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Darwin, artificial selection, and poverty

Contemporary implications of a forgotten argument

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ABSTRACT. This paper argues that the processes of evolutionary selection are becoming increasingly artificial, a trend that goes against the belief in a purely natural selection process claimed by Darwin's natural selection theory. Artificial selection is mentioned by Darwin, but it was ignored by Social Darwinists, and it is all but absent in neo-Darwinian thinking. This omission results in an underestimation of probable impacts of artificial selection upon assumed evolutionary processes, and has implications for the ideological uses of Darwin's language, particularly in relation to poverty and other social inequalities. The influence of artificial selection on genotypic and phenotypic adaptations arguably represents a substantial shift in the presumed path of evolution, a shift laden with both biological and political implications.

Key words: Natural selection, artificial selection, evolution, genetically modified organisms, poverty, social construction, justice

"Mankind assuredly continues to evolve, both culturally and biologically. The grave problem is whether the direction in which the biological evolution is now proceeding is an acceptable one."

– Theodosius Dobzhansky, 1963

This essay considers an obvious situation, namely humans' active dominance over the planet and other living species, and explores its theoretical implications within the context of Darwin's natural selection theory. Even though the configuration of species and populations is increasingly impacted by human intervention, Darwinian language remains central in biology and other evolutionary disciplines and species survival is still primarily described in terms of natural selection. Major evidence is found in the accelerated extinction of biodiversity resulting from human causes as well as by the expansion of genetically modified

organisms. Human arrangements also impinge on the survival of disadvantaged populations, as shown by the extensive poverty in many countries, arguably connected to the way policies and institutions have developed and are maintained.

In this paper I argue that the character of such processes is artificial, inasmuch as they originate mostly from human purposiveness rather than deriving from strictly unguided natural tendencies. I also assert that artificial selection, as selection originating from human intentions, is gradually displacing natural selection as the driving force of planetary changes. Secondly, the paper contends that the dismissal or ignoring of artificial selection within current evolutionary thinking underestimates the consequences of human interventions over presumed evolutionary tendencies.

The appropriateness of artificial selection as a concept and the legitimacy of examining poverty in terms of Darwinian natural selection will be treated in

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the second section. This excursion is necessary to address arguments that the distinction between natural and artificial selection is unfounded, or that social outcomes such as poverty cannot be explained in terms of natural selection.

Biodiversity

As the massive BP oil spill in the Gulf of Mexico dramatically illustrates, humankind has become the decisive factor in the biosphere.¹ The extraordinary magnitude of human activities across the planet is placing unexpected selective pressures upon living species, more than in any previous period, with probable consequences for the evolutionary tendencies assumed to govern species' survival. Major indications are found in two current trends causing international alarm: the dramatic rates of biodiversity extinction due to human actions, and the increase of genetically modified organisms.

A 2006 United Nations report asserted that, "changes in biodiversity due to human activities [have been] occurring more rapidly in the past 50 years than at any time in human history."² Similarly, *The Millennium Ecosystem Assessment* report, prepared in 2005 by more than a thousand scientists from all over the globe, concluded that human activity has increased the rate of species extinction by "as much as 1,000 times background rates that were typical over Earth's history."^{3,4} Such changes, according to the World Resource Institute, situate human activity as being "responsible for the sixth major extinction event in the history of the Earth, and the greatest since the dinosaurs disappeared, 65 million years ago."⁵ This scale of intrusion and devastation led biologist Ernst Mayr, who has been called "the Darwin of the 20th century,"⁶ to observe that, "we are now living in another era of mass extinction caused by humans through the destruction of habitats and the pollution of the environment."⁷

Mayr's observation calls attention to the ostensibly unintended consequences of human activities, but it does not preclude the possibility of *intentional* practices affecting the welfare of living species. To be sure, the configuration of species and varieties has been slowly altered by traditional practices of hybridization, breeding, and cultivation by farmers and communities

for thousands of years.⁸ However, today such processes are highly accelerated and technologically augmented due, among other reasons, to a growing biogenetic industry based on the manipulation of DNA, which promises impressive changes in the constitution of species, and even the invention of new organisms towards presumably more beneficial ends.⁹

The reduction of biodiversity is usually described as "depletion," "predation," "loss," "massive extinction," or "ecocide," while transgenic products, such as "fluorescent fish," are lauded as outstanding achievements of science and biotechnology. However, if examined from an evolutionary perspective, these changes might also be referred to in terms of *species* selection, although they manifestly illustrate processes distinct from those of *natural* selection, if only by the privileged position of human agency. In Darwin's language, they can be properly described as "artificial selection," as it will be argued in the next section.

Interestingly, the biogenetic industry advocates for extensive human-controlled selection in surprising coexistence with evolutionary discourses praising Darwinian natural selection as an invariable tendency.^{10,11,12} Whether the transgenic promise is plausible or not, in Darwinian terms, the relevant point is that natural selection among living species, generally attributed to the unrestrained "co-adaptations" of multiple organisms within their environment,^{13,14,15} is being appropriated by humans either through direct or indirect mechanisms. A century and a half after the publication of *On the Origin of Species*, these changes might make natural selection theory less explanatory of future developments than it appeared in Darwin's day.

Poverty

Besides biodiversity, the other relevant case that can be portrayed in terms of artificial selection is that of poverty affecting human populations. Poverty is not a minor issue in the contemporary world. Around 6 million children under 5 years of age die every year as a consequence of hunger, mostly in developing countries.¹⁶ Moreover, considerable differences in life expectancies between different nations are reported, ranging from over 80 years in countries like Canada or Japan, to below 45 years in countries such as Afghanistan or Zimbabwe.¹⁷ Similar disparities be-

tween higher and lower socioeconomic groups are also estimated, as poverty generally equates to unequal access to health services. A United Nations *Report on Human Development* estimates that children born to the poorest 20 percent of households in sub-Saharan Africa face a 1.7 times greater risk of dying before they reach 5 years of age than those in the upper economic brackets.¹⁸

As with biodiversity, the magnitude of survival threats posed by poverty suggests a type of selection affecting humans with no precedent in natural history, aside from ecological catastrophes. Abundant literature confirms that the biological destiny of populations is highly dependent upon conditions of hunger and health, which are regularly tied to situations of socioeconomic inequality and poverty.^{19,20,21,22,23,24} Rather than being connected with any sort of natural selection, poverty mostly originates from artificial circumstances. While it is possible to make conceptual comparisons involving social stratification and hierarchies between animals and humans,²⁵ analogies such as these do not prove *per se* that the extreme stratification and hierarchies found in human societies are naturally evolved, as indicated by the intensity and scale of social differences among humans. Doubtless the building of hierarchy and inequality among humans is highly dependent upon human arrangements, such as money, cultural norms, and institutional configurations.

People living in poverty are restricted in their ability to access goods; hence, they are less able to meet basic standards of nutrition and health. They are also prone to diseases and have less probability of being successful in achieving life goals. As MacIntire points out:

It is important to stress the ubiquity (over time and space) of the observed pattern of systematically poorer health and a shorter life span being associated with each successively lower position in any given system of social stratification, whether this is measured by occupational social class or by other indicators such as prestige, education, or access to material resources.²⁶

Strickland and Shetty maintain that the accumulation of health risk is primarily associated with social disadvantages,²⁷ undoubtedly related to socioeconomic conditions. Similarly, Murali and Oyeboode emphasize the strong connection between poverty, inequality, and survival, reinforcing Wilkinson's claim that psychoso-

cial stress, health deterioration, and mortality are closely associated with social inequalities over time.²⁸

Extreme poverty appears to have declined slightly during the last decade;²⁹ however, this does not mean that poverty is not a chronic situation worldwide. Additionally, the gap between the rich and poor has increased many times over a comparable period. The *World Distribution of Household Wealth* report estimated that in the year 2000, the richest 1 percent of adults alone owned 40 percent of global assets, and that the richest 10 percent of adults accounted for 85 percent of the world's total wealth. In contrast, the bottom half of the world's adult population owned barely 1 percent of global wealth.³⁰ This contrasting distribution of wealth undoubtedly implies unequal opportunities to access the finite stock of available resources. Thus, artificial selection should be expected.

Darwin's artificial selection

The idea of artificial selection should not be looked upon as unusual. The term is implied throughout *On the Origin of Species* when Darwin speaks of "domestication," "men's selection," "methodical," and "unconscious" selection, in relation to animal breeding and horticultural practices. Darwin contrasts artificial selection with selection spontaneously occurring "under nature," particularly in chapters one (Variations Under Domestication), two (Variations Under Nature), and four (Natural Selection). To be sure, the concept of natural selection was elaborated by Darwin through analogy with human-made selection,^{31,32,33,34} after reviewing copious data on breeding practices of the time. Specialists agree that after publication of *The Voyage of the Beagle* (1836), and abundant revision of the facts regarding variation and breeding, Darwin was prepared to frame the central ideas of his theory in 1838. But the idea for natural selection came about only in his 1842 sketch.³⁵ "As man can produce, and certainly has produced, a great result by his methodical and unconscious means of selection, what may not natural selection effect?"³⁶ Additionally, Darwin observed,

Slow though the process of selection may be, if feeble man can do much by his powers of artificial selection I can see no limit to the amount of change, to the beauty and infinite complexity of the coadaptations between all organic beings, one with another and with their

physical conditions of life, which may have been effected in the long course of time through nature's power of selection.³⁷

The key role of artificial selection in providing a basis for his theory is explicitly confirmed by Darwin in a letter he sent to A.R. Wallace in April of 1859. "I came to the conclusion that selection was the principle of change from the study of domesticated productions; and then, reading Malthus, I saw at once how to apply this principle."³⁸ Darwin rarely employs the term "artificial selection," but there is no doubt that this concept supports his theory.^{39,40,41,42,43} Snooks has particularly emphasized the central position of artificial selection—the "farmyard analogy," as he calls it—as an important aspect of Darwin's reasoning.⁴⁴ In a letter to Lyell, Darwin commented on Wallace's theory that, "We differ only [in] that I was led to my views from what artificial selection had done for domestic animals."⁴⁵

On the other hand, it is also known that Darwin was ready to speak of social processes in terms of natural selection, connecting the idea with poverty. To be sure, social processes weighed so much in Darwin's thinking that the broad outlines of his natural selection theory can hardly be imagined without taking into account the socioeconomic practices of the Victorian Era.⁴⁶ Darwin's theory is certainly focused on biological processes, but it could not emerge isolated from the social issues and language of his time.^{47,48,49,50,51} A deep connection between natural selection theory with social concerns might be detected in at least three stages of the development of Darwin's thought: first, in some of Darwin's motivations; second, in the key mechanism of selection postulated by Darwin; and third, in the consequences of natural selection in human populations as projected by Darwin, one of which is poverty.

Early in his "colonial encounters"⁵² on board the Beagle, Darwin could circumstantially be influenced by the striking facts of "civilized" countries warring against "barbarians." As he wrote in his diary,

If this warfare is successful, that is, if all the Indians are butchered, a grand extent of country will be available for the production of cattle, and the valleys ... will be most productive of corn. The country will be in the hands of white Gaucho savages instead of copper-coloured Indians. The former being a little superior in civilisation, as they are inferior in every moral virtue.⁵³

A neutral observer might think that the basic insight about the struggle for existence, conveying the survival of the fittest and the demise of lesser individuals, might be implicit in Darwin's reflection about the social destruction he confronted in colonial areas.

Beside these several evident causes of destruction, there appears to be some mysterious agency generally at work. Wherever the European has trod, death seems to pursue the aboriginal. We may look at the wide extent of the Americas, Polynesia, the Cape of Good Hope and Australia, and we shall find the same result. Nor is it the white man alone that thus acts the destroyer; the Polynesian of Malay extraction has in parts of the East Indian archipelago, thus driven before him the dark-coloured native. The varieties of man seem to act on each other in the same way as different species of animals, the stronger always extirpating the weaker.⁵⁴

In framing natural selection theory, Darwin drew on another observation stemming from social issues. This observation came from his reading of Malthus's *Essay on the Principle of Population* in the long period of preparing his fundamental volume upon returning to England. In his autobiography and elsewhere, Darwin recounted this epiphany:

In October 1838, that is, fifteen months after I had begun my systematic inquiry, I happened to read for amusement Malthus on *Population* and being prepared to appreciate the struggle for existence which everywhere goes on, from long-continued observation of the habits of animals and plants, it at once struck me that under these circumstances favourable variations would tend to be preserved, and unfavourable ones to be destroyed. The result of this would be the formation of new species. Here, then, I had at last got a theory by which to work.⁵⁵

Many evolutionary theorists have discussed the extent to which Darwinian thinking reflects the Malthusian model of self-interest and competition mostly avowed by Victorian political economy; most agree that an important element of Darwin's theory derives from Malthus. Such an element is undoubtedly the *struggle for existence*, which provided Darwin with the final catalyst for natural selection theory.^{56,57,58,59}

This certainly does not mean that Darwin's theory lies fully in Malthus,⁶⁰ nor that the building of his argument was as simple as translating Malthus' struggle for existence into biological terms. By the time Darwin had completed his extensive observations about variations among species and individuals, he was effectively positioned to question the mechanism behind this process. More importantly, the concept of struggle is not identical for Malthus and Darwin. In Darwin it has a creative meaning, differing from the pessimistic view of Malthus who initially thought of struggle as an insuperable barrier against progress.⁶¹ Moreover, incidentally, Darwin understood the phrase "struggle for existence" in metaphoric terms.^{62,63}

Darwin dedicates chapter 3 of *Origins* to the concept of "struggle for existence," and in the initial pages of the book remarks:

In the next chapter, the Struggle for Existence amongst all organic beings throughout the world, which inevitably follows from their high geometrical powers of increase, will be treated of. This is the doctrine of Malthus, applied to the whole animal and vegetable kingdoms. As many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be naturally selected.⁶⁴

Later, in the fifth edition, Darwin introduces—also metaphorically—the expression "survival of the fittest," which also derives from social discussions. The phrase was coined in 1852 by Herbert Spencer in an article about population growth.⁶⁵

The third stage linking natural selection theory with social issues, and concretely with poverty, may be seen in the context of the application of Darwin's theory on human populations. Darwin ostensibly devotes the two volumes of *The Descent of Man* (1871) to deal with this problem, although his success in this enterprise has been judged rather debatable.⁶⁶ In chapters 5 through 7, Darwin suggests that poverty would be a "fundamental check" to the increase of human populations. He writes:

Civilised populations have been known under favourable conditions, as in the United States, to

double their numbers in twenty-five years; and, according to a calculation, by Euler, this might occur in a little over twelve years. (57. See the ever memorable 'Essay on the Principle of Population,' by the Rev. T. Malthus, vol. i. 1826. pp. 6, 517.) At the former rate, the present population of the United States (thirty millions), would in 657 years cover the whole terraqueous globe so thickly, that four men would have to stand on each square yard of surface. The primary or fundamental check to the continued increase of man is the difficulty of gaining subsistence, and of living in comfort.⁶⁷

Darwin employs Malthus' language with ease, regarding poverty as a natural "check," which along with other factors such as famine, disease, and warfare, work to reestablish the population's equilibrium.^{68,69,70} Apparently, Darwin remained convinced that these checks operate at least within primitive populations. Correspondingly, he assumed that welfare policies (poor laws), health treatment, and charities in "civilized" nations affect natural selection.⁷¹ These points cannot be clearer than in the following quotation in *The Descent of Man*:

With savages, the weak in body or mind are soon eliminated; and those that survive commonly exhibit a vigorous state of health. We civilized men, on the other hand, do our utmost to check the process of elimination; we build asylums for the imbecile, the maimed, and the sick; we institute poor-laws; and our medical men exert their utmost skill to save the life of everyone to the last moment. There is reason to believe that vaccination has preserved thousands, who from a weak constitution would formerly have succumbed to small-pox. Thus the weak members of civilized societies propagate their kind. No one who has attended to the breeding of domestic animals will doubt that this must be highly injurious to the race of man. It is surprising how soon a want of care, or care wrongly directed, leads to the degeneration of a domestic race; but excepting in the case of man himself, hardly anyone is so ignorant as to allow his worst animals to breed.⁷²

Darwin assumes in this paragraph that asylum, medicine, and poor laws "wrongly directed" may lead to the "degeneration" of our species. That is, he considers that natural selection operates within human

societies, and poverty—or “the difficulty of gaining subsistence”—is one of the most visible mechanisms of selecting. He also believed that some social arrangements may negatively influence natural processes of selection. In a Malthusian way, Darwin thought of poverty as a somehow inevitable mechanism of selection arising from population pressure, furthermore warning that advanced societies might decay by overprotecting the infirm and poor.⁷³ However, he believed that the pains of poverty may be counterbalanced by some sort of moral restraint. Like the later Malthus, who in the second edition of his *Essay* slightly turned to accept the possibility of progress for the lower classes by means of public education and self-restraint,⁷⁴ Darwin tentatively thought that in order to avoid the pains of extended poverty, the poor and unfit should be discouraged from marriage.⁷⁵

It appears that the conservative bias implied in some of the Darwin's ideas has been particularly exploited by typical instances of Social Darwinists who misguidedly curved Darwin's conjectures about overprotecting the weak and the poor and turned them into a normative socio-political program against certain social policies.⁷⁶ However, it is possible that neither Darwin nor the Social Darwinists realized that the prevailing role of artificial institutions might be, in fact, one of multiplying the selection process rather than deterring it; hence making selection less natural than commonly assumed.

Contemporary artificial selection

Apart from the fundamental ethical objections related to human responsibility in altering a species' genetic configuration,^{77,78,79} and the extended concerns brought about by the release of genetically engineered organisms into the evolutionary web in terms of biosafety,^{80,81,82} the facts of *artificial selection* have not been widely incorporated within evolutionary discourses. The direct manipulation of organisms, the depletion of biodiversity due to human progress, and the possible effects of social arrangements upon processes of selection among humans, for example, are mostly overlooked in current evolutionary approaches.

Indeed, although in contemporary literature the expression “artificial selection” pervades the writing of experimental biologists,^{83,84,85,86} it is scarcely

employed by evolutionary theorists. While Darwin might have thought that some social arrangements prevent selection, and Social Darwinists transformed it into an article of faith, human inventions do not have a clear position within the current evolutionary framework.

Natural selection and evolution are the key terms in evolutionary biology. As Dobzhansky stated in 1973, “nothing in biology makes sense except in the light of evolution;” in 1991, Mayr added: “in the light of Darwinian evolution.”⁸⁷ However, human consciousness does not seem to play a significant role in selection within evolutionary theories. The facts of artificial, or human-made, selection are underestimated and the concept of artificial selection is all but absent in the evolutionary theories following Darwin's legacy.

Neo-Darwinians describe the concepts of “struggle” and “survival of the fittest” in natural selection as “greatly exaggerated.”⁸⁸ They frequently associate selection with mutation, genetic drift, and migration, and highlight the great role of chance in evolution.^{89,90,91} Thus, there would be more than one evolutionary force in nature rather than a single selective process;⁹² however, the evolution of species continues to be described as a natural process, in which human interventions play a subordinate role, if any. Selection is preserved as a spontaneous and natural tendency, immune to human activism despite the dominant position of human intelligence and the massive spreading of human artifacts over the planet, particularly those brought about by the Industrial Revolution.

Moreover, evolutionary theorists prefer to view natural selection as a self-determining force, analogous to Newtonian laws,⁹³ perhaps unaffected by human consciousness or even able to direct human behavior as is implied, for instance, by the terms *biopolitics*⁹⁴ and *sociobiology*.⁹⁵ Such inclinations might be partly due to the fact that, today, natural selection is primarily thought of in terms of transmitting variations, with reproductive successes occurring at the micro level, rather than a theory of “preservation,” or species “in the struggle for life,” or contests over the scarce natural resources of which Darwin spoke.^{96,97} There is a tendency to confine selection to the genetic level, conceding only a passive role, or no role at all, to organisms as independent entities.⁹⁸ This viewpoint does not exactly match Darwin's, who thought of

selection mainly in terms of organisms or individuals,^{99,100,101,102} though perhaps these viewpoints are not fundamentally incompatible.

Nonetheless, recovering the initial Darwinian distinction between *natural* and *artificial* selection might render important benefits for descriptive, evaluative, and normative purposes either in biology or in politics. “Artificial” is possibly not the best term to connote what humans do; yet, for now, there are no serviceable substitutes. The term artificial plays a necessary role in making evident the relevant differences existing between selection spontaneously occurring in nature, and that resulting from human inventiveness.

Some might insist that there are no significant conceptual differences between “natural” and “artificial,” as all beings and their activities, including humans, are already natural in origin.¹⁰³ However, the fact that human activities are *ultimately* natural does not mean that *all* products of such activities should also be considered natural. A parallel may be made here by contrasting, for instance, Hobbes’s theory of the state with Hume’s theory of justice. Both believed that the processes involved in forming communities or states were natural, but it does not follow that either states or justice are natural *per se*. Indeed, Hobbes and Hume maintained the conventional character of such instances. On the other hand, we cannot say that human activities are always compatible with nature, nor give the same weight to the activities of non-humans as to human activities in light of the observable results.

In any case, the point is not about the term’s perfection. It might even be accepted, for the sake of argument, that all processes are “natural.” But such a conceptual reductionism cannot conceal: (a) that selective processes are mostly human-made; (b) that these processes are by and large human-centered, and not ecologically decentered, as happens under spontaneous circumstances, which implies a reductive perspective rather than a diversifying one for other living species; (c) that human selection employs devices not preexisting in nature; and, (d) that humans’ selective decisions are causing a radical detriment to species, which by now is considered irreversible.^{104,105}

The point is not about how to precisely distinguish *artificial* from *natural* but the drastic consequences that human inventions, and interventions, are causing over the assumed evolutionary process. Much as the

properties of language cannot be completely isomorphic with lived experience, the discussion over what is “natural” and what is “artificial” will reveal areas of overlap and mutual exclusivity. Nevertheless, it is a distinction that has intuitive appeal. Also, it is an old distinction in the history of ideas, present, for example, in the writing of Aristotle, Aquinas, Spinoza, Hume, and others. Despite efforts to rid careful analysis of this blurry distinction, distinguishing between natural and artificial processes remains pervasive and one could argue that it would be difficult to give a proper account of human originality without having this distinction at the base.¹⁰⁶

In this framework, the concept of artificial selection might provisionally serve to reduce the important analytical differences embracing the various human-made processes, of which Darwin was mostly referring to: the *direct* manipulation of organisms implied in the breeding of plants and animals. Given the expansion of modern biotechnologies, a number of current practices of deliberate selection (or invention) of varieties and species can be added. For instance, the practices of direct genetic selection and DNA molecular manipulation for experimental, health, agricultural, or commercial purposes are widely conducted via genetic engineering on the human genome as well as on plants, animals, and microorganisms.^{107,108} In addition, direct elimination of non-human populations through practices of massive fishing, hunting, plagues, manmade disasters, and pest control, which do not correspond either to the patterns of background or massive extinctions known in natural history, should be counted.¹⁰⁹ In the extreme of human arbitrariness, human populations are sometimes severely reduced through wars or plain genocide.

One must also think of the *indirect* effects on species survival of typical human activities, such as agriculture, mining, industry, and urban development, which employ technologies either nonexistent in nature or so strong that other species’ evolutionary forces may simply be abolished or incapable of resisting. Werner Arber groups these activities into two categories: the management of land, which drastically alters original living conditions, and the increasing pollution of the air, soil, and water. Such indirect technological applications, he argues, “may in the long term considerably change selection criteria in the biosphere and thus exert a direct influence on biological evolution.”¹¹⁰

Technological innovations may be deemed inherent to human nature, but insofar as they cause disturbing consequences on living species, some degree of unwelcomed artificiality may be recognized. Besides, even if legitimate, necessary, or inevitable, there is no reason to believe that this set of practices should be ignored within a comprehensive theory of living species' survival by means of selection.

Conclusion

This paper has explored the consequences of Darwin's notion of artificial selection for interpreting contemporary processes such as the release of genetically modified organisms, biodiversity extinction, and poverty intending to maintain a basic loyalty to Darwin's metaphors and implications. A central ascertaining of this brief journey involves the recognition that artificial selection is not at variance with Darwin's language.

Beyond natural selection, or perhaps in parallel with it, there are increasing instances of artificial selection originating from human interventions and contrivances. Thus, it is mischievous to involve in the concept of *natural* selection in selective processes that clearly originate from human arbitrariness. More importantly, selective processes in the contemporary world cannot be completely, or even primarily, attributed to natural selection.

On the other hand, I have also tried to suggest that, as in the case of biodiversity, the expansion of poverty can be regarded as an outcome of the selective processes mainly favored by artificial arrangements.

Does artificial selection entail the complete deterring of natural selection? How might the selective processes connected to poverty impact the biology of human groups? Does artificial selection imply an optimistic or a regressive future, and is it compatible with the sustainability of life on Earth? These questions are left open for further debate. Yet we should not ignore warnings about the possible "end of evolution" brought about by massive biodiversity extinction,¹¹¹ or claims that humankind could be leading life on Earth towards a scenario of evolutionary disequilibrium.^{112,113} As Hirshleifer placed the problem in 1977:

It was not very debatable, perhaps, that the socio-biological approach does have some utility for social science purposes. But how much? The central question is

whether or not the human species has entered a new domain of experience where general biological laws will have only negligible relevance or have even been abolished by the unique developmental advances achieved by mankind. Among such might be included: (1) the transcending importance of cultural as opposed to genetic change; (2) the degree of intelligence and awareness, suggesting that man can henceforth regulate and control the evolutionary process by deliberate cultural and even genetic modifications of the human material itself—quite apart from operations on the environment; (3) the invention of weapons of intraspecies competition that threaten the survival of all mankind; and, (4) what might hopefully be a countervailing factor, man's possession of moral, spiritual, and ethical values.¹¹⁴

At that time, Hirshleifer thought that a proper answer to the question of the real permanence of biological laws was not possible. However, today it is possible to say, in the middle of a gigantic ecological crisis, that perhaps we are better prepared to find out an appropriate descriptive and normative answer to the uses of biological theories for explaining our evolutionary future. The first step on this path is to avoid blaming nature for that which is entirely our responsibility.

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Artificial selection

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