

The meaning of evolutionary progress

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It is commonly admitted that evolutionary theory was pioneered by Jean Baptist Lamarck in his major work *Philosophy of Zoology*, the bicentennial of which one can celebrate this year if one feels like that, although it is well known that Lamarck is a loser: his mechanism of evolution by inheritance of acquired characters does not work. After all, theory of evolution is not about losers, but about winners, and the winners are those who accepted Charles Darwin's theory of natural selection. Darwin's followers equipped with hard facts of genetics exterminated last remnants of Lamarckism. This is considered as their great achievement (mainly owing of which Lamarck is still remembered) giving Darwin's ideas the finality of a well grounded theory. Do we need an alternative theory of evolution? Why, this one is good enough.

By this reasoning, to go on with evolutionary studies is not for what people pay us scientists their money. Scientists have a lot to do, like fighting cancer, fighting drags, fighting climate change and what not. Darwin taught that evolution is struggle for existence, but with whom are we struggling except with ourselves and why there is no end to struggling in view? The existing theory tells that evolution drives us toward adaptation. We struggle for being better adapted to the circumstances that change with our effort: a wild-goose chase.

Nonetheless, theory of evolution by natural selection (or as it was presented in the title of Darwin's famous book, preservation of favored races by means of natural selection) is great if only because of its tremendous impact not only on biology, but actually on all spheres of human life. This is not a theme of this essay, but what happened during the two centuries makes it obvious that as theory of evolution is so the people are, and vice versa. We firmly believe that life is boosted by competition and stagnates in the lack of such, although all major discoveries in all spheres of life were made by those who did not

push their way by elbows, but found a less crowded place for doing what nobody else has ever done.

Fossils

Creationist doubt paleontological evidence and for the good reason because paleontology suggests that world was not created in six days, unless we take the book of *Genesis* symbolically. They might not know that Darwin, their supposed opponent, also doubted the fossil record. By his theory, the more adapted an organism becomes the more fit it is for the struggle of life and the longer it survives. Now, on paleontological evidence bacteria are the champions of survival being there for nearly four billion years, of which for about three billion years they were the only survivors. In comparison, dinosaurs survived for little more than 0.2 billion years and we humans were on the verge of extinction several times having only 0.002 billion years behind us. If surviving by adaptation was the goal of evolution than the logical sequence would be humans – dinosaurs – bacteria rather than the other way as paleontology implies. This is why Darwin said that one who believes in paleontology is fully justified in rejecting his theory (*The Origin of Species, Chapter IX. On the Imperfection of the Geological Record*).

Yet struggle for life is too emotionally charged for a scientific formula. Spencer's *survival of the fittest* is far more sporting and gentlemanly. That is why it was accepted, but Darwin's followers took it seriously and even endeavored to measure fitness by reproductive output. This way or another, bacteria come out the fittest all the same. However it is well known that oppressed (rather than oppressors) are the most prolific (the *Exodus* rule: *the more they were oppressed the more they multiplied*). Romans called *proletarians* those who were not fit for anything but making babies considering them the lowest cast rather than the highest. A similar reasoning has led Nietzsche to conclude (*Thus spaked Zarathustra*) that by idolizing adaptation "Darwin's school" turned evolution upside down. But the philosopher must have been wrong. While the majority of living beings is oppressed one way or another the Darwinian adaptation principle would survive all the criticism it ever has evoked.

Facts and prejudice

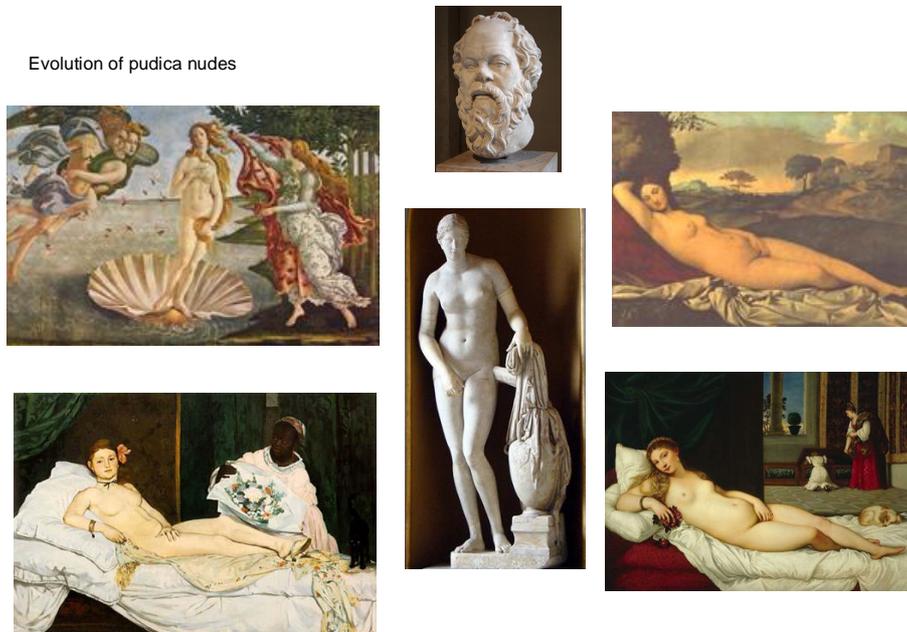
The mechanism of environmental induction (“the inheritance of acquired characters”) was introduced far before Lamarck and survived in the post-Darwinian era under euphemistic designations, such as “genetic assimilation”, being now tacitly rehabilitated at the molecular level. About ten years after publication of the “Origin of Species” Thomas Huxley said on the subject of the Darwin - Lamarck controversy (“Mr. Darwin’s Critics”, 1971, p. 475):

I cannot find that Mr. Darwin has ever been very dogmatic in answering these questions. Formerly, he seems to have inclined to reply to them in the negative, while now his inclination is the other way.

At the onset, neither Lamarck nor Darwin had any empirical evidence for the mechanisms they adopted. Then why to be dogmatic? The choice was entailed by their ontological convictions. The ontological theory championed by Lamarck was based on Neo-Platonism, the mystical branch of which was a sister theory to Christianity in cladistic terms. In the framework of Neo-Platonic deterministic philosophy, comprehensive definitions of life and progress of life were given by Spinoza (*Ethics*, 1667). His *conatus* (effort) theory describes living things as capable of active resistance to death (be it by feeding, reproduction, thermoregulation, mobility, intelligence, etc.) in contrast to non-living things that exist and cease to exist effortlessly. Progress of life is an increase of conatus. To replace his essentially medieval terminology by the modern one, life follows the physical law of preservation of form, but dead things preserve it passively eventually evolving to the state of maximum entropy, whereas living things persist in an unbalanced state by consuming energy and evolving to the opposite end, the minimal entropy production.

In XVII – early XIX centuries, theory of evolution sought to explain meaning of life projected onto the meaning of ethics. The panglossian optimism of Leibnitz (the prototype of Voltaire’s Pangloss), the Faustian philosophy of endeavor, the Lamarckian use and disuse as formative agents of evolution are all derived from the essentially thermodynamic conatus concept.

Flourishing in II century, Neo-Platonism had its second birth in the Renaissance Florence where a Neo-Platonic Academy was established by Cosimo Medici. Sandro Botticelli was a member and his canvases, although beautiful paintings as such, were designed to give visual perception to Neo-Platonic symbolism.



Socrates and the sequence of *pudica* nudes: *Aphrodite of Cnidus* by Praxiteles (center), *Birth of Venus* by Botticelli (left), *Sleeping Venus* by Giorgione, *Venus of Urbino* by Titian, and *Olympia* by Manet (bottom).

In his program work *Birth of Venus*, central figure conveys the Socratic (Diotima's) concept of ideal love, which is our longing for immortality that adsorbs and enlightens our perfectionist aspirations on the way to the Oneness. Her *pudica* pose imitates *Aphrodite of Cnidus*, but the Praxitelean prototype stands still as an immutable gift of gods, whereas Botticelli's Venus, although anatomically less perfect, is driven ashore by the joint breath of Zephyr and Chloris, a union of conflicting natural forces. The *pudica* pose was replicated by other Renaissance painter, in particular Giorgione and Titian whose provocative *Venus of Urbino* was reproduced in Manet's *Olympia* arousing a great scandal when exposed only four years after publication of *The Origin of Species*. Despite the amazing persistence of form, the Venetian masters followed an essentially different, Epicurean concept of beauty mounting opposition to Neo-Platonism, whereas Manet was influenced by *naturalism* of his friend Emile Zola, a Darwin's follower.

The sequence of *pubica* nudes embodies the Aristotelian persistence of form filled with different content. For me the *Birth of Venus* and *Olympia* symbolize the Lamarckian and Darwinian view of evolution respectively. I don't know which is better, but, although painted with different techniques, both are beautiful in their own way. They are of a widely divergent ontological descent and the way from one to another was not a straight line, but rather a zigzag line of paleontological sequences.

Darwin belonged to a line of thought traceable from St. Augustine to Calvin, Hobbes, Voltaire, Schopenhauer, William Paley and Malthus who found the panglossian optimism ungrounded or even ridiculous. Darwin graduated from Trinity College, Cambridge and as all his mates was an admirer of William Paley, an intellectual hero of the college, rather than of his grandfather Erasmus. He found serious flaws in the Neo-Platonic interpretation of evolution. In the first place, the criterion of morphological complexity did not work. There are paleontologically documented trends toward increased as well as reduced complexities, if these could have been objectively compared at all. To define progress by anthropocentric criteria was scarcely scientific. Moreover, evolutionary sequences are not direct lines of ascent, but rather chaotic rallies of unrelated forms. Thus mammals originated from theriodonts, the archosaurian diapsids that were dominant before dinosaurs that belonged to a different – synapsid – branch of reptilian phylogeny

Similar considerations have led Thomas Huxley to *agnosticism* (his term) also adopted by Darwin as an existential philosophy that shifted the focus of evolution from the ideal to pragmatic reducing progress of life to progressions driven by the opportunistic process of adaptation. Since opportunists seek effortless existence, adaptation is an anti-conatus development more becoming of dead things than living things. The Huxlean – Darwinian agnosticism rapidly evolved from a thought inspiring “I don't know” to the thought immobilizing “I don't want to know”, a low conatus state of mind.

Spandrels

In his paper “*Darwin and humanities*” dedicated to Charles Darwin's centennial, James Baldwin, a renowned psychologist and philosopher, suggested an interplay of induction and selection as a mechanism for the origin of instincts, the so called *Baldwin effect*. He justifiably considered his ideas to be an extension of Darwin's, and for good

reason, because no else but Darwin explained the Lamarckian inheritance by introducing the idea of pangenesis. He predicted mobile genetic elements and thus founded transposition genetics almost simultaneously with Mendel's founding recombination genetics. However, although Darwin's idea inspired the "intracellular pangenesis" by Hugo de Fries, it waited nearly hundred years for being rediscovered. So powerful was the post-Darwinian paradigm that it succeeded in suppressing Darwin's own ideas (not speaking of Baldwin's) for so long.

Direct inheritance of individual experiences well suited the Lamarckian theory of evolutionary progress, whereas evolution by natural selection explained how masses are driven to their opportunistic destinations. Derived from ontological distinctions, the induction – selection controversy was worked up to a high pitch with the appearance of Weismannian dualism (*Zur Frage nach der Vererbung erworbener Eigenschaften*. 1887) claiming that life consists of two completely autonomous compounds, soma and germ plasma, competing with each other. Having little to do with Darwin, August Weismann's theory was obviously Cartesian. More than two hundred years before Weismann Rene Descartes argued that thinking and physicochemical events in the brain are just parallel processes having no functional relation to each other. Thinking is the only real existence, whereas body is dispensable (in his older years Descartes tried to dispose of this awkward theory, but it was too late for him). When the phenomena of phenocopy and genocopy were discovered (and they have been vaguely known to Weismann already), the dualists immediately announced them to be parallel developments of little if any theoretical significance, thereby undermining experimental work on these phenomena.

Neo-Darwinians supported dualism because it liberated them from thinking of bizarre organismic adaptations. Evolution is about relative frequencies of alleles rather than about elephant's trunks or giraffe's necks. But they overlooked the danger of tipping Darwin out together with all those trunks and necks. First impotency of natural selection unaided by the random process of genetic drift was shown on mathematical models, then randomness was extended from microevolution to speciation through the intricacies of the founder effect. The wholesale neutralism is just a logical outcome of this tendency. Darwin wrote of neutral variation and he admitted the importance of structural constrains.

But the theory in which this constrains are to the status of major agents is emphatically anti-Darwinian.

The currently conflicting concepts of “selfish DNA” and “spandrels” are merely the elegant variations of the same theme. The idea of spandrels as non-adaptive elements of evolutionary design was inspired by the architectural design of St. Marcus cathedral in Venice. But in fact, spandrels are as non-adaptive as the cathedrals themselves. Socrates notorious for his physical ugliness once argued that he is the most beautiful instead, because his protruding eyes see better than the socked ones and, his snubbed nose is ideal for inhaling odors. By failing to persuade his opponent he asserted that beauty is non-adaptive, just a gift of gods that raises us closer to immortality. A functional style, as of public toilets for example, would give you the idea of spandrels. Indeed, the advance of adaptive evolution can be measured by the ever increasing ratio of toilets to cathedrals. Consumerism means that the more we consume the more waste we produce. Yet even under the present day pragmatic orientation our longing for cathedrals occasionally overrides our longing for toilets.

Periodicity

Organisms owe their existence to cooperation of parts integrated by developmental mechanisms. By symbiogenetic theory, the parts might have been autonomous and competitive before organism, the basic unit of life, has appeared. Secondary symbiotic systems commonly start as parasitic and selfish, but evolve toward reciprocal altruism and cooperation, a difficulty for the theory of natural selection, but in the evolutionary perspective more productive than competition.

Early geneticists shifted the focus of evolutionary thinking from organisms to populations of allelomorphs, for which even the most simplistic explanations seemed plausible. Not long ago it seemed that all organismic biology would fall victim to reductionism. But recently molecular biology has found tools for unraveling the immense complexity of developmental processes leaving no room for reductionism. Regulation of even the simplest traits, such as density of stomata, the gas exchange pores on leaves, requires elaborate cascades of genes many of which are involved in regulation of other traits providing for their coordination, as well as in responses to environmental impacts

providing for the entry of environmental signals into the system (e.g., D.C. Bergman and F.D. Sack *Stomatal Development*: Ann. Rev. Plant Biol., 2007, 58, 163-181). Distinctions between genetic and epigenetic processes are becoming less obvious. In effect, old controversies about mechanisms of genetic variation are losing most of their pathos. But ontological controversies remain.

Paleontology presents hard evidence for the life spreading over the globe, the total biomass increasing, the ratio of standing crop biomass to dead mass production decreasing (in my book *Terrestrial paleoecology and global change*, Pensoft, 2004) , and these are progressive tendencies, because progress of life means that there will be more life and less death.

This can only be achieved by increasing efficiency of life systems through division of labor between their components, which makes the basis for biological diversity. Yet evolution is punctuated by mass extinctions, great losses of biological diversity that are partly inflicted by environmental impacts, but must have an intrinsic causation, because even mass extinctions are selective.

Recovery follows recreating diversity and even advancing it to a higher level, because it is built on what was achieved before extinction. Such sequences are many times repeated over the fossil record persuading us that regularities of evolution do exist. In perspective, our survivor as human beings depends on uncovering their meaning.

Theory of natural selection is a great achievement of evolutionary thought by a simple reason that this mechanism does exist. But when we assume that it is the only mechanism of evolution that exists in nature we inevitably endow it with god-like properties of foresight and creativeness forgetting Darwin's description of it as a relentless blind force. Selection, be it in natural populations or concentration camps, implemented by shooting, eugenics, spreading paradigms or ranking scientific journals by their impact factor brings uniformity which is a prelude to destruction. It is opposed by diversity at both individual and species level, because only similar compete, but dissimilar do not.

In both ecological and social systems, competition is a function of ecological niche (social role) overlap that decreases with differentiation of functional roles thus elevating chances for survival for all the players in the field. Coherent groups of organisms that we call species survive not on the principle the fittest have all, but as components of a system

of biological diversity and collapse with it. With the advent of individual life experience, evolutionary advance was enhanced through every new life style discovered, but it was then slowed down with mass adoption of this life style by opportunists who turned it into standard living. This is the intrinsic periodicity of evolution. Adaptation provides short-term safety, but is dangerous in the long evolutionary run. Opportunist existence requires less conatus reducing the distance between life and non-life and is invariably terminated by extinction. A lesson worth to be learned.

If humankind descended from a single pair, as not only religious people but many geneticists believe, then this pair must have nobody to compete with. Founders of new species are given chance to reveal their evolutionary potentials in the absence of competitors. Evolution was extremely slow before organisms were given individuality by sexual reproduction. The meaning of sex and derived systems lays not in providing more work for natural selection, but in their creativity mounting resistance to the morbid power of natural selection. Progress is a breakthrough to a higher level of resistance. People are higher than bacteria not because of our wishful thinking, but because humanity as a system is by far the most effective anti-selection enterprise. Yet historical experience teaches us that it can be turned into a powerful selection enterprise with grave consequences for life on earth. This is what evolutionary theory must prevent.