I.I. PREZENT

J.B. LAMARCK A MATERIALIST BIOLOGIST

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J.B. LAMARCK

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On February 12, 1909, at a solemn gathering in the People's House in Jena, on the occasion of the centenary of Charles Darwin's birth and the centenary of the publication of Jean-Baptiste Lamarck's "Zoological Philosophy," their most eminent successor, Ernst Haeckel, stated:

"Two contemporary schools, 'neo-Lamarckism' and 'neo-Darwinism,' are now vying for supremacy. Since countless other directions in the study of evolution have their followers, who often raise dust clouds in the heat of the battle, obscuring the bright sunlight of truth, it is right and appropriate that today we concentrate our attention exclusively on the works and personalities of both great teachers, whom we have the right and the duty to honour."

Recalling Haeckel's statement, whose words about "dust clouds" can be attributed to many directions and proponents in modern biology, we will focus our attention on one of the great teachers whose honour and duty we have the right to celebrate this year, Jean-Baptiste Lamarck, and on the general biological and ideational-philosophical foundations of his teachings.

It is precisely in relation to the general biological and philosophical foundations of Lamarck's doctrine that Lamarckians, on the one hand, and psycho-Lamarckians, on the other, have raised not columns but whirlwinds of dust that obscure the solar light of truth. This necessitates, to a large extent, resorting to Lamarck's own texts in order to make any assertion regarding the tenets of his doctrine reliable. Lamarck is a difficult author, his style is far from the bright and easy style of the French encyclopedists. Many of his statements are expressed in a way that can be interpreted in different ways. Therefore, it is essential to compare his own statements in order to address certain fundamental questions about Lamarck's concept. I am aware that this type of presentation makes reading the book challenging. However, I would like to believe that all of this is justified by increasing the degree of its conclusiveness.

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One hundred and fifty years ago, a doctrine was unveiled that first proclaimed the historical principle in biology. This doctrine asserted not just the transformation or alteration of living forms but their sequential, increasingly complex development over time and the creation of their diversity in relation to functioning in changing circumstances, through the inheritance of changes acquired in this manner. The creator of this first system of views in biology and philosophy, founded on an historical understanding of living nature, was Jean-Baptiste Lamarck (1744-1829). These new ideas found their full expression and elaboration in Lamarck's work "Zoological Philosophy," published in 1809, marking a breakthrough into the future which rejected the metaphysical views that had dominated the study of living nature for a significant period.

Lamarck initiated his scientific career by advocating the concept of species permanence, the constancy of species characteristics. In his article "Species," published in the second volume of the French "Methodical Encyclopedia" in 1786, Lamarck argued against botanists who "endlessly increase the number of *species* through varieties, having no limits in their desire to create new categories of beings: the slightest difference in size, colour or density between two individuals is sufficient for them to form two separate species. They do not take into account that seeds of the same plant, when transported to two different places and grown under opposite conditions, will inevitably produce, after several years, two plants that will differ greatly from each other primarily in their external appearance." According to Lamarck, differences produced by conditions of growth of this kind do not bear "the character of truly distinguishing features," and species established in this way are far from being true; they only bring chaos to botany. The degree of difference in characteristics does not characterize the distinction between true species, according to Lamarck; such differences can be very slight. "I have ascertained that two species... sometimes exhibit fewer differences between them than two varieties of the same species." The true criterion for distinguishing species is the "constancy of preserving these differences in the reproduction of plants by seeds." Species possess certain constant characteristics that, despite the discovery of random differences produced by varying conditions, invariably reappear during seed reproduction. Varietal differences are reversible during seed reproduction, whereas species differences are not. Hence, according to Lamarck, "both in botany and zoology, a species should consist of a group of individuals similar to each other in terms of the fundamental characteristics of the species." A species established in this manner, Lamarck believed, is genuine, real and permanent. In this context, Lamarck rejected the nominalistic interpretation of species and explained the reason for such interpretation as a confusion between varietal and species differences. "If there were authors," Lamarck wrote, "who doubted the very existence of *species* in nature, this undoubtedly occurred because they, like many contemporary botanists still do, called simple varieties 'species,' and, as a result, they had the opportunity to observe the gradual disappearance of most of the distinctions they had established."

In contrast to the reality of the existence of species in nature, Lamarck, even in this article, considered all other systematic categories as entirely artificial subdivisions that, while useful for science, do not exist in nature. In particular, "since there are species in nature, not genera... the establishment of genera has no other purpose than to facilitate the understanding of species and their natural relationships."

By considering the *constancy* of the reproduction of essential species traits as the true criterion and indicator of their reality in nature, Lamarck was able to perceive the species category not just as a logical classification category but as a specifically *biological* category that only exists where there is offspring reproduction. "Hence," he wrote, "it would be a mistake to consider minerals that we have observed as different *species* because they do not reproduce."

The notion of biological specificity, which we will encounter in a fully developed form in Lamarck's later work when he presents his own system of views on living nature based on the historical principle, was only in its nascent state here. It served not the concept of development but that of the constancy of living forms, without indicating the temporal, transitory nature of such constancy. In Lamarck's early statements on species, one can easily discern the influence of metaphysical ideas about the permanence of "true," ideal forms that are not subject to the influence of external circumstances. At this point, Lamarck is not yet the Lamarck who would rebel against the idea of the constancy of forms, advocate the recognition of their historical development, and thereby, for the first time, oppose metaphysics in biology with a comprehensive system of historical views on living nature.

On Floréal 21 of the 8th year of the Republic, i.e., May 11, 1800, Lamarck delivered an introductory lecture for the course of zoology at the Paris Museum of Natural History. Here, for the first time, he presented his new ideas, which were groundbreaking in the history of science, introducing the *historical* principle.

Instead of the three kingdoms — animal, vegetable and mineral — into which naturalists usually divided nature, Lamarck proposed a different, strictly dichotomous division based on the presence or absence of essential signs of life: "1. Organized bodies. living, 2. Unorganized bodies, non-living." Thus, he unified animals and plants into a single "realm" and provided a general definition of their attributes: feeding, development, reproduction and being subject to death. He particularly emphasized the peculiarity of the nutrition of living bodies, which "themselves form the substance of their own bodies through the activity and capabilities of their organs" and from their residues create all the complex inorganic substances of the mineral kingdom. The laws governing the two realms of nature are sharply different, and in this regard, Lamarck wrote, "it can be affirmed that there is a profound gap between inorganic bodies on one hand and living ones on the other."

In the realm of living nature, both in its botanical and zoological sections, there is a "peculiar and remarkable gradation," which consists of increasing organizational complexity of living bodies, the number and development of their abilities, and the increasing ease, speed, and diversity of means for increasing their numbers. It is this first lecture of the course, marking Lamarck's entry onto the path of historicism, that allows us to understand the motives that led Lamarck to arrange forms of living beings not in ascending but in descending order, not in gradation but in degradation. This question has concerned many researchers of Lamarck's work. Most of them believed that Lamarck used such a descending order as a didactic technique, aiming to present the material from the

better-known to the less-known. In line with this common view. I.M. Polvakov, the compiler and editor of a highly valuable edition of Volume I of Lamarck's Selected Works. explains in his notes (Notes 8, 31, etc.) the reversal of Lamarck's presentation of gradations in nature as a "technical technique." Emphasizing Lamarck's "idea that, following the path trodden by nature, one should begin by considering the simplest animals and then move on to more and more complex ones," I.M. Polyakov writes further, "However, the state of scientific knowledge in his era and the better study of higher animals forced a descending order of considering the animal series as a 'technical technique.'"

I am not inclined to reject the position put forward by I.M. Polyakov, especially since Lamarck himself wrote about his method of presentation through degradation: "...it is wiser to proceed from the known to the unknown, rather than start with what we know poorly." However, Lamarck also made the following critical statements: "The established custom, hitherto maintained, of placing the most perfect animals at the head of the animal kingdom and ending with the least perfect and simplest in organization, arises on one hand from the human tendency to give preference to objects that make the greatest impression on him, please him more, and interest him more, and on the other hand, from the fact that it is preferable to move from the more known to the less known.

"Undoubtedly, in the times when the study

of natural history was first undertaken, such considerations were quite acceptable, but now they must give way to those prompted by the needs of science, especially those that contribute to the successful development of our knowledge of nature." Furthermore, Lamarck wrote that the order of presentation, which "will not only provide a more accurate reproduction of the order of nature but at the same time significantly facilitate the study of the objects themselves," should be gradation.

So why did Lamarck, in contrast to his critical methodological statements, present them in a *descending* order before giving the *ascending* order of stages of animal organization?

Lamarck did not likely compromise his fundamental principles solely for didactic purposes. It can be assumed that fundamental considerations pushed him in this direction.

Anticipating the classification he provided later, which reflects "the most gradual simplification of organization, a simplification that clearly increases from one end of the series to the other, both *among invertebrates* and *vertebrate* animals," Lamarck wrote:

"It is precisely invertebrate animals, more than any others, that vividly reveal to us the remarkable degradation of organization and the gradual reduction of the capacities inherent in animals, which should so greatly interest a naturalist-philosopher; finally, these animals insensibly lead us to the unknown origins of animal life, i.e., to that limit where the most imperfect and simplest in organization animals are located, creatures that, one can suppose, are barely endowed with the attributes of animal nature, in other words, those beings *from which, perhaps, nature began to create animals*, and then over a long period, and with the help of favourable circumstances, brought to life all the others" (emphasis mine — I.P.).

Isn't it clear that the necessity of gradually leading to the origins of natural life prompted Lamarck to choose the method of classifying life forms through stages of degradation? Lamarck's classification served as a means of conveying the significance of evolution not only in the development of life but also in its very origins. The cognitive value of this approach is evident. However, the prerequisite, covering both the evolution of life and its very inception, could only be the proclamation and demonstration of the position that all the abilities of living forms, from their inception, increase in number and develop due to natural factors. Lamarck proclaimed this prerequisite, asserting the omnipotence of time and favourable circumstances: "It can be thought, as I have already said, that the two main means nature uses to give existence to all its creations are time and favourable circumstances. It is known that time has no limits for it, and therefore it always has it at its disposal."

As for the circumstances that nature needed and continues to use daily to modify its creations, it can be said that they are, in a sense, inexhaustible for it. Let's note that Lamarck defends the *boundlessness* of time for nature. This position will need to be taken into account when considering the question of Lamarck's deism. But what circumstances does Lamarck refer to when he mentions those used by nature to modify its creations? Lamarck answers this question right here: "The main ones arise under the influence of climate. different atmospheric temperatures, the entire environment, habitat conditions, habits, movements, actions, and finally, way of life, means of self-preservation, self-defence, reproduction, etc. And it is due to these various influences that abilities expand and strengthen through exercise, become more diverse due to new, long-lasting habits, and imperceptibly, the structure, composition, in short, the nature and condition of the parts and organs are subjected to all these influences, the results of which are preserved and transmitted through reproduction to the next generations" (emphasis mine — I.P.).

We have emphasized Lamarck's words about the emergence of *more diverse abilities* under the influence of new, long-lasting habits. This is important to emphasize due to the prevailing interpretation in the literature of Lamarckian views as contrasting the driving forces of organizational progress, gradation, with the forces of adaptive property formation. This interpretation is often associated with his deistic statements.

In his first introductory lecture in 1800, Lamarck defines gradation as the complexity of organization increasing with the growth of abilities and their greater development. He identifies time and favourable environmental circumstances such as climate, different atmospheric temperatures, habitat conditions, etc., as the two main means for the "creation and elaboration of this countless multitude of existing works of nature." These *natural* circumstances lead to the formation of new, long-lasting habits, the results of which are preserved in offspring. Thus, it is in his very first introductory lecture that Lamarck presents unified laws and driving forces for both progress and adaptations.

In his second introductory lecture in 1802, Lamarck specifically argues that progress in organization, gradation, involves the transition of abilities uniformly distributed throughout an animal's body to their specialized distribution and concentration in specific organs, i.e., the differentiation of organs. Here, Lamarck establishes that organs of little importance for life do not always show conformity concerning their improvement or degradation. These organs are more susceptible to the influence of external conditions, which results in corresponding changes in the shape and condition of external parts. This leads to significant and intricately expressed diversity among species. However, according to Lamarck, both deviations and proper graduations are produced by natural factors. The difference lies in the fact that changes in an internal system of organization require more powerful and much longer-lasting combinations of circumstances than in cases where external organs undergo greater or lesser modifications.

In his lecture in 1803, Lamarck repeated

the idea that all changes in organic forms, including the *complexity of organization*, are the consequences of natural causes: "Relying on numerous observations, we know that, with the help of an extended period of time and under the influence of changes in habitat, climate and, consequently, habits, the organization of animals continuously became more complex, and the diversity of their parts correspondingly increased. As a result, all the animals we know today could have sequentially formed just as we see them now."

Later, in his 1806 lecture, Lamarck explains and substantiates the position that nature directly produced only the simplest living bodies, while all more complex bodies "could have successively originated from the first ones through changes gradually brought about by nature over a long period and as a result of the increasing complexity of the organization of these living bodies, with all acquired changes and improvements remaining unchanged during the process of reproduction."

According to Lamarck, what are the *means* by which the emergence of the simplest organisms and the subsequent complexity of an organism occur?

To explain the origin of the simplest living bodies, Lamarck pointed out that "water, warmth, light, and subtle fluids from the environment become the instruments in the hands of nature by means of which she produces this miracle." As we can see, in Lamarck's interpretation, this "miracle" is a completely natural process. As for the complexity of organization, he explains it in the following way in this lecture: New conditions of existence or new habits acquired by individuals require new functions and, consequently, new organs. The means by which such new formations occur are through the "movement of fluids."

In Lamarck's understanding, "fluids," as in the view of many scientists of the 18th and early 19th centuries, were ordinary substances, among which there were certain especially fine substances distinguished by their particular permeability into other substances and bodies. The functional intensification of specific parts of the body in some particular respect attracted corresponding "fluids" to the "pliant parts" of these areas. These fluids engaged in substance exchange, ultimately resulting in the previously distributed function throughout the body generating a specialized organ in a particular part of the body over several generations.

This is Lamarck's concept, which he retained in his later works. According to Lamarck, there is no need for extratemporal or immaterial means for the complexity of organic forms. "The movement of fluids has the ability to gradually complicate the organization by increasing the number of organs and the emergence of new ones as new conditions related to lifestyle or new acquired habits prompt the need for new functions and, consequently, new organs." This is the position characterizing Lamarck's stance in the "Zoological Philosophy" regarding the driving forces of adaptation to new conditions and the progress of organization. As Lamarck emphasized repeatedly, these are one and the same *physical* forces.

Speaking about the ways of complicating organization, Lamarck believed it necessary to add: "The faster the movement of fluids occurs within a living body, the more complex its organization becomes, and the more branched its vascular system becomes." He reiterated his old formula: "To transform any internal system of organization, a combination of more effective circumstances that exert their influence for a significantly longer time than for the greater or lesser modification of external organs is required."

According to Lamarck, "invisible, subtle fluids" such as heat-oxygen and electricity are sustained and transformed on our Earth through the continuous action of solar light. While altering the structure of organisms, these fluids themselves undergo changes in the process of exchange. For example, the "electric fluid, modified in the process of animal metabolism, somewhat animalized through its presence in the blood, has undergone changes here that allowed it to become part of the body and remain exclusively in the cerebral substance of nerves and the brain, where it continuously enters with the blood," becoming a qualitatively distinct "nervous fluid." Overall, the fluids, which "by their movements... organized living bodies and modified them in various ways... were themselves modified in the process."

In his explanation of the origin of mammals from reptiles, which, according to Lamarck's classification, belong to the 14th class, and which he describes as "indeed including the most perfect animals, i.e., animals possessing the greatest number of abilities. the most developed minds, and, finally, the most complex organization," Lamarck clearly points out that this phenomenon of gradation occurred "under the influence of circumstances." Essentially, Lamarck's position is that "nature, through the agency of heat, light, electricity and humidity, produces spontaneous or immediate births at the end of each of the realms of living beings, where the simplest among them are found." After all, the least perfect living bodies are undoubtedly more complex than the lifeless substances from which they originated.

However, as it seems to me, the decisive argument in favour of the proposition that, according to Lamarck, the same forces, causes and conditions that ensure adaptability also create progress in the living world, lies in examining Lamarck's interpretation of the ways and means of shaping the structure of the body and the development of human abilities. Indeed, for Lamarck, humans served as the highest standard of gradation, against which the degree of higher perfection was measured. For instance, when speaking about mammals, Lamarck wrote that "by its structure, it [mammals] stands closest to man and therefore possesses a more perfect combination of senses and abilities than all other animals."

"Although man, due to the exceptional superiority of his mind, occupies a position outside this series [the general series of animals]," nevertheless, with respect to his organization, he can undoubtedly be considered as a model from which one can judge the degree of perfection or degradation of the organization of all other animals." So, what were the paths and means that led to the highest level of the "gradation" — humans?

In the "Zoological Philosophy," in the section "Some Remarks on Man," Lamarck sets up all his arguments on this issue with the conditional "if": "...if man differed from animals only in his organization ... " But to clarify Lamarck's interpretation of the driving forces and causes of gradation in organization, it is sufficient to focus on this, albeit limited by the term "if," difference in organization, in the structure of the human body, which served as the standard of perfection for Lamarck. In his latest work, specifically devoted to humans, Lamarck wrote: "Man, the most perfect and indisputable work of nature... With the greatest confidence. I can assert that, concerning his physical existence, he is completely subject to the laws of nature... As a part of the world of living beings, he is subject to the laws governing their actions, and his organization is closer in its structure to animals. Furthermore, it is precisely here that nature has achieved its highest perfection — indeed, his organization is more complex than that of any existing animal, and its most important organs are also the most complex, which accounts for

the possibility of the optimal development of the highest abilities." So, how did Lamarck characterize the process of forming the highest stage of "gradation" — humans?

"If man differed from animals only in his organization, it would not be difficult to show that all the features of his structure, on the basis of which his varieties are distinguished as a separate family, represent the result of changes of very ancient origin in his actions, as well as in habits adopted by him, which became the exclusive possession of individuals of his species."

Indeed, if a certain species of *quadrupeds*, especially the most perfect among them, were to lose, due to certain circumstances or for some reason, the habit of climbing trees and grasping branches both with their legs and hands to hold onto trees, and if individuals of this species were forced for generations to use their legs exclusively for walking and ceased to employ their hands for the same purpose as their legs, then, as the considerations presented previously show, quadrupeds would undoubtedly, in the end, become *bipeds*. Their big toe and other toes would cease to be opposable, as their legs would serve only for walking.

Moreover, if the individuals in question, driven by the need to dominate and see everything happening around them, make efforts to maintain an upright posture, consistently preserving this habit from generation to generation, then undoubtedly, their legs would gradually adapt to supporting the body in this upright position and they would develop calves. These animals would have difficulty using both their legs and hands simultaneously for walking.

Finally, if these same individuals were to stop using their jaws as tools for biting, tearing and grabbing, or as instruments for cutting the grass they feed on, and started using them exclusively for chewing food, then undoubtedly, their facial angle would increase, the protruding front part of the skull would gradually shorten and eventually smooth out completely, and the incisors would assume a vertical position.

Individuals of the dominant species in question, having mastered all the convenient places for habitation and significantly multiplied their needs, as their communities became more numerous, must have increased the stock of their ideas and, consequently, felt the need to transmit them to others like themselves. Without a doubt, these individuals had to make constant efforts and use all the means at their disposal to create, enhance and diversify the signs required by their ideas and numerous needs. Being unable to express all these numerous and necessary signs solely through pantomimic gestures or changes in their voice, they apparently acquired the ability to produce distinct sounds through various efforts. Initially, they probably used only a small number of such sounds, continuing to rely on vocal inflections for this purpose. However, later on, they increased, diversified and improved these sounds in accordance with their growing needs and acquired skills in pronunciation. Indeed, the habitual exercise of the throat, tongue and lips in articulating sounds must have significantly developed this ability in them.

This is the source of the emergence of the remarkable ability of speech in this particular species. Thus, everything is created solely by needs: these needs gave rise to efforts, and the organs adapted for articulating sounds must have developed further through the habitual use of them.

When presenting the ways and means of forming the specific features of the structure and functions of the human body, its bipedalism, Lamarck refers to the "considerations presented in the previous chapter." In the previous, seventh chapter of the "Zoological Philosophy," Lamarck discusses the influence of circumstances on the actions and habits of animals and the impact of the actions and habits of these living beings as causes that alter their organization and its parts. It is in this chapter that Lamarck formulates his famous "two laws of nature": the first one creating organs adapted to the circumstances of life as a result of the use of specific body parts, and the second law — the hereditary transmission of acquired characteristics, provided that the acquired changes are common to both sexes or to the individuals from which new individuals originate. In this chapter, Lamarck cites, as evidence for the formulated principles, examples such as fast runners, like greyhounds, the changes in wild plants under cultivated

growing conditions, and so on. It is in this chapter that Lamarck outlines the methods for developing adaptive changes. *These same principles* are the foundation for explaining the development of traits of higher perfection the traits of the organization, structure and functioning of the human body. Thus, there is no doubt that Lamarck encompasses both the course of gradation of organization and the course of developing adaptive changes with a *unified principle* encapsulated in the laws he formulated.

However, here in the seventh chapter, when discussing gradation or degradation, Lamarck contrasts the correct course of gradations with the destructive influence of various circumstances. He writes: "The state in which we currently see animals represents, on the one hand, the result of increasing organizational *complexity*, which seeks to maintain the correct course of gradation, and on the other hand, the result of the influence of a multitude of very diverse circumstances constantly striving to disrupt this correct course of gradation within the increasing complexity of organization." In the sixth chapter of the "Zoological Philosophy," Lamarck talks about two different causes: the cause of organizational complexity and a special cause of deviations in the course of gradations (or degradations). "If the cause continually leading to organizational complexity were the sole cause influencing the form and organs of animals, then increasing organizational complexity would proceed everywhere with continuous, proper

consistency. But this is far from true. Nature is forced to subject its actions to the influence of circumstances, and these circumstances constantly alter its creations. This is the special cause that produces deviations here and there in the course of degradation, caused by the influence of the conditions of habitat and the acquired habits." Lamarck illustrates his point further. He writes that if there were only aquatic animals living in identical conditions - at the same depth, in waters of the same salinity, in the same climate — then these aquatic organisms would exhibit a completely proper and gradual gradation, unaffected by diversity. However, since in reality, waters vary greatly — freshwater and saltwater, stagnant and flowing, waters of hot and cold climates - animals of the same level of organization end up being differently modified due to the influence of these diverse conditions.

So, how can we explain the apparent contradiction where Lamarck talks about the unity of the driving forces of gradations and adaptations on one hand, and on the other hand, asserts that there is a cause that distorts the course of gradations due to the adaptation to local conditions of existence? Lamarck is referring to the deviating action of environmental conditions, to which an organism adapts due to acquired habits, not as isolated phenomena but as a general zoological principle: "Increasing organizational complexity undergoes deviations here and there in the overall series of animals caused by the influence of habitat conditions and acquired habits."

To understand the apparent contradiction in Lamarck's theory, we must consider the following. According to Lamarck, life within an organism leads to the combination of material "basic elements" into complex compounds, which could not have combined without life. "These compounds become more complex as the life energy increases." The life energy, or the energy of organic movement, is a derivative of the "increase in fluid movement energy." These fluids, the "subtle forms" of which are continuously sustained by solar energy, undergo an organization influenced by life's presence, becoming a prerequisite for further, even more energetic movement. This can be observed, for instance, during the formation of arterial-venous circulation and the development of the nervous system, among other processes. The increasing involvement of the primary fluid in organic exchange processes, its "animalization," leads to its own increased complexity and acceleration of its movement. An essential factor here is that "each newly acquired organ system is always retained at all subsequent stages of organization." Since this preservation of acquired traits gives the increasingly complex and faster-acting fluids time for their action. Lamarck concludes that "nature never ceases to work on the continuous improvement of its [organ systems]." As a result, according to Lamarck, "life, especially under favourable circumstances, inherently strives by its very essence (emphasis mine - I.P.) for organization complexity, the creation of specialized organs, the isolation of these organs and their functions, the division and increase in the number of various centres of activity. Over time, various observable living organisms must have emerged from this abundant source... This is the way nature truly created its *works*, although it directly formed only the simplest living bodies."

We come to the conclusion that, according to Lamarck, both the "abundant source" for the formation of all living bodies and the pathway through which nature created all its creations are unified, encompassing all the structural and functional features of living beings, including both their graduated and adaptive traits. This unified source and pathway for the formation of organic beings are determined by the activity of the same invisible fluids, such as caloric and electricity, which serve as the "spring" of life energy, influencing visible fluids, i.e., substances that fill the "matrix" that Lamarck considered the "cellular tissue of the body." Adapting to circumstances, the movement of fluids generates new organs and improves them through habitual use, which is inherited and consolidated over time.

Flowing from a common source and driven by unified forces, the increase in organization and the adaptation of organs to conditions are at the same time distinguished by associated abilities. According to Lamarck, "all abilities, without exception, are phenomena of a purely physical nature; in other words, each of them represents a product of organizational activity." With organs forming the stages of increasing complexity in organization, there are associated specific abilities that arise at certain stages, are preserved, and perfected at subsequent stages: digestion, respiration through a specialized organ, muscular action, sensation, sexual reproduction, the ability to circulate vital fluids, mental ability of varying degrees. Later, Lamarck added an eighth ability to these seven — "reproduction by viviparous means, i.e., in a way that gives active life to the embryo at the very moment of conception." All these eight abilities Lamarck defined as "constant and of primary importance," in contrast to other specific abilities that he referred to as "changeable and of lesser importance." He classified the latter as specialized organs and abilities related to mobility, touch, grasping objects, tearing and grinding food, attacking and defending, vocal expression, and so on.

The organs and their corresponding abilities, which are "constant and of primary importance," are, according to Lamarck, the results of a single life force, which itself has its source in "exciting causes" — oxygen and electricity. When they emerge, these special abilities, marking the path of organizational complexity, remain constant, i.e., they do not disappear in the future but are expressed differently in different species, adapting to *local* circumstances. For example, when talking about the ability to breathe through a specialized organ, an ability that arises on the stage following polyps, Lamarck writes that "nature, having established a specialized *breath*- ing organ, gradually modified it for the purpose of its improvement and adaptation to the habitat conditions of animals." The specialized breathing organ in the form of gills, which is a higher stage than tracheae, took on two forms among mollusks based on differences in habitat conditions: aquatic and aerial. "But in both cases," Lamarck writes, "these are still just gills, and it seems extremely inappropriate to assert that mollusks breathing air have *lungs*. Who is not aware of how many times the incorrect use of words and the improper application of terms have led to a distorted understanding of things and caused confusion?"

In this and similar statements, the motives that led Lamarck to distinguish adaptations from the relationships between stages of organization become clear. Prior to Lamarck and during his time, *homology* and analogy of organs were often equated, which found vivid expression in the tenets of transformism. It was only with the emergence of the evolutionary concept that the task of distinguishing between two types of organs that are analogous in biological function but differ morphologically — morphologically homologous and morphologically analogous — arose, and Lamarck initiated this differentiation.

What is "aerial respiration"? It can occur with both the "gills" organ and the "lungs" organ, which are included in different "systems of organization." Despite the apparent commonality of the functions of aerial respiration, one must be able to discern the profound difference between the organs that facilitate it at different "stages of organization." "The nature of the lung is completely different from the nature of the gill cavity of some mollusks... A respiratory cavity devoid of a *respiratory* throat and bronchi, incapable of expanding and contracting alternately, a cavity into which the inhaled fluid enters not through the mouth and which adapts either to aerial or aquatic respiration, cannot be considered as lungs in any way. To designate such different organs with the same name not only fails to advance the science but hinders it. Lungs are the only respiratory organ capable of endowing an animal with a voice. After reptiles [in the context of degradation, as Lamarck perceived it], no animal possesses lungs, and therefore, none of them has a voice."

As we can see, in characterizing the specificity of the lung, Lamarck introduces the presence of "voice" associated with it. In its own further development and improvement, as part of the associated "system of organization," the lung will become an essential feature that makes the emergence of "speech" possible, which is entirely excluded for gills, even if they are "aerial." In this homological context, Lamarck examined the organs and systems of organization of living beings, sharply distinguishing and even contrasting the characteristics of the "stages of organization" and the characteristics of "adaptation to local circumstances."

For Lamarck, when he constructed the system of living beings, developed princi-

ples for studying the living world and presented its "system," the starting point of evolution — the emergence of life — and the "final" of evolution — the emergence of humans — were always present in his mind. This key element underlies many of Lamarck's constructions, his positions and formulations. The roots of his contradictory positions on gradation and degradation lie here, as we have noted before. This is also where the roots of his often-encountered "teleological" formulations, such as "nature... had the aim of achieving such a plan of organization that would allow the highest degree of perfection," lie. This is the central theme of his "Zoological Philosophy" - the dual examination of the animal system: first, through degradation, back to the origins of life, and then through gradation, towards humans, despite Lamarck's numerous "ifs." Therefore, Lamarck often employed expressions like "on the one hand" and "on the other hand" — on the one hand, the increasing complexity of organization, and on the other hand, the distorting influence of "a multitude of various circumstances" on the "correct course of gradation."

There are two types of diversity: one, often subject to analogy and reversibility, and the other, "a special kind of diversity," irreversible and subject to homology, which cannot be lost amidst the vast array of forms and parts of animals formed under various circumstances. Lamarck carries this idea throughout his entire system of "Zoological Philosophy." In this sense, he speaks of two reasons for diversity, although essentially in his constructs, both types of diversity — gradation and adaptations to local circumstances — stem from a common source and are driven by unified forces.

Lamarck divided specific abilities into abilities: a) of primary importance, which are the result of the sole "force of life," less susceptible to the influence of circumstances, and indestructible after their emergence, and b) numerous abilities of lesser importance, arising not only from the "force of life" but also from the circumstances of life, which can greatly alter them and even destroy them. It is important to remember that, according to Lamarck, the highest standard of perfection — the physical organization of humans — is a derivative of the second group of abilities. Lamarck believed that the physical organization of humans, as he wrote, is indebted to functions altered by circumstances such as mobility, chewing, phonation, i.e., abilities listed in the second group of his classification. Thus, despite some contradictions, Lamarck essentially regarded life circumstances as all-powerful, capable through two laws of formation — adaptation and heredity — of leading to the creation of humans.

As for the "force of life," it is a somewhat obscure concept, as we have noted before. It is the "energy of organic movement" that, according to Lamarck, is a derivative of the "increase in the energy of fluid movement."

The idea of the natural emergence of life, as well as the natural origin of humans through evolution and its driving forces, matured early in Lamarck's thinking. In his early years, Lamarck formulated his overarching philosophical credo. These formulations sound deistic. "Without a doubt," wrote Lamarck, "everything exists only by the will of the Almighty Creator of all things. But can we prescribe rules to Him and indicate the methods for fulfilling His will when we are only allowed to understand this will by observing His actions? Undoubtedly, it would be audacious, or rather - complete recklessness, to attempt to establish the limits of the power of the Supreme Creator of all things, and due to this alone, no one would dare say that this boundless power might not have wished for what nature itself accomplishes as His will."

We encounter such deistic statements from Lamarck in his later works as well. In "Zoological Philosophy," he writes: "To consider nature as something eternal, i.e., existing at all times, seems to me an idea devoid of foundation, abstract, indefinite, improbable and unsatisfactory to my reason. Having no possibility of knowing anything certain on this subject, having no premises for any conclusions regarding this matter, I am inclined to think that *nature as a whole* is nothing else but the product of the creative act of the Supreme Creator. Therefore, I want to assume the existence of a first cause, in other words, the highest power that created nature and made it as it is." In the same spirit, Lamarck expresses himself in one of his later works, "Analytical System of Positive Knowledge of Man" (1820).

Lamarck's deistic views can be summarized as follows:

The "Supreme Being" created "matter" and the "order of things," subjecting the former to the latter. This "order of things" consists of an inexhaustible source of motion. various laws governing all kinds of movement. and boundless time and space. A synonym for the order of things is nature, which is the force that shapes all physical bodies from matter, and the activity of nature is limited and subject to the laws inherent in nature, with the direction of these actions changing according to compelling circumstances. According to Lamarck, the essence of nature is its activity, which forms and produces continuously, albeit gradually, and changes the direction of its actions each time circumstances require it. Nature, as an active force, is far from being rational or having intentions, as it is everywhere limited, and in each particular case, it inevitably acts in the same way when the circumstances are similar. This regular activity of nature is purely of a physical nature, and hence, all its products are physical bodies. As Lamarck put it, "Nature itself, however great its power may be, acts and can act only physically, produces and accomplishes everything only in time, only gradually, and never instantaneously. Each particular action on its part is governed by a law; and if, likewise, a particular circumstance, also unique, changes the direction of its action, then its new action is again governed by a unique law: this is what is constantly observed."

This is what "nature," or alternatively, the "order of things," is according to Lamarck. It is a "*force, dependent* and, thereby, very distinct from the supreme force, which indeed acts on all physical entities, on matter — its only domain, forms different bodies, modifies them, changes, destroys and renews them continuously."

Therefore, according to Lamarck, there are no supernatural elements inherent in the effective nature; all its elements — motion, laws, time, space — are essentially physical and only produce physical phenomena. One of the phenomena produced by nature or the order of things, as pointed out by Lamarck among the listed products of nature, is the complexity of organization.

"The order we call nature, does it have any power? Does it do or produce anything?" Lamarck asks and answers, "Certainly, we can answer this question affirmatively because we have been and still are witnesses of its power and the results of its actions in all the physical, chemical and physiological phenomena that have been observed and studied. Therefore, not without reason, we have long called all the bodies we observe *natural bodies* and said that minerals, plants and animals are *the products of nature*.

If we were correct in these designations, if nature possessed and always possesses the power to do all that we observe, if it produces all changes, all disturbances, all decompositions, all complexities and all restorations, then it also produces bodies of all kinds and gives existence to what we call species among its creations."

So, according to Lamarck, the complexity of organization, just like the various types of living bodies, is created by nature. Lamarck specifically emphasizes that "everything that nature does is subject to the circumstances in which it acts, and in all its actions, it applies time."

Here arises the question: What is the nature of Lamarck's deism? Were his deistic statements incorporated into his principles and methods of understanding nature? Specifically, did Lamarck consider the "order of living nature" as the embodiment of some supreme will and intelligence, a primary design of the Creator? Does this divine will and intelligence shine through in living beings, in their properties, relationships and development, according to Lamarck? Do Lamarck's explanations of the paths and means of evolution require a "beyond," a supernatural "first cause"? In short, according to Lamarck, is there something in nature, in its laws, causes, connections, that speaks of its divine origin?

After a critical examination by Marx and Engels, it is known that deism can be a particular covert form of materialism, a convenient and easy way to distance oneself from religion. However, the history of philosophy and natural science also knows of a deism that, while denying the constant intervention of God in the affairs of nature, nevertheless asserts that God once "set it in motion" in a specific way, which can be discerned in its fundamental structure. In Cuvier's view, God repeatedly destroyed living nature through global catastrophes and then recreated it through some form of "transmigration," without directly interfering in the actions of its laws. But in Cuvier's interpretation of laws, the idea of supreme providence and higher intelligence is implied. In Leibniz's "Monadology," in the world created by the Creator, there is no place for the immediate intervention of the "supreme will." However, the entire world of monads is permeated with harmony and spirituality, expressing the supreme intelligence, which is evident in the absolute purposefulness of its creation. John Locke, who fought against the idea of a God "sitting in heaven in the form of a man," still believed that "in all the works of creation, so clear are the signs of extraordinary wisdom and power that any rational being who seriously reflects on them cannot but be led to acknowledge a deity." Voltaire, the famous author of "Candide" who opposed the idea of a "pre-established harmony," believed that "every real event is born of the past and in its turn gives birth to the future." At the same time, he claimed that experience tells us not only about the material world but also about its great geometer and "prime mover" - God.

Jean-Jacques Rousseau opposed divine "revelations," religious cults and all kinds of miraculous interventions of God in worldly events, stating that "everything I feel outside of myself and that affects my senses, I call matter." However, at the same time, he believed that matter is passive, and that motion is communicated to it from an immaterial source. From this, he concluded the existence of an immaterial mover of the universe. whose reality is manifested in the free will of the immaterial soul. This form of deism has, so to speak, a constructive value, influencing the principles and methods of its adherents when they act as scientists, and in many ways hindering them from discovering the truth. What, then, was Lamarck's deism? There is no reason to assume that Lamarck's deism, as a dedicated and selfless scientist, was a compromise with conscience and a deliberate disguise. There is no doubt about the sincerity of all his deistic statements. However, when analysing Lamarck's principles and methods of teaching, we should focus on the objective side of the matter, and therefore, we need to find an answer to the question: Did the "creator" occupy any place, and if so, what exactly, in Lamarck's outlined paths of living nature, in its causes and regularities? In other words, does Lamarck's system of evolution of life require the existence of God? The answer to this question regarding adaptations and gradations has already been given in the previous presentation and analysis of Lamarck's concept of living nature. According to Lamarck, the beginning of life is natural, and it does not require extraneous explanations; the evolution of life, including the formation of humans, adheres exclusively to the laws of natural order (which, of course, does not necessarily confirm the complete accuracy of Lamarck's interpretation of these laws and causes). All mental properties of animals and humans, including instincts and the ability to reason, according to Lamarck, have their roots in "physical causes." The title of the third part of "Zoological Philosophy" speaks for itself: "Reasoning on the Physical Causes of Sensation, Physical Causes that Produce the Force that Drives Actions, and Finally, Physical Causes that Determine the Mental Acts Observed in Various Animals." This title characterizes the author as a proponent of a materialistic interpretation of issues related to the mind. Lamarck vehemently opposes those who posit an "inaccessible interaction between divisible matter and indivisible 'self,' a chasm in our understanding, and an eternal stumbling block for any philosophy." He criticizes such agnosticism and writes: "It takes a certain amount of courage, it seems to me, to set the limits of knowledge accessible to the human mind, just as it takes courage to set limits on the intellect itself and measure its capacity. Who, indeed, can claim that man will never acquire certain knowledge and never penetrate certain secrets of nature? Hasn't man already discovered many important truths, some of which seemed completely beyond his reach?... This imaginary entity, having no counterpart in nature, I only regard as a product of imagination created to resolve difficulties that could not be otherwise resolved due to the insufficient study of the laws of nature. It is somewhat like global catastrophes that were invented to explain a series of geological questions that present difficulties

for us precisely because the mode of action of nature in various, continuously occurring changes has been scarcely studied."

In none of his specific investigations whether on the origins of life, its evolution, the origin of humans, mental abilities and phenomena, or geological phenomena – does Lamarck see the need to go beyond nature. According to Lamarck, there is nothing, so to speak, "supernatural" in the laws of nature. This, for him, is the "law of investigation." He explained his position by saying, "If we are already dealing with the phenomena of nature, then it alone should be the subject of our study. We must investigate only the facts that it reveals to us and strive to discover the physical laws governing these facts. However, we should never include in our reasoning the consideration of objects lying outside of nature, i.e., those about which we can never learn anything positive." In these words, we see a kind of "agnosticism," an "ignorabimus," but this can be entirely explained by the fact that Lamarck refused to speculate within science on supernatural topics. Lamarck does not reject the possibility of a supernatural existence but removes it from the realm of positive knowledge about nature. He does not require any supernatural cause when studying and explaining natural phenomena. When discussing the phenomena of the organization of living beings and the abilities associated with it, Lamarck emphasized that "all these phenomena owe their origins solely to physical causes." Lamarck comes to this conclusion, which he considers a guiding principle of knowledge, a "law" in all his research. In general, Lamarck is inclined to admit the "existence of a prime cause" with its "supreme power, which created nature." However, this power did not leave any trace in the evolution of living nature, and Lamarck never finds any evidence of creation in this evolution. He writes, "Thus, as a naturalist and physicist, I must deal in my research on nature only with bodies that are known to us or have been accessible to observation; only with the qualities and characteristics of these bodies; only with the relationships established between them in various circumstances; and finally, only with the results of these relationships and the various movements constantly maintained in them."

"Only by this method, the only one at our disposal, can we, to some extent. understand the causes of this multitude of phenomena presented to us by nature in its various parts, and even come to the discovery of the causes of the remarkable phenomena exhibited by living bodies, in other words — the causes of the existence of life in those bodies endowed with it." In general, according to Lamarck, "nature possesses, thanks to its inherent properties, everything necessary to accomplish, through its own forces (emphasis mine - I.P.), that which we admire in it." If Lamarck were asked a sacramental question about the evolution of living beings, similar to the one Laplace was asked — how the idea of the creation of nature by a creator helps him in his research on the evolution of living beings — then Lamarck, if he were logical, should have answered, like the great astronomer, "I have no need for this hypothesis to explain the evolution of living nature." It is no coincidence that Lamarck resorts to God in a very peculiar way. Following the chemist Lavoisier, he repeats his phrase that "God, by providing the Earth with light, laid the foundations for organization, sensation and thought." Light, he argues, gives rise to *heat*, and heat is the mother of generations, the material soul of living beings.

Thus, according to Lamarck, the Creator, having created matter and nature, left nothing immaterial in the universe and freed the naturalist from the need to appeal to His wisdom in their specific research activities.

This is Lamarck's deism.

In the fundamental epistemological question concerning the relationship between thought and being, Lamarck was a materialist. He repeatedly emphasized his agreement with Locke's formula that "there is nothing in the intellect that was not previously in the senses" and that "everything generated by the mind but not connected with an object perceived through sensation is undoubtedly a chimera."

He fights against the concept of "innate ideas" and writes, "I acknowledge as an unconditional rule, as an undeniable truth, that there are no *innate ideas*, that every idea is acquired after the first vital actions and arises directly or indirectly from the sensations experienced and impressed upon us." Thus, Lamarck aligns himself with the materialistic aspect of Locke's teachings.

Even dreams and delirium. Lamarck explained to be the disorderly reproduction of *mental* representations. "Never," Lamarck wrote, "can an individual make tangible to himself in a dream representations he never had before: in other words, he cannot dream of objects about which he never knew anything." Lamarck had a more nuanced understanding of the relationship between thought and sensation than Condillac, Cabanis and de Tracy. He objected to these authors who reduced thought to sensations, and wrote that it was "extremely important to distinguish sensation resulting from mental activity from physical sensation." At the same time, he emphasized that "undoubtedly, both of these kinds of sensation have physical causes." As Lamarck wrote, all representations, without exception, are nothing more than the result of the images or specific characteristics of objects affecting us. These images or characteristics are reproduced in the mind only when they leave a trace in the special organ of the mind, which he considered to be the large cerebral hemispheres. Differentiating between "simple" and "complex" representations, Lamarck wrote that by the former, he meant "all those that arise directly and exclusively from our noticed sensations, conditioned by objects either external to us or within us." Complex representations, on the other hand, were those that were formed by the combination of simple ones in a way that preserved the resemblance to the objects from which they were derived.

Mental activity, according to Lamarck,

consists of "attention," which prepares the "organ of the mind" for performing its inherent acts; "memory," which revives previously acquired representations based on traces left in the mind; "reflection" on these representations, i.e., their comparison and the revelation of relationships between them, giving rise to "judgements," i.e., analysis and conclusions that serve as the source of the *will to action*: "acts of imagination," which involve constructing new representations through comparisons and judgements based on previously acquired representations, serving either as models or as contrasts. Particularly strong imagination, guided by very sound judgement, constitutes genius. However, the same imagination, if not subjected to rigorous judgement and not limited to "objects existing in nature," leads to errors. Even the most whimsical and unusual representations ultimately have their source in simple or complex representations of objects in nature, constructed as contrasts or opposites. Lamarck writes that "man, having arrived at the concept of the finite, created through the power of his imagination the concept of the infinite; by forming the notion of limited duration, he created through his imagination the notion of eternity or boundless duration; by constructing the notion of body or matter, he created, through the power of his imagination, the notion of spirit or immaterial essence, and so on and so forth."

In the formation of complex first-order representations, and from their comparison, the formation of second-order representations, and so on, "almost to infinity," according to Lamarck, speech plays a significant role. While challenging Condillac's assertion that conditional "signs" are necessary for the immediate formation of representations, Lamarck also emphasized that these "signs" or elements of speech are crucial because they enable the exchange of representations, thereby allowing for the almost boundless increase in their number and complexity. Additionally, they create, beyond individual reasoning, a "collective or nearly universal reasoning."

According to Lamarck, all mental operations are acts that take place within a specific organ: the hypocephaletum, which refers to the cerebral hemispheres of the brain. Where this organ is absent, there is no mental activity. This organ evolves historically through a series of gradations and develops through exercise, following fundamental laws, just like all other organs. In insects, which lack the hypocephaletum, Lamarck argued that they cannot have representations but only simple perceptions of objects that affect the individual, i.e., sensations. Animals with no nervous system whatsoever have no sensations and possess only simple irritability. However, the repetition of irritations leads to them becoming increasingly habitual. Lamarck asserted that a consistent rule applies to mental activities of all degrees and forms: "Where there is no organ for a particular capacity, the capacity itself cannot exist." Therefore, Lamarck disagreed with some mechanistic materialists like Condillac, de Tracy and Cabanis, whose judgements did not consider the *historic* formation of organs and their inherent functions. These authors *reduced* thinking to sensations. Lamarck, on the other hand, contended that both sensations and instincts, as well as reason, are the result of external influences that are transferred from the outside to the inside to the extent of the organization of the living body.

However, while arguing against a mechanistic reduction of the complex to the simple, Lamarck himself acknowledged mechanistic principles in explaining psycho-physiological phenomena. The essence of the matter is that, regarding psycho-physiological functions, Lamarck considered nervous fluid to be the active principle. He believed that the brain and the entire nervous system, which he considered a container for the action of nervous fluid, were entirely passive. The complex structure of the hypocephaletum, with its numerous and diverse parts, cavities, and regions of varying shapes and sizes, only accounts for the complexity and diversity of the traces left by nervous fluid perceptions. This separation of activity and its transformation into an independent body separate from the brain was one of the consequences of Lamarck's overarching concept of "subtle fluids" as distinct, energetic substances separate from living bodies. This misunderstanding by Lamarck regarding the self-motion of living bodies is connected to his general mechanistic conception of forces as external drivers of material bodies.

Not only is matter itself inert, but the organization of this matter does not impart any activity to it, as Lamarck staunchly defended in one of his articles. Lamarck wrote, "The term 'organization' refers to the order of things observed in every living body, but we have not paid attention to the fact that organization itself is just one of the conditions for life. It is necessary to discover the cause capable of exciting and sustaining the continuous series of movements within it. Regardless of its nature. organization is merely a passive subject; it constitutes only half of the conditions to the extent that it maintains its essential integrity, and the cause that enlivens and triggers the continuous series of movements within it is entirely foreign to it."

Lamarck not only disagreed with John Toland, who proclaimed that "matter is as necessarily active as it is extended," but also with the great French materialists who demonstrated that motion is an attribute of matter. Lamarck persistently deprived matter and any material body of motion as their inherent property. "Certainly, motion cannot be inherent to any kind of matter, in a word, it cannot be a property of any body." But what about the pervasive fluids? Lamarck then specifically addressed this issue and stated that neither heat fluid, nor electric fluid, nor magnetic fluid possesses any inherent activity that would be their own essential attribute. Their apparent activity is of the same order as the "activity" of a pneumatic gun whose air can propel a bullet when compressed but "has no movement of its own. And I ask," Lamarck declares, "is it impossible that there are substances that we can only perceive when they are in a state of motion caused by external factors beyond them? As for me, I am entirely convinced that substances of this kind exist."

The mechanistic concept of forces and inert matter nurtured Lamarck's deistic positions. If every body lacks its own self-motion, then the entire world, inert matter itself, implies a mover external to matter. Only God can be such a mover.

Why did Lamarck find it necessary to isolate motion from matter as persistently as illogically and unconvincingly characterize this isolation as "entirely evident and at the same time one of the main principles of physics"? Why did the author, who devoted all the power of his talent to proving the "obvious and indisputable fact that there is nowhere in the entire physical world absolute rest, no immobility and no mass whose strength is absolutely unchanging," need such an unnatural separation of motion from matter? We believe that Lamarck needed this unnatural separation because of his clear inability to find in the "field of realities," as he called the physical world, clear and real "traces of creation."

On one of these "discoveries," we will further elaborate. At the same time, it is worth noting the following: Lamarck was too much of a naturalist not to notice the insolubility of the contradiction between asserting the creation of the world's principles — matter and motion — and being convinced of the universality of the physical causes of the existence of the world. He was a vehement opponent of including anything outside the "field of realities" in the realm of positive knowledge, arguing that even the word "metaphysical," which cannot express anything accessible to our positive knowledge, should be discarded. Simultaneously, he invoked a creator from the meta- (beyond) physical realm. He defended the formula: "There is nothing in the intellect that was not previously in sensory perception," while understanding that "the representation we have of the spirit lacks any positive foundation." Yet, in a purely rationalistic spirit, he considered the highest level of knowledge to be "the concept of the Supreme Creator of all that exists." He proclaimed the inaccessibility of our understanding to everything related to the creator and the immediate results of his activity, while confidently outlining acts of creation: separately — matter, and separately — nature, as if the creator himself were present.

It seems to us that Lamarck could not help but understand the epistemological inconsistency with the real world and the hopelessness of the contradiction in which he, as a thinker, was entangled. Nevertheless, he could not escape from this contradiction because, as we assume, the roots of this contradiction lay primarily not in the epistemological but in the pseudo-humanistic domain. Some of Lamarck's statements support our conclusion: "The tendency that inspires fear of *destroying our existence...* makes him [man] feel fear and aversion to destruction and provides a source of hope for a second infinite existence that will follow death. In this hope, our thoughts find consolation in the loss of the first. Its positive foundations, however, are not yet known, and they remain to be discovered. However, humans have long been able to elevate their thoughts to the *Supreme Being* through observation of some of His creations that are available for contemplation. And this great thought has strengthened his hope and inspired religious feelings, as well as the obligations imposed on him by these latter."

Thus, according to Lamarck, the fear of death is a source of hope for an afterlife and, in general, a source of religious sentiments. A person who fought against the illusions of the "soul" as a second "self" could not admit such an illusion into the "field of realities." However, he accepted it and tried to "justify" the world soul — the creator — by referring to some "observations" of His creations that are available for contemplation, without specifying exactly which creations of the creator are available for contemplation. Lamarck could not specify this because he believed that a person could not only contemplate but "cannot have any correct and true *understanding* of metaphysical objects" (empahsis mine — I.P.). As for observations, "we can only observe the activity of nature, the laws that govern it, the results of this activity, in a word, only bodies and what pertains to them; everything that is the immediate result of the activity of the higher power is incomprehensible to us, just

as this power itself is incomprehensible to us. To create, i.e. to create something out of nothing, is an idea that we will never comprehend, because in everything accessible to our knowledge, there is not a single similar example."

Furthermore, Lamarck, having proposed his first principle for knowledge, considered it, along with two principles of social morality, as "the greatest service that can be rendered to social man." This principle should help social man "correct his thinking, giving him the ability to distinguish prejudices or biases from positive knowledge... The first principle: Any knowledge that is not an immediate product of observation or a result of conclusions drawn from observation has no value and is entirely illusory." Contrary to all this, Lamarck persistently proclaims a creator. For what reason? I believe the answer is contained in Lamarck's own words: "For human thought, which is generally strictly limited, the *field of imagination*, where it gains almost absolute power, has a great deal of attraction. In it, it creates pleasant and flattering illusions that sometimes give it the opportunity to escape from everything that oppresses it. Thanks to the activity of thought, the field of imagination reaches its highest limits. Of the products of imagination, only hope is absolutely necessary for man. Indeed, everyone nurtures it within himself, and one must be an enemy of man to deprive him of this blessing, which sometimes remains his only consolation in the final moments of his life."

In the name of this "hope," which eases

the "final moments," Lamarck considered it necessary to leave some room for a creator. But in order to step out of the realm of illusions, he detached motion from matter, making it easier to let the creator unite them. This is how Lamarck created the illusion of at least some epistemological foundation for his deism, which he could not draw from the sphere of his characteristic interpretation of realities on a materialistic basis, albeit without overcoming mechanicism. After all, he was primarily a naturalist and investigator of nature, with all the inherent irresistible force of materialistic tendencies. However, all this only applied to the area he specifically and deeply researched.

Indeed, as soon as Lamarck transitioned from questions of classification and revolutionary relationships to a brief consideration of the interactions of different animal forms. their interdependence in the process of reproduction and distribution, he did not delve into the concept of the revolution of interactions between organic forms under certain conditions of their existence. Instead of such a seemingly natural revolutionary aspect, Lamarck turned to the principle of harmonious equilibrium, to the mutual compensation of the forces of destruction and reproduction of organic forms as "wise precautions." Lamarck wrote that man is not afraid of the largest and strongest animals and "even has the ability to exterminate their species." However, in his opinion, such capabilities are paralysed by the fact that "nature has endowed man with numerous passions," due to which, unlike animals. "man is as if assigned the duty to continuously reduce the number of his kind." Lamarck concludes all these arguments with the following words: "Thus, thanks to these wise precautions, everything remains unchanged in the established order of things; continuous changes and renewals to which it is subjected are kept within certain limits from which they cannot escape. All species of living beings are preserved, despite the changes they undergo; acquired improvements in organization are not lost; everything that appears to be a disruption, destruction of order or deviation from it is continuously reintegrated into the general order and even contributes to its strengthening; everywhere and always, the will of the supreme creator of nature and everything that exists is carried out unswervingly."

The deistic postulates, which are entirely unnecessary for Lamarck when he seeks specific causes and natural laws from the perspective of development, immediately acquire a powerful, legislative character as soon as Lamarck deviates from this path. At best, he remains within the bounds of what Robiné formulated as the "law of the equality of good and evil in nature," which, even for Robiné, explained nothing and was associated with his *departures* towards deism from materialistic views.

But what new horizons would have opened up for Lamarck if he had remained true to his fundamental position of seeking specific natural causes from the angle of history in the question of the relationships between organic forms! Biotic relationships between organic forms would have appeared before Lamarck as integrated into the historical process of creating forms and functions. The ability to reproduce, as well as the characteristics of reproduction in small and large animal species, would have been included in the study of historically acquired abilities, rather than hanging in the air as once-given and so alien to Lamarck's entire "law of investigation" that they found no place in the "gradations."

Lamarck observed a very important regularity in the living world, demonstrating through invertebrates "that which nature loses in terms of size in each individual, she compensates for abundantly in the number of these animals, their immense fertility, their astonishing ability to reproduce quickly and increase the size of their rapidly appearing offspring." Lamarck noted the significant fact that "individuals of the same species rarely prey on each other; they are in a state of war with other species." However, without subjecting these observations to a natural scientific theoretical analysis from the perspective of historical development, he redirected them from nature to the "original creator" - and here. deism took revenge on Lamarck as a naturalist who paved a path of historical biology research but deviated from these positions in unsubstantiated reasoning about the relationships between organic forms.

To understand the roots of Lamarck's deism, one must consider the following. La-

marck was not only a scientist but also a citizen who closely sympathized with the great events of the French Revolution. His sympathies were with the people against the tyrants. "Accept, O generous and victorious people, victorious over all enemies, people who have managed to reclaim your sacred rights, inherent in you by nature; accept, I say, not a flattering greeting, as was offered to kings by crawling slaves under the old regime, or by the nobility that favoured them, but rather a tribute of astonishment and admiration, deserved by your virtues and energy. developed through the wisdom and unwavering persistence of vour representatives," Lamarck addressed the French people with these words, dedicating his work "Investigations into the Causes of the Principal Physical Phenomena" (1794) to them.

Coming from a minor noble background, Lamarck did not become a slave to class interests and expressed this in the principle he recommended to "social man": "No matter how strong a social man's attachments may be to various objects around him, aside from his natural attachment to family or people who had a role in his youth, these attachments should never contradict the public interest, i.e., the interests of the nation to which he belongs."

Lamarck spoke of society as an initially simple agreement among people, which, as it progressed towards civilization, led to inequality in positions and intellectual states, despite the equality of natural abilities. This inequality gave those who possessed more resources dominance and the opportunity to rule over others. He believed that civilization brought poverty, disease and moral corruption to the majority of people congregating in cities. Lamarck argued that "only in a certain state, somewhere between poverty and wealth or greatness, do people enjoy the pleasures of a peaceful and happy life." Thus, it is easy to see the influence of Jean-Jacques Rousseau in Lamarck's social views. Rousseau's teachings were the ideological program of Robespierre, who considered atheism as the ideological weapon of the aristocracy and bourgeois plutocracy. "Atheism is aristocratic; the people need religion, purified of priests and rituals, a pure cult of the Supreme Being" — this was the gospel of Robespierrism. Lamarck, who sympathized closely with the Jacobin wing of the revolution, apparently shared this viewpoint and made considerable efforts, albeit with limited success, to serve it through a series of arguments in his writings.

These, as we see it, are the socio-class roots of Lamarck's deism, which, apart from verbal expressions, left no trace in his biological research as a naturalist, which did not lead him to deism. Deism in Lamarck only persisted where he did not conduct independent research or where he limited himself to empirical observations outside the historical-biological aspect. Deism did not penetrate the fabric of Lamarck's own historical-biological doctrine. Lamarck's naturalist genius was great enough not to allow him such a departure from the truth, to which he came close given the scientific conditions of his time and even surpassed his era.

Lamarck was a classic representative of natural-historical materialism, although he did not overcome mechanism with all its limitations and inconsistencies.

But if we are correct in our general conclusions, how can we understand Engels' comment regarding Lamarck, who wrote:

"The *inner purpose* in an organism subsequently paves its way through *desire*, according to Hegel (V, p. 244). *Pas trop fort* (not too convincing this). Desire should [according to Hegel] bring the individual living being more or less into harmony with its concept. Hence it is clear how much this *inner purpose* itself is an ideological determination. And yet, this is what Lamarck is based on (Und doch liegt hierin Lamarck)."

Did Engels consider Lamarck a teleologist, believing in a spiritual driving force behind the world and its phenomena, evolving towards a predetermined goal set by someone?

To answer this question, one should turn to Engels' statement where he characterizes Hegel's concept of "inner purpose."

In "Anti-Dühring," Engels writes: "In any case, the application of Hegel's 'inner purpose,' i.e., a purpose that is not introduced into nature by an intentionally acting external element, like the wisdom of Providence but consists in the necessity of the phenomenon itself, leads philosophically undisciplined people to constantly and frivolously impose conscious and intentional activity on nature."

So. the "inner purpose" mentioned by Engels is not introduced into nature by an external element, like divine providence, but rather consists of the necessity inherent in the phenomenon itself. However, even this kind of application of the concept of "inner purpose" is an ideological determination fraught with idealistic tendencies when insufficient philosophical discipline is applied. As previously noted, Lamarck's formulations resemble the concept of "inner purpose," although he fundamentally and consistently asserts the necessity of the phenomena themselves. Only his unwavering natural-historical materialism prevents Lamarck from succumbing to the philosophical indiscipline of imposing conscious and intentional activity on nature. "I hope to prove," Lamarck wrote, "that nature possesses the necessary means and possibilities for self-creation of everything we admire in it." Lamarck dedicated his tumultuous life to substantiating this idea. The immortal merit of this great scientist lies in being the first to proclaim the historical principle in biology. He defended the position that "species... possess only relative stability and cannot be as ancient as nature." This great achievement of Lamarck was duly appreciated by the classics of Marxism, who placed his name in the illustrious ranks of those great naturalists who stormed the fortress of metaphysics.

* * *

The fate of Lamarck's doctrine is remark-

able. Unrecognized during the author's lifetime, it subsequently found numerous followers vving for the "right to inheritance." Among them are "psycho-Lamarckians" who grossly distort Lamarck's teachings in the spirit of idealism and "mechano-Lamarckians" who were unable to overcome the mechanistic traits present in his doctrine. Charles Darwin accepted Lamarck's proposition regarding the inheritance of acquired characteristics, which is essential for the historicity of organic forms and for the cumulative action of natural selection. Konstantin Timiryazev and Ernst Haeckel explored Darwinian problems while enriching the theory of evolution with Lamarck's ideas about evolutionary factors. At the same time, contemporary metaphysics in biological science, represented by vitalists and organicists, have maligned Lamarck, denouncing all genuinely materialistic aspects of his doctrine as unscientific.

Finally, in the struggle for materialism in biology, Michurin's doctrine, avoiding a superficial approach to both Lamarck and Darwin, emerged as the true heir of everything genuinely scientific in these views. Thus, Lamarck's doctrine, in its best and truly materialistic aspects, found its development in the most progressive biological doctrine of the present day — the Michurin doctrine — which absorbed all the genuinely scientific heritage of the history of biological knowledge.



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