Baquedano appeals to the sense of responsibility, underscoring the anthropogenic character of the sixth mass extinction. See Sandra Baquedano Jer, “Ecocide or Environmental Self-Destruction,” *Environmental Ethics* 41 (2019): 237–47.

²⁵ Claire Régnier et al., “Mass Extinction in Poorly Known Taxa,” *Proceedings of the National Academy of Sciences* 112 (2015): 7761–66; Nico Eisenhauer, Aletta Bonn, and Carlos A. Guerra, “Recognizing the Quiet Extinction of Invertebrates,” *Nature Communications* 10 (2019): 1–3.

²⁶ Pedro Cardoso *et al.*, “The Seven Impediments in Invertebrate Conservation and How to Overcome Them,” *Biological Conservation* 144 (2011): 2647–55; Tim R. New and Michael J. Samways, “Insect Conservation in the Southern Temperate Zones: An Overview,” *Austral Entomology* 53 (2014): 26–31.

²⁷ For freshwater, terrestrial, and marine invertebrates, see respectively, David L. Strayer, “Challenges for Freshwater Invertebrate Conservation,” *Journal of the North American Benthological Society* 25 (2006): 271–87; Justin Gerlach et al., “Prioritizing Non-marine Invertebrate Taxa for Red Listing,” *Journal of Insect Conservation* 18 (2014): 573–86; Francisco Sánchez-Bayo and Kris A. G. Wyckhuys, “Worldwide Decline of the Entomofauna: A Review of its Drivers,” *Biological Conservation* 232 (2019): 8–27.

²⁸ The term *Necrocene* was coined by environmental historian Justin McBrien, “Accumulating Extinction: Planetary Catastrophism in the Necrocene,” in Jason W. Moore, ed., *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism* (Oakland, Calif.: PM Press, 2016), 116–37.

their disappearance will generate in the alteration of the structure and functions of ecosystems.²⁹ Entomologist and conservationist Edward O. Wilson has warned:

If human beings were to disappear tomorrow, the world would go on with little change. . . . But if invertebrates were to disappear, I doubt that the human species could last more than a few months.³⁰

This is shocking. It should awaken in us an understanding of ecological interdependence among all living things, including humans, and the ethical imperative of making invertebrates and their mass extermination visible. The extinction of a species is rarely an isolated event. For example, parasite, commensal, and mutual species face the risk of co-extinction.³¹ Interactions between species in ecological networks can trigger extinction cascades.³² These cascades of co-extinctions should arouse in us a sense of mourning: A grief over the massive loss of small co-inhabitants, a distress over their extermination, and a social demand to care for them, including the habitats where their ecological interactions take place. To trigger this sense of responsibility and ethics of care, it is essential to leave behind the taxonomic chauvinism that has made invertebrates invisible.

In this paper I address the problem of *taxonomic chauvinism* with a dual objective. First, I evaluate the animals represented in the work of David Hume, whose empiricist philosophy decisively influenced modern science. As an empiricist, he contributed to overcome the Cartesian dualism between humans and other animals. However, the taxonomic diversity of the animals that constitute Hume's imagery and support his arguments has not been researched. The spectrum of animals represented in Hume's work could provide clues to understanding the origins of the "invisibility" of most animal species in global society's symbolic universe and material culture.

Second, I explore ways to liberate ourselves from taxonomic chauvinism. Toward this aim, I examine concepts that could support the inclusion of animal diversity in culture, political decisions, educational programs, and moral considerations. I start with David Hume and the work that Charles Darwin developed under his influence, and I culminate with my work in biocultural ethics. Hume and Darwin represent two founding figures of modern philosophy

²⁹ For the consequences of mass extinction, see Eric W. Sanderson, "How Many Animals do we Want to Save? The Many Ways of Setting Population Target Levels for Conservation," *BioScience* 56 (2006): 911–22.

³⁰ Edward O. Wilson, "The Little Things That Run the World: The Importance and Conservation of Invertebrates," *Conservation Biology* 1 (1987): 344–46, p. 345.

³¹ See Robert R. Dunn et al., "The Sixth Mass Coextinction: Are Most Endangered Species Parasites and Mutualists?" *Proceedings of the Royal Society B: Biological Sciences* 276 (2009): 3037–45; Robert K. Colwell, Robert R. Dunn, and Nyeema C. Harris, "Coextinction and Persistence of Dependent Species in a Changing World," *Annual Review of Ecology, Evolution, and Systematics* 43 (2012): 183–203.

³² Robert R. Dunn, "Modern Insect Extinctions, the Neglected Majority," *Conservation Biology* 19 (2005): 1030–36.

and science. The analysis of their works allows an identification and evaluation of possible historical causes of taxonomic biases that prevail in the twenty-first century, and through this diagnosis find solutions to overcome them. I conclude by introducing the concept of *co-inhabitants*, which counteracts taxonomic biases because it considers all animals and living things that share a habitat as co-inhabitants. It also counteracts reductionist approaches focused on individual animals (isolated from their environment) since it maintains that all animals co-constitute their habitats and life habits through interactions with other beings—including humans with their diverse material and symbolic-linguistic cultures. In this way, we can cultivate a biocultural ethic that protects the biosphere in a more comprehensive way.

TAXONOMIC BIAS, HUMAN CHAUVINISM, AND TAXONOMIC CHAUVINISM

For those unfamiliar with the concept of taxonomic bias, I begin with concise definitions of three interrelated terms.

Taxonomic bias refers to disparities in the degree of presence of different types of organisms (e.g., biological species or classes of animals) in cultural realms (e.g., ethics and biodiversity conservation) and in biophysical realms (e.g., from local marine, freshwater, or terrestrial ecosystems to the global biosphere). A society, or a discipline, would not be considered taxonomically biased if it incorporates in its discourses and other cultural expressions a diversity of animals in a way that reflects the diversity of each taxonomic group in given ecosystems or in the global biosphere. In contrast, a society or discipline would be considered taxonomically biased if it repeatedly *over-represents* some types of animals, such as large vertebrates, and *under-represents* “less charismatic” animals, such as small invertebrates, despite the latter exhibiting greater diversity of species, life habits, and ecological roles. This type of bias (which implies the cultural presence of a few kinds of animals and denies the presence of a majority of animals) has severely affected scientists since the late twentieth century until today. In 2002, to call attention to the under-representation of insects in scientific research, zoologists J. Alan Clark and Robert M. May published in the journal *Science* the essay “Taxonomic bias in conservation research.”³³ Until today, however, no similar analysis has been carried out on the problem of taxonomic bias in the field of philosophy. In the next section, I adapt the approach developed by Clark and May to the field of philosophy in order to analyze the animals represented in Hume's work, because a taxonomic bias in philosophy would have consequences for both animal ethics and sciences, particularly in relation to the conservation of biodiversity.

Human chauvinism is an extreme case of taxonomic bias, where the focus is

³³ J. Alan Clark and Robert M. May, “Taxonomic Bias in Conservation Research,” *Science* 297 (2002): 191–92.

exclusively centered on *Homo sapiens*. This type of chauvinism has even considered only a few members of our own species; for example, the exclusion of women exerted by patriarchies or of ethnic, racial, and socioeconomic groups exerted by colonial elites or by contemporary racist movements such as “white supremacy.” The term chauvinism derives from the French word *chauvinisme*, coined in reference to Nicholas Chauvin, a French soldier who idolized Napoleon and his Empire long after its demise. Chauvin was ridiculed in 1831 by the brothers Theodore and Hippolytus Cogniard in their popular play *La Cocarde Tricolore*, to criticize excessive patriotism and distorted belief in the superiority of one’s own “empire.” During the twentieth century, the term was adopted by the feminist movement and by decolonial thinkers to criticize patriarchal “male chauvinism” and “racial chauvinism” associated with forms of nationalism.³⁴

In 1973, the term *human chauvinism* was used for the first time in the field of environmental ethics by Richard Routley, who criticized the arbitrary taxonomic bias that privileges the interests of the human species over those of other species.³⁵ Routley’s concept is similar to that of *speciesism* coined a few years earlier by Richard Ryder,³⁶ who established a parallel with racism to criticize:

[T]he widespread discrimination that is practiced by man [sic] against other species . . . Speciesism and racism are both forms of prejudice that are based upon appearances—if the other individual looks different then he is rated as being beyond the moral pale. . . . Speciesism and racism both overlook or underestimate the similarities between the discriminator and those discriminated against and both forms of prejudice show a selfish disregard for the interests of others.³⁷

In 1975, Peter Singer popularized the concept of *speciesism* in his book *Animal Liberation*, defining it as “a prejudice or attitude of bias in favor of the interests of members of one’s own species and against those of members of other species.”³⁸ Although the term *speciesism* has been used more often than *human chauvinism*, the latter is more expressive regarding the arrogance of colonial exclusion, within and beyond the human species. In 1983, Tom Regan used this term in his book

³⁴ For a critical history of the concept, see Hannah Arendt, “Imperialism, Nationalism, Chauvinism,” *The Review of Politics* 7 (1945): 441–63; Gerard de Puymege, “Chauvin and Chauvinism: In Search of a Myth,” *History and Memory* 6 (1994): 35–72.

³⁵ Richard Routley introduced the term *human chauvinism* in “Is There a Need for a New, an Environmental Ethic?” *Proceedings of the Fifteenth World Congress of Philosophy* 1 (1973): 205–10. In collaboration with Val Routley (later Val Plumwood), they further developed this concept to criticize the “favouritism toward humans in theories (or opinions) on the allocation of value, or satisfaction of preferences,” p. 65, in Roger Fjellstrom, “Specifying Speciesism,” *Environmental Values* 11 (2002): 63–74.

³⁶ Richard Ryder, *Animals, Men and Morals: An Inquiry Into the Maltreatment of Nonhumans* (New York: Taplinger Publishing Co., 1972). See also Ryder’s webpage: <http://www.62stockton.com/richard/index.html>.

³⁷ Richard Ryder, *The Victims of Science* (London: Davies Pointer, 1975), p. 16.

³⁸ Peter Singer, *Animal Liberation* (New York: New York Review/Random House, 1975), p. 7.

In Defense of Animal Rights to emphasize that (like all forms of chauvinism) it involves arbitrary denial or an inability to recognize in members of other groups (gender, ethnicity, nation, or biological species) those capacities considered important or admirable in oneself or in the members of the group to which one belongs. Concisely, Regan defined human chauvinism as “*not* to attribute [human] characteristics to those nonhuman [animals] who [do] have them and to persist in the conceit that only humans do.”³⁹

Taxonomic chauvinism constitutes a special case of taxonomic bias. When scientists or other researchers disproportionately focus on certain groups of animals, such as warm-blooded or endothermic vertebrates, and arbitrarily dismiss other groups of animals, such as cold-blooded or ectothermic vertebrates, their taxonomic bias has been viewed as a type of chauvinism because it expresses an excessive preference for members of the most human-like phylogenetic classes. In 2002, conservation biologists Xavier Bonnet, Richard Shine, and Olivier Lourdais coined the term taxonomic chauvinism in order to criticize research efforts that have arbitrarily focused only on “popular organisms,” such as birds and mammals, and have hindered the study of “unpopular organisms,” such as snakes and toads. Bonnet and collaborators concluded that these are *unconscious biases*, which affect science development and publication processes.⁴⁰ I suspect these biases may have cultural roots. It is necessary to examine these roots and to consciously criticize them in order to rectify taxonomic chauvinism.

In the next section, I investigate one possible cultural root of these taxonomic biases. By analogy to Bonnet et al., I propose that when philosophers disproportionately focus their attention on mammals and omit other groups of animals in their considerations or examples, their taxonomic bias can be considered a type of chauvinism because it expresses an excessive preference by the members of the phylogenetic class to which we humans belong: *Mammalia*.⁴¹

The origins of taxonomic chauvinism could be found in modern philosophy. This seems to be the case with David Hume. A bias in his work would seem paradoxical since his empiricist endeavor should have guided him towards an unbiased representation of animal diversity. Resolving this possible paradox in Hume's work would contribute to a more precise diagnosis of the historical origins of the problem. This also would favor a reinterpretation of Hume's thought and a reevaluation of his influence in nineteenth century sciences. Until now, there are no quantitative nor qualitative analyses of the animal imagery included in the works of philosophers. First, I try to resolve the apparent contradiction between the generality of Hume's

³⁹ Tom Regan, *The Case for Animal Rights*. (Third edition, Berkeley: University of California Press, 2004), p. 31.

⁴⁰ Xavier Bonnet, Richard Shine, and Olivier Lourdais, “Taxonomic Chauvinism,” *Trends in Ecology and Evolution* 17 (2002): 1–3.

⁴¹ Mammals are unique not only for having mammary glands but also for having a stratified cerebral neocortex with six layers of neurons.

philosophical arguments and the particularity of the images of animals that prevail in his texts. A reevaluation of the taxonomic scope of the arguments of a central pillar of modern philosophy could lead to conceiving theoretical and practical solutions to end taxonomic chauvinism today.

TAXONOMIC BIASES IN HUME'S WORK

In his philosophical enterprise to understand human nature, Hume stands out among modern philosophers because he directs his attention to nonhuman animals in the search for common natural processes, which include reason, passions, and sentiency. In 1730 he published *A Treatise of Human Nature* that included an independent section on the "reason of animals," where he stated that

No truth appears to be more evident, than that beasts are endowed with thought and reason as well as men. The arguments are in this case so obvious, that they never escape the most stupid and ignorant.⁴²

Hume was not only an empiricist, but also a skeptic who questioned the philosophical concept of necessity. Therefore, his definitive tone, "no truth seems to be more evident," to state his naturalist thesis ascribing reason to nonhuman animals is striking. His tone is also deliberately provocative, since he was aware that his thesis markedly contrasted with the rationalist philosophy of Rene Descartes who attributed the faculty of reason only to humans. Hume further elaborates his analysis of nonhuman animal's reason in *An Enquiry Concerning Human Understanding* published in 1748.⁴³ Additionally, he extends the similarities between human and nonhuman animal nature to the origin of passions. In book two of the *Treatise*, he dedicates two sections to it: *Of Pride and Humility of Animals* in part one and *Of Love and Hatred of Animals* in part two. In this way, in the first half of the eighteenth century, Hume challenged rationalist philosophy that denied the ability to think and feel of nonhuman animals, and undertook the task of founding a new science that conceives of human and nonhuman animals as part of the same natural order. Even "the most stupid and ignorant" should leave behind Cartesian dualistic distinctions between humans and the "rest of animals." In his empiricist reformulation of modern philosophy, Hume built a bridge between human and nonhuman animals regarding their capacities to reason and to feel emotions.

However, does Hume's bridge include *all* animals, or only some, in their capacity to reason and feel? Which animals are mentioned by Hume? Is there a taxonomic

⁴² David Hume, *A Treatise of Human Nature*, ed. L. A. Selby-Bigge and P. H. Nidditch. (Oxford: Clarendon Press, 1978), p. 176.

⁴³ David Hume, *Enquiry Concerning Human Understanding*, ed. L. A. Selby-Bigge and P. H. Nidditch (Oxford: Clarendon Press, 1976).

bias in his mental images of animals that favors a few groups of animals? Will Hume's potential taxonomic bias coincide with that which persists in the animal imagery that prevails in the global culture of the twenty-first century? To answer these questions, I reviewed all examples of animals given by Hume in his works, and began by distinguishing the two most general categories of animals: vertebrates and invertebrates.⁴⁴

In David Hume's complete works, I found 526 mentions of animals. Among them, ninety-seven percent correspond to vertebrates, and only three percent to invertebrates (Figure 1.A).⁴⁵ To assess taxonomic bias, I compared the former percentages with the proportions of vertebrate and invertebrate species known to science (Figure 1.B). Under this criterion, Hume's texts contain such a marked taxonomic bias toward vertebrates that they evoke a mirror image of animal diversity in the biosphere: ninety-seven percent of the animal species described by science are invertebrate, and only three percent correspond to vertebrates (Figure 1.B).⁴⁶

To analyze Hume's taxonomic bias more precisely, I used higher resolution categories of animal classification. Vertebrates and invertebrates are classified in phyla.⁴⁷ Today scientists recognize thirty-four animal phyla. Among them, thirty-three phyla include solely invertebrates and only one phylum, Chordata, includes both invertebrates and vertebrates. This indicates that the Animal Kingdom is richer in invertebrates than in vertebrates. But in his examples of animals, Hume mentions representatives of only two (of thirty-three!) invertebrate phyla: *Arthropoda* (insects and arachnids) and *Mollusca* (gastropods and bivalves). When he refers to the phylum *Chordata*, his examples are restricted to vertebrates (fishes, amphibians, birds, and mammals); allusions to invertebrate *Chordata* (such as sea squirts and amphioxys or lancelets) are absent.⁴⁸ Consequently, Hume mentions representatives of less than ten percent of the total animal phyla inhabiting planet Earth. This denotes not only a taxonomic bias, but also that the animal diversity present in the "animal imagery" of modern philosophy has been greatly reduced.⁴⁹

⁴⁴ To review all the specific examples of animals that Hume mentions in his works, I used digital search tools for the *Past-Masters CD-Rom—Complete Works of David Hume* (InteleX Corporation, 1992).

⁴⁵ I identified 526 mentions of animals in Hume's complete works; 512 corresponded to vertebrates and only fourteen to invertebrates. I presented a list of all animals mentioned by Hume in Ricardo Rozzi, "Biocultural Homogenization in Modern Philosophy: Hume's Noble Oyster," in Rozzi et al., *From Biocultural Homogenization to Biocultural Conservation*, pp. 185–204.

⁴⁶ For a summary of described species, see Camilo Mora et al., "How Many Species are There on Earth and in the Ocean?" *PLoS Biology* 9 (2011): e1001127. In 2019, the International Union for Conservation of Nature updated the number of described animal species to a total of 1,571,454, of which over a million and half are invertebrates (IUCN: <https://www.iucnredlist.org/resources/summary-statistics>).

⁴⁷ Zhi-Qiang Zhang "Animal Biodiversity: An Update of Classification and Diversity in 2013," *Zootaxa* 3703 (2013): 5–11.

⁴⁸ See Rozzi, "Hume's Noble Oyster."

⁴⁹ In another essay, I discuss the consequences that this severe reduction of animal diversity in Hume's works might have for biocultural homogenization, a process that began with modernity and colonialism. Today, biocultural homogenization represents a major indirect driver of global socio-environmental change. See Rozzi, "Hume's Noble Oyster."

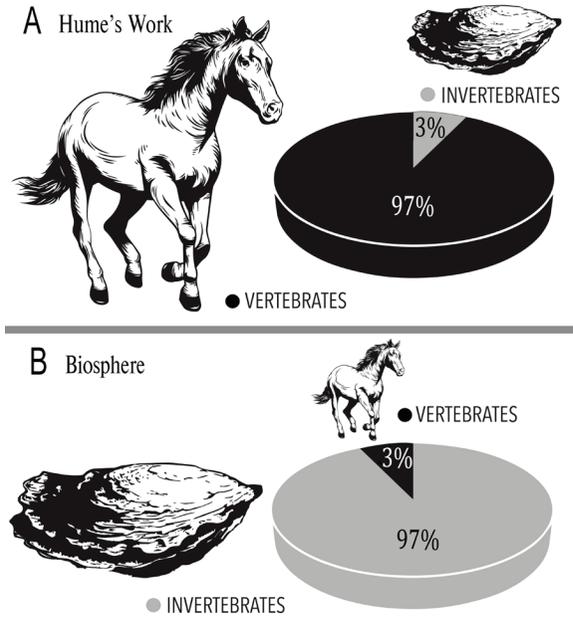


Figure 1. A. Relative percentages of vertebrates (such as a horse) and invertebrates (such as an oyster) calculated on the basis of all the examples of animals provided by Hume in his published works. B. Relative percentages of vertebrates and invertebrates calculated on the basis of all species that have been scientifically described in the world.

The taxonomic bias that favors the small group of vertebrates is also reflected in the names that Hume uses to refer to these animals. For invertebrates he employs generic names such as “insects,” which correspond to the taxonomic class *Insecta*, and in a few occasions uses slightly less generic names such as “oysters,” which refers to two broad taxonomic ranks: class *Bivalvia* and order *Ostreida*. In contrast, for vertebrates, he employs names that distinguish animals with the highest taxonomic resolution: species (e.g., dog), types (e.g., hound), and breeds (e.g., greyhound).

To detect patterns of taxonomic bias by identifying animals with more precision, I used a taxonomic rank with higher resolution than the coarse taxonomic rank of phylum. I managed to apply the taxonomic rank of “class” to compare both invertebrate and vertebrate types of animals mentioned by Hume (Figure 2). This analysis revealed two new taxonomic biases in Hume’s work: over ninety percent of all the nonhuman animals mentioned by him belong to only two classes: *Aves* (birds) and *Mammalia* (mammals); moreover, mammals alone account for seventy-five percent of his animal examples!

The mammal-centric taxonomic bias in Hume's work appears even more disproportionate when considering the proportions of species described by science for each animal class: the class of mammals includes only 0.3 percent of all known animal species (Figure 2). This means that in Hume's work mammals are over-represented 250 times!⁵⁰ The overestimation for the combined mammal and bird classes is 100 times, since these two classes include only 0.9 percent of all animal species described by science.⁵¹ The most diverse class of animals is *Insecta*.⁵² With over one million species, insects account for circa ninety percent account for of the species known to science today. In contrast, the class *Insecta* accumulates only eleven examples in Hume's works.

As mammals constitute the majority of animal examples given by Hume, next I assess if there is any taxonomic bias toward particular species within this class. Toward this aim, I examined which species of mammals are mentioned by Hume and how many times each is cited. I found 394 allusions to mammals, encompassing forty-four taxa (considering species and breeds).⁵³ However, over half of these entries refer to a single species: the horse (Figure 3). In the section *On the Origin of Ideas* at the beginning of the Enquiry Concerning Human Understanding, in his first mention of an animal, Hume portrays a horse, affirming that

A virtuous horse we can conceive; because, from our own feeling, we can conceive virtue; and this we may unite to the figure and shape of a horse, which is an animal familiar to us.⁵⁴

Horses are the most familiar animals for Hume, and they play a special role in the inspiration for his analogical thinking between human and nonhuman animals. Just like humans, horses cannot only be virtuous, but also can be "a vicious horse that throws his rider" as Hume portrays in another work.⁵⁵ In several of his 220 mentions of horses, Hume exercises his analogical thought with descriptive detail. It amazes me, and worries me, that in the work of this great philosopher, who builds the conceptual foundations for modern empirical sciences, more than half of all his examples of mammals are concentrated on a single animal species!

⁵⁰ I estimated an "overrepresentation rate" by dividing the relative percentages of mammals mentioned by Hume (HM) and of mammal species described worldwide (DM): (75% HM) / (0.3% DM) = 250 (overrepresentation rate).

⁵¹ I estimated this overrepresentation by dividing the relative percentages of animals mentioned by Hume that belong to the classes *Mammalia* and *Aves* (HMA) and of species described worldwide that belong to these two classes (DMA): (90.3% HMA) / (0.9% DMA) = 100.3 (overrepresentation rate).

⁵² See Arthur D. Chapman, "Numbers of living species in Australia and the world." (Canberra, Australia: Report for the Australian Biological Resources Study [ABRS], 2009), pp. 1–78; Camilo Mora et al., "How many species are there on Earth and in the ocean?" *PLoS Biology* (2011) 9: e1001127.

⁵³ For a detailed list of all mammals mentioned by Hume, see Rozzi, "Hume's Noble Oyster."

⁵⁴ Hume, *Enquiry Human Understanding*, p. 19.

⁵⁵ In *Of Impudence and Modesty*, p. 381. This essay was written in 1741, but was published posthumously in *Essays Moral, Political, and Literary by Hume*, vol. II, ed. Thomas Hill Green and Thomas Hodge Grose (London: London Longmans, Green, Ani Co., 1875).

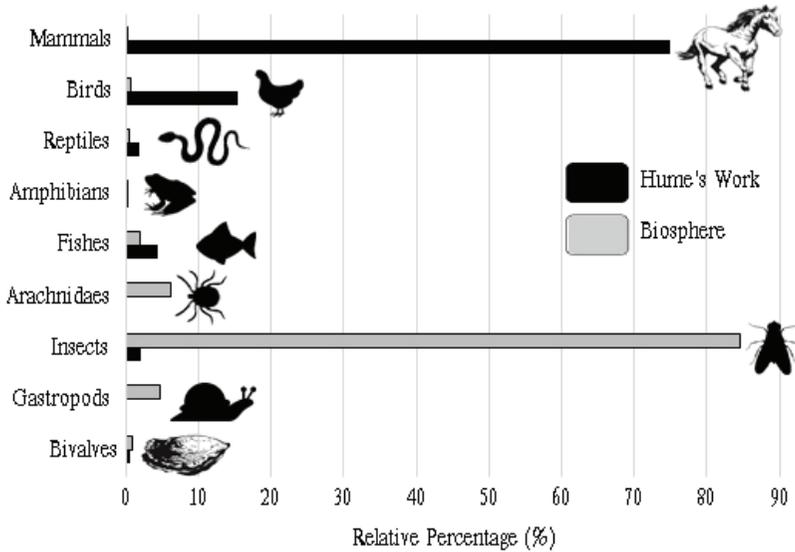


Figure 2. Relative percentages of types of animals of different taxonomic classes. Grey bars illustrate the proportion of all scientifically described species that belong to each class. Black bars show the proportion of examples given by Hume.

The disproportionate taxonomic bias in Hume’s animal imagery can lead to distortions in the interpretation of his thinking, as I will discuss later. After the horses, the most frequently named species is the dog. This species constitutes eleven percent of Hume’s mammalian examples (Figure 3). Just like horses, dogs are used by Hume to develop his analogical argument about sentience and reason in human and nonhuman animals. For Hume, dogs are capable of experiencing and inferring! For instance, in the section *Of the Reason of Animals* of his *Enquiry Concerning Human Understanding*, he asks himself:

Is it not *experience*, which renders a dog apprehensive of pain, when you menace him, or lift up the whip to beat him? Is it not even *experience*, which makes him answer to his name, and *infer*, from such an arbitrary sound, that you mean him rather than any of his fellows, and intend to call him, when you pronounce it in a certain manner, and with a certain tone and accent?⁵⁶

Two other mammal species capture his attention recurrently: sheep and cows (Figure 3). Combined they account for about fifteen percent of the mammalian

⁵⁶ Hume, *Enquiry Concerning Human Understanding*, p. 105 (emphasis added).

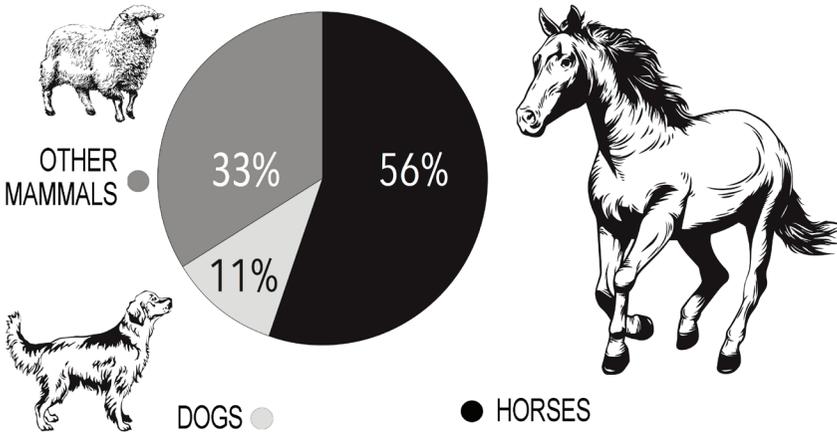


Figure 3. Relative percentages of mammal species most frequently mentioned by Hume. Other mammals include sheep (seven percent), cows (seven percent), and other domestic and wild animals.

examples. Consequently, the types of animals that are most frequently mentioned by Hume are domestic. This represents a type of taxonomic bias that is not only biological, but also cultural. Hume's animal imagery has a marked taxonomic bias not only toward vertebrates, especially mammals, but also toward domestic animals.

Taxonomic biases favoring vertebrates, mammals, and domestic animals could be an expression of the influence that British culture had on Hume. During the eighteenth century, vertebrate species prevailed in natural sciences,⁵⁷ with a particular emphasis on mammals in the early biomedical sciences.⁵⁸ In Britain, population grew explosively and cities expanded rapidly.⁵⁹ Hence, citizens encountered mostly domestic animals. Dogs were popular as companion animals in urban society, so much so that in 1796 a British dog tax was established.⁶⁰ Gentlemen raised horses, carriages were moved by animals, and in the nineteenth century *Horse*

⁵⁷ Regarding the preponderance that vertebrates had in eighteenth-century sciences, see Peter Bowler, *The Norton History of the Environmental Sciences* (New York: WW Norton and Company, 1993).

⁵⁸ See Nuno Henrique Franco, "Animal Experiments in Biomedical Research: A Historical Perspective," *Animals* 3 (2013): 238–73.

⁵⁹ E. Anthony Wrigley, "Urban Growth and Agricultural Change: England and the Continent in the Early Modern Period," in Peter Borsay, ed., *The Eighteenth-Century Town: A Reader in English Urban History* (New York: Routledge, 2013), pp. 47–90.

⁶⁰ John D. Blaisdell "The Rise of Man's Best Friend: The Popularity of Dogs as Companion Animals in Late Eighteenth-Century London as Reflected by the Dog Tax of 1796," *Anthrozoös* 12 (1999): 76–87.

and *Hound* was launched as a weekly publication that has remained active until today, representing the oldest equestrian magazine in Britain.⁶¹

These contextual historical factors, nonetheless, should not divert us from the gravity of the implications of Hume's taxonomic biases. By focusing on only four vertebrate-mammal-domestic species, Hume omits most of the animal species known to science. This omission might be associated with broader cultural and philosophical contexts of taxonomic biases in the animal-imaginaries that also had an influence on the scientific community.

TAXONOMIC BIASES IN TWENTY-FIRST CENTURY CONSERVATION BIOLOGY SCIENCES

The problem of taxonomic biases in favor of vertebrates reaches beyond Hume's work in eighteenth century philosophy. Taxonomic biases affect contemporary sciences; paradoxically, even conservation biologists experience this problem. For example, between 1987 and 2001, eighty-six percent of the publications on animal conservation focused on vertebrates and only fourteen percent on invertebrates.⁶² Beyond conservation, ethological sciences also have been biased toward research on vertebrate species. Between 2000 and 2015, over seventy percent of papers published in the journal *Animal Behaviour* were dedicated to vertebrates, with a marked preference for birds and mammals.⁶³ Canadian ethologist Malcolm Rosenthal warns that

[E]thology requires a taxonomically diverse foundation of work . . . if we restrict the bulk of our research effort to a subset of taxa, we risk drawing conclusions that are invalid at broader scales by assuming that the predominant behaviours in that subset of taxa are universal.⁶⁴

In twenty-first century sciences, not only publications are skewed toward vertebrates, but also funding. In 2006 and 2007, eighty-three percent of the funds allocated for animal ecology by the United Kingdom National Environmental Research Council (NERC) were assigned to research on vertebrate species. During the same period, the U.S. National Science Foundation (NSF) allocated seventy-two percent of its funding for animal ecology to research associated with

⁶¹ See Susanna Hedenborg and Manon Hedenborg White, "Changes and variations in patterns of gender relations in equestrian sports during the second half of the twentieth century," *Sport in Society* 15 (2012): 302–19.

⁶² To evaluate taxonomic bias in conservation biology research, J. Alan Clark and Robert M. May reviewed fifteen years of issues (1987–2001) of the two leading journals in this field: *Conservation Biology* (United States) and *Biological Conservation* (United Kingdom), analyzing more than 2,700 indexed articles. See "Taxonomic Bias in Conservation Research," *Science* 297 (2002):191–92.

⁶³ Malcolm F. Rosenthal et al., "Taxonomic bias in animal behaviour publications" *Animal Behaviour* 127 (2017): 83–89.

⁶⁴ *Ibid.*, p. 83.

vertebrates.⁶⁵ Therefore, the problem of taxonomic biases in the animal-imaginary does not represent a problem that is limited to Hume's philosophical works. It is a widespread phenomenon that has influenced other cultural realms, including conservation sciences even in our days.

As mentioned above, the term *taxonomic chauvinism*, coined by conservation biologists at the beginning of twenty-first century,⁶⁶ called attention to the problem that most researchers restrict their investigations to our closest animal relatives. Bonnet and collaborators examined over a thousand articles on vertebrates published between 1992 and 2000 in nine leading journals on ecology, ethology, and evolution, and found that seventy-one percent of the publications focused on birds and mammals; a disproportion that resonates with what I detected in Hume's work. Therefore, contemporary sciences perpetuates the pattern of taxonomic chauvinism.

In summary, in this first section, I demonstrated quantitatively that the animal imagery in modern philosophy is tinged with taxonomic chauvinism (at least in a central philosopher for modern empiricism). Mammals or birds represent less than one percent of the species of the Animal Kingdom, but they constitute over ninety percent of the examples in Hume's work. The "rest of animals," the majority, i.e., cold-blooded vertebrates (ectotherms: amphibians, reptiles, and fishes) and invertebrates are omitted or under-represented. From a philosophical and scientific point of view, this taxonomic bias that has continued into the twenty-first century is problematic. It limits both moral consideration and conservation actions for the majority of animal species at a time when we face the sixth wave of mass extinction (the Anthropocene extinction).⁶⁷ How can we contribute to repairing the reduction of animal imaginary in philosophy and science, which represents an indirect driver of the current global biodiversity crisis by "making invisible" the majority of animal species? How can we stop vertebrate-centrism and taxonomic chauvinism in order to achieve a more equitable appreciation for all species with which we co-inhabit the planet?

FIRST ANTIDOTE: HUME'S "NOBLE OYSTER"

To address the taxonomic chauvinism detected in Hume's animal imagery, I identified a "conceptual antidote" in the work of this multifaceted philosopher. In the sections of the *Treatise* and the *Enquiry* dedicated to animal reason, Hume provides examples of animals that are mostly vertebrates. However, when he makes

⁶⁵ Simon R. Leather examined data from NERC and NSF in 2006 and 2007. See "Taxonomic Chauvinism Threatens the Future of Entomology," *Biologist* 56 (2009): 10–13.

⁶⁶ See Bonnet et al. "Taxonomic Chauvinism."

⁶⁷ See William J. Ripple et al., "World Scientists' Warning to Humanity: A Second Notice," *BioScience* 67 (2017): 1026–28; Rodolfo Dirzo et al., "Defaunation in the Anthropocene," *Science* 345 (2014): 401–06.

general statements about reason and sentience, he expresses them in such a way that he extends both capacities to the entire animal kingdom. For instance, when he introduces the topic of animal reason in Book I of the *Treatise*, he writes:

We are conscious, that we ourselves, in adapting means to ends, are guided by reason and design, and that 'tis not ignorantly nor casually we perform those actions, which tend to self-preservation, to obtaining pleasure, and avoiding pain. When therefore we see *other creatures, in millions of instances*, perform like actions, and direct to like ends, all our principles of reason and probability carry us with an invisible force to believe the existence of a like cause. *'Tis needless in my opinion to illustrate this argument by the enumeration of particulars.* . . . The resemblance betwixt the actions of animals and those of men is so entire in this respect, that *the very first action of the first animal we shall please to pitch on*, will afford us an incontestable argument for the present doctrine.⁶⁸

Hume asserts that examples are *needless* to prove that animals share an analogous cause with humans regarding “obtaining pleasure, and avoiding pain.” The analogy between human and nonhuman animal reason seems such a general phenomenon that the “very first action of the first animal” we may look at would confirm that both are guided by reason. Therefore, Hume’s analogical thinking could be applied to human and nonhuman animals, vertebrates and invertebrates.

Hume also ascribes passions to nonhuman animals. In Book II of the *Treatise*, he concludes that “All these are evident proofs, that pride and humility are not merely human passions, but extend themselves over the whole animal creation.”⁶⁹ To analyze the taxonomic scope of this statement, let us look at the three examples of invertebrates included in the *Treatise*. The first two refer to an insect and a mite, and are included in the section on “*the infinite divisibility of our space and time*,” where he says nothing about their capacity for reason and sentience. In contrast, the third example of an invertebrate is an oyster that Hume mentions at the end of the *Treatise* to illustrate the case of an animal with the most basic level of biological organization that has the “potential for having a mind”:

We can conceive a thinking being to have either many or few perceptions. Suppose the mind to be reduced even below the life of an oyster. Suppose it to have only one perception, as of thirst or hunger.⁷⁰

This passage is a suggestive statement by Hume: the oyster, an animal that lacks any obvious resemblance to the human body, even less to human behavior, is still considered as an animal having a mind. The oyster is understood as a thinking or

⁶⁸ Hume, *Treatise*, p. 176 (emphasis added).

⁶⁹ *Ibid.*, p. 326.

⁷⁰ *Ibid.*, p. 634.

sentient animal: What a surprise for British society accustomed to interacting with this invertebrate mostly at their dinner tables!

Hume is radical because nothing stops him in his empiricist project to conceive a common thread that links all animals. He connects the processes of perception and behavior among diverse animals, by affirming that

There are also instances of relation of impressions, sufficient to convince us, that there is a union of certain affections with each other in the inferior species of creatures as well as in the superior, and that their minds are frequently conveyed through a series of connected emotions.⁷¹

Hume conceives a hierarchy among animals, but he proposes that even the perceptions of invertebrates—such as the oyster’s thirst or hunger—rely on processes that operate in kindred ways among higher animals, such as vertebrates—humans included. The elegance of the argument leads to the conclusion that an oyster adapts “means to ends” struggling for self-preservation, and “to obtain pleasure and avoid pain.”⁷² The oyster is “guided by reason and design” in a manner comparable to birds or mammals.

The radicalism of Hume’s analogical argument, however, was not well understood by some ethologists of the nineteenth and twentieth centuries. The disproportion of examples of well-known vertebrates, such as horses or dogs included in the *Treatise* and the *Enquiries*, would have led to misunderstanding the scope of his argument. For example, in 1979 William Thorpe⁷³ stated that

David Hume (1711–76) held it be self-evident that the beasts, as brothers of men, were endowed with thought and reason.⁷⁴ . . . Naturalists had by that time [the last quarter of 19th century] generally accepted the conclusion of David Hume’s *A Treatise of Human Nature* that *higher animals* use the same principles of intel [*sic*].⁷⁵

Thorpe acknowledges the relevance of Hume for the origins of ethology, but restricts the extension of reason to beasts or “higher animals” (vertebrates). This taxonomic bias mutilates the refinement of Hume’s argument. Thorpe gave greater weight to the abundance of references to higher vertebrates, than to the generality of Hume’s analogical argument that can be traced throughout the whole animal kingdom. Without further analysis, Thorpe excluded the invertebrates off the “ethological community of animals.” In this way, toward the end of the twentieth century, oysters ceased to be

⁷¹ *Ibid.*, p. 327.

⁷² *Ibid.*, p. 140.

⁷³ William Homan Thorpe (1902–1986) was an influential British ethologist. A zoologist, particularly an ornithologist, he was professor of ethology at Cambridge University and became the first director of the Cambridge Ornithological Field Station in 1950. Along with Nikolaas Tinbergen, Patrick Bateson, and Robert Hinde, Thorpe contributed to the establishment of behavioral biology in Britain, where he introduced Konrad Lorenz’s ethological research.

⁷⁴ William Homan Thorpe, *The Origins and Rise of Ethology* (London: Heinemann Educational Books, 1979), p. 14.

⁷⁵ *Ibid.*, p. 20.

conceived as capable of suffering pain and pleasure, and even less as “thinking beings having either many or few perceptions,” as Hume sagaciously thought two centuries earlier. Thorpe's taxonomic amputation is problematic because of its consequences for scientific studies as well as for the moral consideration of invertebrates by some animal ethicists, as I show later.

Fortunately, other scientists in search of the evolutionary origin of all living beings (including humans), captured the relevance of Hume's argument. It will be Charles Darwin who will dissolve the conceptual discontinuities between the nature of human and nonhuman animals, and empirically substantiate Hume's thesis: “A theory on the functioning of human understanding will acquire more authority if tested for nonhuman animals.”⁷⁶

SECOND ANTIDOTE: HUME'S INFLUENCE ON DARWIN'S EVOLUTIONARY THINKING

To tackle taxonomic chauvinism in the scientific community, I identified a strong “conceptual antidote” in the work of the founder of modern evolutionary sciences, who built his theory inspired, in part, by Hume's philosophical foundations. The influence of the philosopher was introduced into the family of Charles Darwin through his grandfather Erasmus. In his first unequivocal evolutionary pronouncement, Erasmus cited Hume's posthumous work *Dialogues on Natural Religion*.⁷⁷ In his main book *Zoonimia*, Erasmus wrote in 1784

[T]he late Mr. David Hume . . . concludes that the world itself might have been generated rather than created; that is, it might have been gradually produced from very small beginnings, increasing by the activity of its inherent principles, rather than by a sudden evolution of the whole by the Almighty fiat.⁷⁸

This passage evokes the thoughts of Philo, Hume's skeptical character in the *Dialogues*, when he announces the following “discovery”:

[I]n examining the ancient system of the soul of the world, there strikes me, all of a sudden, new idea, which, if just, must go near to subvert all your reasoning. . . . If the universe bears a greater likeness to animal bodies and to vegetables, than to the works of human art, it is more probable that its cause resembles the cause of the former than that of the latter, and its origin ought rather to be ascribed to generation or vegetation than to reason or design.⁷⁹

⁷⁶ Hume, *Enquiry Concerning Human Understanding*, p. 104.

⁷⁷ See James Harrison, “Erasmus Darwin's view on evolution,” *Journal of the History of Ideas* 32 (1971): 247–64.

⁷⁸ Erasmus Darwin, *Zoonimia; or the Laws of Organic Life* (New York: AMS Press, 1974), pp. 245–46. First published in London: J. Johnson, in St. Paul's Church-Yard, 1794.

⁷⁹ David Hume, *Dialogues Concerning Natural Religion*, ed. N. Kemp Smith (New York: Social Sciences Publishers, 1948), p. 176.

Via Philo, the “late Mr. Hume” planted the germ for the evolutionary theory in Darwin’s family. However, Charles was reluctant to acknowledge Hume in his published work—a footnote in *The Descent of Man* constitutes his only public citation of this philosopher. This could be associated with a well-established aspect of Darwin’s personality. He avoided publicizing his controversial considerations on human evolution and delayed as long as possible his publication of *The Descent of Man*.⁸⁰ In fact, this publication revolted Victorian society far more than the *Origin of Species*. Darwin was aware of the theological implications of his theory, and wanted to elude further controversies, which could have occurred by referring to the atheist philosopher.⁸¹

In contrast to his public writing, Charles Darwin did not hesitate to prolifically quote Hume in his personal notebooks.⁸² In August 1838, just two weeks before coming up with his fundamental evolutionary mechanism of natural selection, Darwin wrote in his notebooks that “Hume’s essay on Human Understanding [is] worth reading.” The temporal contiguity between Darwin’s readings of Hume and his conception of the evolutionary theory is astonishing.

During Spring 1839, Darwin continued working on the formulation of his evolutionary theory and he added several notes on Hume that refer to *The Reason of Animals* and *Dialogues Concerning Natural Religion*.⁸³ In the latter, Philo (the skeptical character of Hume) states that “the world might have been generated rather than created.” Thus, this statement by the philosopher would have inspired the idea of evolution in both Darwin’s grandfather and the grandson. Charles, however, will go much further.

Darwin’s notebooks illustrate how Hume’s *Dialogues* provided an argument to *refute* any creationist theory, which lacked any empirical evidence that could support the analogy between the creation of a house and the creation of the universe.

⁸⁰ John T. Bonner and Sir Robert M. May (1981) develop this point in their introduction to *The Descent of Man* by Charles Darwin.

⁸¹ Hume’s Scottish contemporaries were heavily involved in the general British debate between “religious philosophers” and “speculative atheists.” Hume was called by his adversaries “The Great Infidel.” In this context, as historian William Huntley surmised, “Darwin (and Lyell) did not wish to introduce a host of unwanted implications that the mentioning of the name Hume would suggest to some readers.” In “David Hume and Charles Darwin,” *Journal of the History of Ideas* 33 (1972): 457–470, p. 465.

⁸² Hume is the most cited philosopher in Charles Darwin’s notebooks. A summary of all notes on Hume in Darwin’s personal notebooks is presented in Ricardo Rozzi, “Hume’s Noble Oyster.” In *Darwin and the Emergence of Evolution Theories of Mind and Behavior* (Chicago: University of Chicago Press, 1989), historian Robert Richards described David Hume as “Darwin’s favorite philosophical author,” (p. 109). In *The Young Darwin and His Cultural Circle: A Study of Influences* (Dordrecht: D. Reidel Pub. Co. Philosopher, 1978), philosopher Edward Manier quantitatively analyzed the number of times that Darwin mentioned different philosophers in his notebooks. Hume ranked first with nine quotes, followed by five other philosophers: August Comte (eight quotes), David Hartley (six quotes), Dugald Stewart (six quotes), William Paley (two quotes), and Immanuel Kant (one quote).

⁸³ These notes are added in his notebooks M and N, dedicated to the theme “Man, Mind and Materialism.”

Complementarily, Hume also contributed to Darwin his analogical argument to *affirm* that “similar effects arise from similar causes,” from which it is derived that a more justifiable explanation is that “the universe was generated instead of created.”

This naturalistic explanation, however, will require an additional task that remains pending for nineteenth century science. At the end of the *Dialogues*, Demea (a theistic character) challenged Philo's thesis, asking him: “If you affirm that the universe was generated instead of created, what data do you have for such extraordinary conclusions?”⁸⁴ Philo admits that until now “I have no data to establish any system of cosmogony.”⁸⁵ The *Dialogues* are over, Hume passes away, and he left this task pending: to collect the data on which the naturalistic thesis of generation of the universe could be based.

This task was assumed by naturalist Charles Darwin sixty years after Philo's words were written. In his personal notebook, Darwin noted in 1838 that

We can allow “satellites,” planets, suns, universes, nay whole systems of universes “of man” to be governed by laws, but the smallest insect we [Victorian society] wish to be created at once by special act, provided with its instincts its place in nature. . . . [Ironically] our faculties are more prepared to recognize the wonderful structure of a beetle than that of the Universe.⁸⁶

We can interpret Darwin's reflection as a development of Philo's argument. To elaborate his own evolutionary theory based on a natural mechanism that would explain the generation of the diversity of living beings, Darwin needed (as much as Philo) to replace the worldview that prevailed in Victorian society, which was based on creation and design. At the end of 1838, Darwin noted in his notebooks:

Arguing *from man to animals* is philosophical, viz.; man is not a cause like a deity . . . because if so *ourang outang* [sic], *oyster & zoophyte*.⁸⁷

In this philosophical note, Darwin raises a radical evolutionary, thesis: there is no reason to attribute a different origin to human and nonhuman animals. Like Hume, Darwin concludes that the same generation process “applies to the entire animal kingdom.” The origin of humans, other vertebrates (orangutans), and invertebrates (oysters and zoophytes) is explained by the same mechanism. Therefore, all animals (and other living things) are evolutionary relatives. In the *Origin of Species*, Darwin postulated:

⁸⁴ Hume, *Dialogues*, p. 80.

⁸⁵ *Ibid.*

⁸⁶ Charles Darwin in Barrett PH et al., eds., *Charles Darwin's Notebooks, 1836-1844* (Ithaca: British Museum Natural History & Cornell University Press, 1987), Notebook N, note 36, p. 573.

⁸⁷ Rozzi, “Hume's Noble Oyster,” p. 576 (emphasis added).

All modified descendants from a single species, are represented as related in blood or descent to the same degree; they may metaphorically be called cousins to the same millionth degree.⁸⁸

By representing *Homo sapiens* as an evolutionary relative of all other biological species, Darwin not only stimulated a new scientific understanding, but also triggered an ethical reconsideration of the kind of relations humans establish with other species, spanning far beyond vertebrates in the phylogenetic tree.⁸⁹ A century after Darwin's death, in *The Little Things That Run the World: The Importance and Conservation of Invertebrates*, evolutionary biologist and conservationist Edward O. Wilson concluded that

A hundred years ago few people thought of saving any kind of animal or plant. The circle of concern has expanded steadily since, and it is just now beginning to encompass the invertebrates.⁹⁰

THE OYSTER OF HUME AND DARWIN: AN ANTIDOTE FOR "SINGERISM"

The conceptual antidotes identified in the works of Hume and Darwin also counteract the taxonomic chauvinism that prevails in vertebrate-centric animal ethics.

The oyster that seemed to provide an isolated, but relevant, case in Hume's work, acquired with Darwin the rank of evolutionary relative of humans. In Darwin's reflections on the phylogenetic range to which human and non-human animal's attributes are shared, the oyster takes on a notable role:

Origin of cause & effect being a necessary notion is it connected with 'our' willing [with that] of the simplest animal, as hydra toward light. . . . The *Cynocephalus* [baboon] when fondling the keeper, clasping '[sic]& rubbed' his arms & show signs of affecting something *like man*. *Has an oyster necessary notion of space*.⁹¹

Darwin relies on the Humean principle "like causes, like effects" to argue that vertebrates (such as a monkey) and invertebrates (as an oyster) share common properties related to perception and behavior. He even entertains the possibility of

⁸⁸ Charles Darwin, *On the Origin of Species by Means of Natural Selection* (Cambridge: Harvard University Press, 1964), pp. 420–21.

⁸⁹ See Ricardo Rozzi, "The Reciprocal Links between Evolutionary-Ecological Sciences and Environmental Ethics," *BioScience* 49 (1999): 911–21.

⁹⁰ Edward O. Wilson, in *Conservation Biology* 1 (1987): 346. It is necessary to make a note of caution on Wilson's statement "few people thought of saving any kind of animal or plant." In the last section of this essay, with a biocultural perspective I discuss the problematic aspect of Wilson's claim because it does not apply to all cultures, and makes their alternative traditions of thought invisible.

⁹¹ Darwin, *Notebook N*, notes 12, 13 and 14, p. 567 (emphasis added).

extending one of the two Kantian *a priori* forms of sensibility—space—beyond humans to the oyster, and hence to the whole animal kingdom.

Darwin went so far as to ascribe to invertebrates the highest human faculty: free will. For this radical thesis, the oyster is again present:

With respect to free will, seeing a puppy playing cannot doubt that they have free will, if so *all animals*, then an *oyster* has [*sic*]& a *polype* . . . now *free will of oyster* . . . [*is the*] *direct effect of organization, by the capacities its senses give it of pain or pleasure.*⁹²

In 1838, the naturalist considers the free will of a dog vis-a-vis with that of an oyster, and the polyp or coral. For him, free will, as well as the capacity to feel pain or pleasure, emerges from a natural organization shared by all animals. In the mind of Darwin, Hume's analogical argument about the nature of human and nonhuman animals is definitively extended to vertebrates and invertebrates, terrestrials and aquatics.

Darwinian theory of the common origin of all living forms, including humans, was inspired and stimulated by Hume's philosophy. In turn, Darwinian theory provided the empirical support that Humean philosophy required. Post-Darwin, in the nineteenth and twentieth centuries, new scientific evidence was provided by cell theory, comparative anatomy and physiology, recapitulation in the ontogenetic development of phases of phylogenetic history, and the genetic basis of evolution. These scientific disciplines have provided solid empirical and conceptual foundations to understand human beings as a biological species among many other animal species in the "evolutionary tree of life."

The proposition of a common nature shared by all animals developed by Hume and Darwin unsettled not only Victorian society; today it still challenges ethical deliberations concerning our relations with animals. For instance, when Peter Singer published *Animal Liberation*, he stated that "a liberation movement is a demand for an end to prejudice and discriminations based on an arbitrary characteristics like race or sex."⁹³ However, his statement becomes more hesitant and confined regarding ending prejudice and discrimination for all animals, when he asks: "How far down the evolutionary scale shall we go? Shall we eat fish? What about shrimps? Oysters?"⁹⁴ And his answer is:

Oysters . . . and [other] mollusks are in general very primitive organisms. . . . Most mollusks are such rudimentary beings that it is difficult to imagine them feeling pain, or having other mental states.⁹⁵

The answers that Hume or Darwin would have given to this question about oysters are more radical than Singer's. For the founders of modern philosophy and the theory

⁹² Darwin, *Notebook M*, note 72, p. 536 (emphasis added).

⁹³ See Singer, *Animal Liberation*, pp. xii–xiii.

⁹⁴ *Ibid.*, p. 176.

⁹⁵ *Ibid.*, p. 179.

of modern evolution, oysters and organisms “even below the oyster” do have some mental states and sentience. As I documented in the introduction, in the twenty-first century, novel and unexpected empirical evidence supports Hume's principle of “like causes, like effects” as encompassing both vertebrates and invertebrates, even regarding the evolutionary origin of consciousness during the Cambrian Period. This evidence compels us today to revisit the “Singerism” that excludes the oyster and other invertebrates from the moral community.⁹⁶

Today it is necessary to recover a deeper understanding of Hume's philosophical and evolutionary approaches, both encompassing all branches of the tree of life. In the moral realm, Hume examines together the value of human and nonhuman existence. In his essay “Of Suicide” (that the Scottish philosopher refused to publish in his lifetime),⁹⁷ he arrives to his most radical conclusion:

The lives of men depend upon the same laws as the lives of all other animals. . . .
the life of a man is of no greater importance to the universe than that of an oyster.⁹⁸

In this allusion to the oyster, Hume builds a solid and comprehensive bridge between human and nonhuman animals. All animals are subject to the same laws of nature. The value of human and nonhuman existence is also equivalent. In short, in Hume's philosophy: What counts for humans also counts for all other animals!

THIRD ANTIDOTE: THE OYSTER AND OTHER INVERTEBRATES APPRECIATED AS CO-INHABITANTS

Hume's analogical argument and the evolutionary theory of his “intellectual inheritor,” Charles Darwin, present yet another limitation. These purely cognitive arguments have not been sufficient to open the “ecological eyes” of most philosophers, scientists, and citizens. The vast diversity of animal life and its intricate ecological and biocultural interrelationships with humans, remains invisible to global society.

To free ourselves from the immense “blind spot” generated by *vertebratism*, it is necessary to incorporate concepts and practices that can cognitively and emotionally transform our animal imagery. To do this we have created an educational practice that we call *field environmental philosophy*, in which students, policy makers, tourists,

⁹⁶ For this cause, oysters have also inspired New York writer Karl Steel, who has stated that “our effort to save animals from Cartesianism and even Singerism might begin by giving oysters a voice,” (p. 82). In “Insensate Oysters and our Nonconsensual Existence,” in Steve Mentz, ed., *Oceanic New York* (New York: Punctum, 2015), pp. 79–91.

⁹⁷ Hume refused to publish this essay while he was alive. See John Charles Addison Gaskin, “Hume on religion,” in David Fate Norton, ed., *The Cambridge Companion to Hume* (New York: Cambridge University Press, 1995), pp. 313–44.

⁹⁸ David Hume, “Of Suicide,” in *The Philosophical Works of David Hume*, ed., Thomas Hill Green, and Thomas Hodge Grose (London: Spottiswoode and Co., 1882), p. 371.

and other citizens are guided to combine and integrate practices from: (i) ecological science and natural history (such as observation, drawing, and “direct encounters” with animals in their native habitats); (ii) philosophy, humanities, and the arts (such as critical reading of texts and composition of metaphors that stimulate analogical thinking); and (iii) ethnography (such as participatory observation with indigenous people and local cultures).⁹⁹

Meeting with members of local communities helps participants to understand that taxonomic chauvinism is not universal among human cultures. Oysters and other invertebrates are an integral part of many cultures. Indeed, during his expedition aboard the *HMS Beagle* through the Cape Horn archipelagos, Darwin was amazed by the Fuegian Yahgan culture and their refined knowledge of marine invertebrates.¹⁰⁰ Today, Yahgan fishermen and artisans participate in field environmental philosophy courses at the Omora Ethnobotanical Park teaching the material and symbolic culture that includes invertebrates as an integral component of their traditional ecological knowledge and practices.¹⁰¹

Field intercultural interactions facilitate the understanding that the concept of co-inhabitants extends beyond humans to include nonhuman animals in both their biophysical and symbolic-linguistic dimensions.¹⁰² The concept of co-inhabitants alludes to sharing the same habitat. It has a sense analogous to the concept of “companion” that, in its origin, referred to sharing bread (from Latin, *cum* = with; *panis* = bread). The understanding that we share habitats with vertebrates, invertebrates, and a multitude of other living and ecological beings (such as rivers, mountains, rocks, or oceans), has ontological, epistemological, and ethical implications. Ontological, because human and nonhuman beings do not exist as isolated individuals, but rather exist together in co-inhabitation interrelationships. Epistemological, because to understand human beings and other animals it is necessary to consider the co-habitation relationships that forge their identities and well-being. Ethical, because human beings share a common habitat, the biosphere, which we must take care of for the well-being of all animals. This demands cultivating life habits that recover a sense of being co-inhabitants with myriads of living beings, most of which go unnoticed to citizens; in

⁹⁹ Ricardo Rozzi et al., “Ten Principles for Biocultural Conservation at the Southern Tip of the Americas: The Approach of the Omora Ethnobotanical Park,” *Ecology and Society* 11 (2006): 43. <http://www.ecologyandsociety.org/vol11/iss1/art43/>.

¹⁰⁰ See Ricardo Rozzi, Kurt Heidinger, and Francisca Massardo, *Tracing Darwin's Path in Cape Horn* (Denton, Texas: University of North Texas Press, 2018).

¹⁰¹ Javiera Malebrán and Ricardo Rozzi, “Análisis de los cursos de Filosofía Ambiental de Campo en el Parque Etnobotánico Omora, Reserva de la Biosfera Cabo de Hornos, Chile,” *Magallania* 46 (2018): 207–25.

¹⁰² The animal imagery of the Yahgan culture includes numerous representations of invertebrates. Anthropologist Claude Lévi-Strauss stated that the Yahgan worldview “belongs to the spiritual heritage of humanity along with the great masterpieces of Greek and Roman antiquity and the Near and Far East,” in Johannes Wilbert, *Folk Literature of the Yahgan or Yamana Indians* (Los Angeles: University of California Press, 1977), p. 9.

particular, little organisms with striking life histories, morphologies, and ecological roles that are critical for the health of humans and ecosystems.¹⁰³

The images of animals in the work of modern philosophers, such as David Hume, have focused on individual specimens. Under this “specimen logic” animals have been represented as individuals separated from their native habitats.¹⁰⁴ As I demonstrated earlier, Hume’s animal imagery focuses on individual mammals and birds that have been domesticated and isolated from their wild habitats. In contrast to this emphasis on individuals, the concept of co-inhabitation helps us to understand and value the vital links that sustain the life habits of animals that are forged in interactions with the other co-inhabitants with whom they share and co-constitute habitats.¹⁰⁵ These are the “3Hs” of biocultural ethics: *co-in-Habitants*, with their *Habits* forged in shared *Habitats*.¹⁰⁶ The conceptual model of the “3Hs” recovers the understanding that we are part of communities of co-inhabitants, and the valuation of caring relationships, complementarity, and reciprocity, which emerge in sharing in general, and in sharing habitats in particular.

Based on the concepts of the biocultural ethic, the methodological framework of field environmental philosophy integrates: (i) cognitive and emotional experiences;

¹⁰³ To appreciate the ecological, aesthetic, economic, and ethical values of the micro-cosmos composed by little plants (e.g., mosses, liverworts), lichens, phytoplankton, bacteria, fungi, invertebrates, and other tiny organisms, we have proposed a “change of lenses” to assess biodiversity. Complementarily, in 2000, with a team of philosophers, artists, and scientists at the Omora Ethnobotanical Park in Puerto Williams, capital of the Antarctic Province of Chile, we created an innovative educational and special interest tourism activity that we called Ecotourism with a Hand-Lens. Notably, this “change of lenses” stimulated the creation of the UNESCO Cape Horn Biosphere Reserve, the first protected area in the world that has been designated based on the diversity of mosses and liverworts and other small organisms that have been little appreciated in international conservation. See Ricardo Rozzi et al., “Changing Lenses to Assess Biodiversity: Patterns of Species Richness in Sub-Antarctic Plants and Implications for Global Conservation,” *Frontiers in Ecology and the Environment* 6 (2008): 131–37. The legal protection of small organisms has demanded enormous efforts worldwide. For instance in the U.S., when the Endangered Species Act was due for reauthorization by Congress in 1982, numerous biologists had to testify to both houses of Congress about the importance of plants and invertebrate animals for ecosystem functioning and human welfare. See Laura Tanglely, “Protecting ‘The Insignificant,’” *BioScience* (1984): 406–09.

¹⁰⁴ Under the “logic of the specimen,” animals are represented as objects in scientific or aesthetic collections. See Janice Neri, *The Insect and the Image: Visualizing Nature in Early Modern Europe, 1500–1700* (Minneapolis: University of Minnesota Press, 2011). This form of representation that isolates animals from their native habits has been criticized as a Eurocentric colonialist practice. See José Miguel Esteban, “Dürer’s Rhinoceros: Biocultural Homogenization of the Visual Construction of Nature,” in Ricardo Rozzi et al., ed., *From Biocultural Homogenization to Biocultural Conservation. Ecology and Ethics Book Series*, vol. 3. (Dordrecht: Springer, 2018), pp. 137–65.

¹⁰⁵ Among invertebrates, caddisflies have a remarkable life habit: the construction of habitats by larvae that build portable cases. Materials used include grains of sand, fragments of rock, bark, sticks, leaves, seeds, and mollusk shells. See Tamara Contador et al., “Sumergidos con lupa en los ríos del Cabo de Hornos: Valoración Ética de los Ecosistemas Dulceacuícolas y sus Habitantes,” *Magallania* 46 (2018): 183–206.

¹⁰⁶ See Rozzi, “Biocultural Ethics,” pp. 10–12.



Figure 4. Field environmental philosophy activity, “open your eyes to dive,” designed by Chilean biologist Jaime Ojeda. The uniqueness of this activity is that the participants are equipped with physical lenses (such as their diving masks or filming cameras) and also with a “conceptual lens,” *the 3Hs biocultural lens*. Swimming among kelp forests, participants appreciate the *Habitats* where invertebrates forge their life *Habits* in interactions with other *co-in-Habitants*. By integrating emotions and concepts derived from philosophical, scientific, and vernacular knowledge into the observation of surprising and unexpected behaviors of invertebrates, students and other participants experientially apprehend the concept of co-inhabitants.

(ii) intercultural dialogues; and (iii) experiences of inter-specific co-inhabitation. With this triple integration, biocultural conservation biologist Jaime Ojeda has co-designed a diving experience with the participation of Yahgan fishermen, scientists, and philosophers.¹⁰⁷ This activity integrates indigenous, scientific, and philosophical ecological knowledge to craft a “biocultural lens.” This biocultural lens orients participants to understand the concept of co-inhabitants through “face to face” encounters with the “otherness” of oysters and other invertebrates in the submerged kelp forests of Cape Horn (Figure 4).

This experience of field environmental philosophy makes visible not only the small animals, but also the ecological knowledge of the Yahgan people. Diving and gathering invertebrates in these cold waters has been a central life habit for Hume, I question the overgeneralization of the above statement. In his analogical arguments about humans and nonhuman animals, Hume is more radical than most

¹⁰⁷ Jaime Ojeda et al., “Interacciones Bioculturales del Pueblo Yagán con Macroalgas y Moluscos: una Aproximación desde la Filosofía Ambiental de Campo,” *Magallania* 46 (2018): 155–81.

Yahgan women.¹⁰⁸ The shells of the bivalves have provided the foundation for the wigwams built on shell middens or *akar*, which sheltered the intimate habitat of the Yahgan family. Furthermore, in the Yahgan worldview, mollusks are perceived as co-inhabitants that punish selfishness, but honor respectful and collaborative habits.¹⁰⁹ In sum, this Native American culture at the southern end of South America ascribes to these invertebrates multiple relational values, including instrumental and intrinsic values. With this worldview, humans and mollusks have co-inhabited these archipelagos for 7,000 years.¹¹⁰

In the field environmental philosophy activity “open your eyes to dive,” participants dive not only into a different biophysical world, but also into a different symbolic-linguistic world, that of the Yahgan. This integration allows participants to visualize and to value invertebrates from the perspective of biocultural ethics. Biocultural ethics demands overcoming not only taxonomic chauvinism to appreciate the value of invertebrates, but also overcoming cultural chauvinisms, which may derive from an arrogance of hegemonic knowledge.¹¹¹ In Yahgan Fuegian culture, invertebrates are not people’s knowledge and values. In biocultural ethics, *taxonomic chauvinism*, or speciesism, is overcome and *inter-specific justice* is promoted. At the same time, it demands the overcoming of forms of human chauvinism, linked to Eurocentrism, and promotes intercultural dialogues that lead to epistemic justice.¹¹²

In sum, the biocultural ethic demands overcoming multiple forms of chauvinism. Overcoming human chauvinism is necessary not only to solve the problems derived from anthropocentrism but also from ethnocentrism. It is necessary to leave ethnocentrism behind in order to affirm the value of the diversity of cultures whose knowledge has been made invisible. This knowledge should complement Western

¹⁰⁸ Ibid.

¹⁰⁹ Ibid. See also the scene of Yahgan handrafter Julia González and researcher Jaime Ojeda in the documentary *The Return to the Den*, codirected by Jaime Sepúlveda and Ricardo Rozzi: <https://vimeo.com/31905600>, minutes: 16:53–19:07.

¹¹⁰ Ojeda et al., “Interacciones Bioculturales del Pueblo Yagán.”

¹¹¹ Puerto Rican sociologist Ramón Grosfoguel and other decolonial thinkers have criticized the arrogance of hegemonic knowledge because it implies exclusion and oppression of the knowledge of indigenous communities. See Ramón Grosfoguel, “The Epistemic Decolonial Turn: Beyond Political-Economy Paradigms,” *Cultural Studies* 21 (2007): 211–23. I have added that this direct oppression of indigenous communities also implies an indirect oppression of the biodiversity with which they co-inhabit. Epistemological arrogance “makes invisible” ways of knowing, which are intimately linked with forms of co-inhabitation with multiple biological species. Therefore, this form of human chauvinism affects subaltern cultures and also communities of nonhuman co-inhabitants. See Ricardo Rozzi, “Earth Stewardship and the Biocultural Ethic: Latin American Perspectives,” in Ricardo Rozzi et al., eds., *Earth Stewardship: Linking Ecology and Ethics in Theory and Practice*, Ecology and Ethics Book Series, vol. 2 (Dordrecht: Springer, 2015), pp. 87–112.

¹¹² I use the term *epistemic justice* as a concept that has an inverse meaning to the term *epistemic injustice* coined by Miranda Fricker in her book *Epistemic Injustice, Power and the Ethics of Knowing* (New York: Oxford University Press, 2007). Epistemic injustice occurs when the knowledge of some people or communities is arbitrarily ignored or oppressed.

science and philosophy to address global socioenvironmental change problems, such as the sixth mass extinction, that affect multiple cultures. A comprehensive socioenvironmental justice can only be achieved with the participation of multiple cultures.

CONCLUDING REMARKS

I have demonstrated the presence of taxonomic chauvinism in modern philosophy and contemporary sciences. To counter this chauvinism, I have proposed three “conceptual antidotes.” From the analysis of the problem and the antidotes proposed to solve it, I identify *indicators* that allow us to infer broader challenges. In order to confront them, I suggest some research topics that seem to me to be priority and urgent.

Regarding the problem of *taxonomic chauvinism*, the analysis of animals that David Hume included in his work serves as a particular indicator (a proxy) to infer a more general problem: *the drastic absence of invertebrates in modern philosophy*. Omitting the presence of the most diverse group of animals, invertebrates, in philosophical discourses, sciences, education, and culture also hampers moral considerations about them. The quantitative demonstration of the vertebrate-centric animal imagery in Hume’s work calls attention to a problem that could be more general, and so I invite researchers to carry out similar analyses about animal imageries in the work of other philosophers.

Regarding the first conceptual antidote, *Hume's analogical argument*, this serves as an indicator to infer a more general phenomenon: *the fact that modern Western philosophy is multifaceted*. Hume himself drew inspiration from contrasting Western philosophers, including ancient Greek philosophical traditions, such as the Skeptics, particularly Pyrrho of Elis¹¹³ and the Cynics,¹¹⁴ in his investigations into the value of nonhuman animals. In the twenty-first century, some thinkers have argued that Western philosophy, in its prevailing forms, has little to contribute to resolving today's socioenvironmental problems.¹¹⁵ Based on my analysis of

¹¹³ See Richard Henry Popkin, “David Hume: His Pyrrhonism and his Critique of Pyrrhonism,” in Richard A. Watson and James E. Force., eds, *The High Road to Pyrrhonism by R. H. Popkin* (San Diego: Austin Hill Press, 1980), pp. 103–32.

¹¹⁴ See Stephen R. L. Clark, “Hume, Animals and the Objectivity of Morals,” *The Philosophical Quarterly* 35 (1985): 117–33.

¹¹⁵ As a synoptic illustration of this debate, consider that in the 1970s, Australian philosopher and scholar of David Hume, John Passmore, published *Man's Responsibility for Nature: Ecological Problems and Western Tradition* (London: Duckworth, 1974). This book opened a heated discussion about whether Western philosophy could (or could not) provide the foundation of an animal and/or environmental ethic. In the 1980s, Eugene Hargrove published *Foundations of Environmental Ethics* (Englewood Cliffs: Prentice Hall, 1989). This book offers one of the most brilliant refutations of some of Passmore’s theses. In the 1990s, Val Plumwood published *Feminism and the Mastery of Nature* (New York: Routledge, 1993). With an ecofeminist perspective on liberation, she criticized the anthropocentrism, androcentrism, and Eurocentrism that prevail in philosophy. In the 2000s, Arran Gare published *Postmodernism and the Environmental Crisis* (New York: Routledge, 2006). Gare criticized the “great

Hume, I question the over-generalization of the above statement. In his analogical arguments about humans and nonhuman animals, Hume is more radical than most thinkers of contemporary animal ethics. That Western philosophy would seem to have no value for confronting current socioenvironmental problems would be due rather to processes of biocultural homogenization, which have reduced it to a few dominant concepts and schools of thought that are functional to anthropocentrism and the grand narrative of economic progress.¹¹⁶ Based on the discovery of tensions in Hume's thought, where a taxonomic chauvinism (associated with his animal imagery) coexists with a detachment from this chauvinism (through his analogical argument), I invite researchers to investigate the works of other multifaceted thinkers of Western philosophy, who could provide valuable concepts to solve current socioenvironmental problems.

Regarding the second antidote, the *evolutionary theory* of Charles Darwin, the analysis of the influence that Hume's thought had on the conception of this theory serves as a particular indicator to infer a more general phenomenon: *the reciprocal links in the development of ideas in philosophy and ecological-evolutionary sciences*. Understanding of these historical interrelations contributes to overcoming schisms derived from the compartmentalization of scientific and philosophical disciplines (and those of the humanities). As I showed earlier, scientists conceive their theories influenced by particular philosophical concepts and values, and philosophers value nature based on particular scientific theories and discoveries. This systemic perspective helps to better understand the reciprocal links between ways of knowing animals and ways of co-inhabiting with them (and all biodiversity).¹¹⁷ In the twenty-first century, philosophers and ecologists need and must work together to tackle complex problems, such as taxonomic chauvinism, that have theoretical and practical implications for areas such as animal ethics and conservation biology. Based on the new findings by scientists about the sentient capacity of invertebrates

economic narrative," and identified alternative philosophical traditions in Western modernity. For instance, Juan Escoto Eriúgena, the hermetic philosophers of the Renaissance, and Giordano Bruno, Baruch Spinoza, and Gottfried Wilhelm Leibniz recognize the need to harmonize the conceptions of humanity and nature. The works of these philosophers would contribute today to the mandate of valuing and caring for animals, and biodiversity as a whole.

¹¹⁶ During the second half of the twentieth century, the teaching of philosophy has been minimized. See Arran E. Gare, "MacIntyre, Narratives, and Environmental Ethics," *Environmental Ethics* 20 (1998): 3–21; Rozzi, "Biocultural Ethics," pp. 34–38.

¹¹⁷ In a previous article, I questioned the fact that confronted with the current environmental crisis, the academic community faces a conceptual and practical problem of dissociation: environmental scientists study animals and biodiversity with the aim of understanding them, whereas animal and environmental ethicists examine them asking how we should value them, or co-inhabit with them. How could we bridge these still largely disconnected and parallel courses? To address this question, I examined the development of the scientific ideas of the Darwinian theory of evolution, and the contrasting influences that they had on ethical concepts developed during the twentieth century. See Rozzi, "The Reciprocal Links between Evolutionary-Ecological Sciences and Environmental Ethics."

and their “invisible” disappearance in the midst of the sixth mass extinction, I invite (and appeal to) philosophers to investigate ways of valuing and making visible the small animal co-inhabitants, whose well-being is interdependent with human well-being.

Regarding the third antidote, the concept of *co-inhabitants* conceived in the “3Hs conceptual framework” of the biocultural ethic, serves as an indicator to infer biocultural interrelationships: *humans and other animals co-constitute life habits and shared habitats*. Habitat conservation is a necessary condition for biocultural co-habitation and the well-being of the co-inhabitants that participate in it. Habitats include both biophysical and cultural dimensions. For this reason, the concept of co-inhabitants allows an understanding of the complementarity among worldviews of different cultures, thus contributing to overcoming taxonomic chauvinism. In local cultures, such as the native Yahgan people in Cape Horn and many other cultures, such as oyster fishermen communities in Chesapeake Bay in the United States or on Sado Island in Japan, invertebrates are integral in their material culture and symbolic-linguistic worldviews.¹¹⁸ These findings demonstrate that taxonomic chauvinism is not a universal problem among human cultures. In order to overcome this and other chauvinisms, the invitation is to interrelate in a complementary and contextual way the knowledge and values of Western philosophy and science with those of other cultures.¹¹⁹

In conclusion, to protect biodiversity and prevent the aggravation of the global socio-environmental crisis that we face today, it is not enough to focus only in sciences to address the proximate causes (or direct drivers) of problems such as the indiscriminate use of pesticides or the destruction of habitats. It is also essential to diagnose and counteract the ultimate causes (or indirect drivers) of these problems.¹²⁰ For this challenging task, philosophy and the humanities can play a key role. In turn, philosophy requires a major shift to properly include the diversity of cultures and living beings. In this way, philosophy

¹¹⁸ See Sharon E. Kingsland, “Ecological Science and Practice: Dialogues across Cultures and Disciplines,” in Ricardo Rozzi et al., eds., *Earth Stewardship: Linking Ecology and Ethics in Theory and Praxis* (Dordrecht: Springer, 2015), pp. 17–26; Mitsuyo Toyoda, “Revitalizing Local Commons: A Democratic Approach to Collective Management,” in Ricardo Rozzi et al., eds., *From Biocultural Homogenization to Biocultural Conservation* (Dordrecht: Springer, 2018), pp. 443–57.

¹¹⁹ This call is consistent with the assessment of multiple values of nature launched in 2018 by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which has emphasized the participation of indigenous peoples and local communities to consider diverse conceptualization of multiple values of nature. See <https://ipbes.net/event/ilk-dialogue-workshop-ipbes-assessment-multiple-values-nature>.

¹²⁰ The Millennium Ecosystem Assessment (MEA) used the concepts of direct and indirect drivers. In the MEA, a “driver” is any factor that changes an aspect of an ecosystem. A direct driver unequivocally influences ecosystem processes, and can therefore be identified and measured to differing degrees of accuracy. An indirect driver operates more diffusely, often by altering one or more direct drivers. Indirect drivers include demographic, economic, sociopolitical, scientific and technological, and cultural and religious domains. See MEA, Millennium Ecosystem Assessment, *Ecosystems and human Well-being: Synthesis* (Washington, D.C.: Island Press, 2005).

will contribute more effectively to addressing pressing problems such as the sixth mass extinction, whose ultimate causes are rooted in the prevailing culture of global society that has become desensitized to the diversity of life.

Today, taxonomic chauvinism represent a widespread biocultural problem that needs to be urgently corrected in order to prevent the dire consequences that global society will face if it continues to ignore the small living beings. To contribute to solving this problem, and to foster a *bioculture* that values the vital links between human beings and biodiversity in its entirety, in this article my objective has been threefold. First, to draw attention to taxonomic biases that have permeated philosophy, science, education, and culture. This bias has remained unnoticed because researchers and society have been affected largely unconsciously by it. Second, to demonstrate the need for the conscious awareness of these biases, in order to criticize them and free ourselves from both human and taxonomic chauvinisms. This is imperative in terms of socioenvironmental justice. Third, my deepest motivation is to leave an open invitation to collaboratively (inter-disciplinarily and inter-culturally) cultivate an appreciation for the small invertebrates (and other under-appreciated and under-valued co-inhabitants of biodiversity). These little co-inhabitants are precious in themselves. Additionally, we share our local habitats with them, and the well-being of the global biosphere (including human societies) depends on them.

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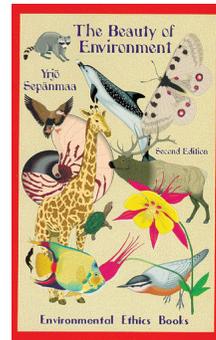


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