

DARWIN, MARX, AND WARRANTED PROGRESS:

*Materialism and Views of Development in Nineteenth-Century Germany**

While Marx clearly saw no historical inevitability forcing every society to pass through a capitalist stage, he did see capitalism as a necessary condition for some societies if his vision of a post-capitalist society was to be realised. I should perhaps emphasise that such 'visions' were significant to Marx only if based on concrete analysis of the internal dynamics of development of capitalist society, and of the social forces set in motion in the course of this development. This is all he meant when contrasting 'utopian' with 'scientific' socialism (Stachel 1984, 85.)

INTRODUCTION—DARWIN AS CHIEF WITNESS OF PROGRESS

Set-backs in political and social, moral and scientific life, which the unified and selfish efforts of priests and tyrants have sought to provoke in all periods of history, might hinder or seem to suppress general progress, but the more unnatural and anachronistic these reactionary pursuits are, the faster and more energetically they induce the progress which inevitably follows them. For, this progress is a law of nature which cannot persistently be suppressed by human power, through either weapons of tyrants or curses of priests.¹

No doubt, it was a sign of not little civil courage if one dared to voice such thoughts in the Germany of 1863. More remarkable, however, is the identity of the person who uttered them and the occasion he chose to deliver such a statement. The sentences quoted are from the opening address to the 38th Conference of German Natural Researchers and Physicians (*Versammlung deutscher Naturforscher und Ärzte*), given by the morphologist and embryologist Ernst Haeckel (1834-1919). The topic of his speech was, of course, not the political situation of the German states still shaped by the restoration following the failed revolution of 1848. Rather, he was talking about the theory of evolution that Charles Darwin (1809-1882) had published in his *Origin of Species by Means of Natural Selection* from 1859. Haeckel was at that time the most active and influential German propagandist of Darwin's theory, which had already stirred many disputes in Germany, among scientists as well as within the broader public, by the early 1860s.² But, as the quotation shows, what Haeckel also propagated was the belief that Darwin had established and proved a "law of progress" for the realm of living beings and furthermore, that this law ruled the history of mankind.

This speech, as well as other talks and articles of Haeckel on this topic, should be seen and assessed in the context of the German Scientific Materialism of the time, also known as Vulgar Materialism and associated mostly with the names of Carl Vogt (1817-1895), Jakob Moleschott (1822-1893) and Ludwig Büchner (1824-1899). This materialism played an important and today often underestimated role in German cultural life after the failure of the revolution of 1848. Especially in the 1850s and 1860s, it was accorded a significance which basically overburdened it.³ Being almost the only voice left under the practice of censorship in the restoration period which could afford to argue against a Christian creed that then dominated public opinion, it was immediately (if indirectly) assigned a critical political character since the alliance of throne and altar had been firmly re-established. The *raison d'être* of this materialism was to confront the Christian creed with results of the sciences—for example, to face the myth of creation with the “conservation laws” of energy and matter (hence the title of the most famous book of Ludwig Büchner, *Kraft und Stoff*), or, to give another example, to confront the doctrine of the immortality of the soul with physiological claims according to which all psychic functions were mere effects of organic activities (Carl Vogt).

Whereas physiology served in the 1850s as the most important weapon in the materialistic side's arsenal in this ideological battle, this role switched over to the Darwinian theory during the 1860s. On the one hand, the biological theory of evolution was employed as an ideological weapon in the same way as the physiological arguments before it—for example, as a refutation of the myth of creation or of the still widespread and popular physico-theology. But, on the other hand, by using the theory of evolution in this way, the ideological criticism of the materialists was transformed into an openly political statement. As the quotation of Haeckel showed, this new openly political character was closely connected with the view that the biological theory of evolution confirmed a “law of progress.” If it was a fact established by science that “progress” cannot be held up, then the inevitability of the overthrow of those trying to hold it up was also a fact established by science. And, in view of the clear-cut political situation then given in the German states, the materialists did not even need to name the political and social forces whose fate was thought to be sealed by science.

It is probably unnecessary to stress that Darwin's theory was invoked in this way as chief witness for a conviction which arguably cannot be derived from it. It was a belief which initially existed entirely independently of it and which later hailed Darwin's theory as its supposedly scientific confirmation but whose connection was contingent rather than logical. Even if Haeckel were right, and if Darwin actually had established a “law of progress” for the realm of living beings, it would of course not decide the question whether the history of mankind is necessarily a history of progress. The same is true with respect to the fact that Darwin himself believed that cultivation, competition, and selection of individuals, races, and nations brings about continuous progress within the history of mankind.⁴ This belief was not a necessary outcome of his theory of evolution, but shows rather how widespread the conviction then was that the historical development of men constitutes a progressive history, a development through which men obtain ever higher degrees of excellence with respect to technology and science, regarding the forms of their social and political

life, and ultimately as moral beings.

In discussions on the use or abuse of the biological theory of evolution for the justification of economical, social, and political convictions, Social Darwinism⁵ occupies the centre of interest, and rightly so, if we think about the murderous racism of the Nazi movement. But it should be remembered that this strain of Social Darwinism first materialised in Germany in the two last decades of the nineteenth century, whereas in the 1860s and 1870s, Darwin's theory was used as evidence by those who believed in a progress brought about by solidarity rather than competition or selection. I refer, of course, to the German labour movement taking shape at that time. For Ludwig Büchner, the veteran of the German Scientific Materialism, the "struggle for life" was a unshakable law of nature that also ruled the history of men but had to develop a more humane form in the course of the historical advancement of human reason (*Vernunft*).⁶ In contrast with this, the German Social Democrats paid almost no attention to the "struggle for life" or the "survival of the fittest" when claiming Darwin as a witness for their cause.⁷ For them, his theory primarily confirmed the principal of development itself, implying a two-fold meaning of this principle. On the one hand, they saw confirmation of the general principle that nothing is permanent and, hence, that the existing social and political order would not last forever. On the other hand, they saw confirmation of their belief that historical development is an objectively progressive development, independent of our wills and wishes, like a law of nature.

In this contribution, I will not go into the political implications of a view which considers the collapse of the criticized social and political state, as well as the emergence of the desired state, inevitable and warranted by certain laws of development. I will not deal explicitly with the problem of reductionism either, that is, with the question of if and how ideas that consider progressive development as a physical necessity miss the peculiarity of the human mode of life and its historical dynamic by ascribing it to alleged (or well established) laws of nature. Rather, I will at first try to outline roughly the ideas of development that referred to a natural law of progress (section 1.1). In a next step, I will briefly examine the relationship of these ideas to much more general ideas of development from that period which defy any classification under the labels "materialism" or "idealism" (section 1.2). I will then confront the ideas of development that considered themselves supported by Darwin's theory with the mechanism of development inherent in the theory of the latter (section 2). Against this background, I will finally discuss some aspects of Marx' theory of history (section 3).

1. VIEWS OF DEVELOPMENT

1.1. Progress as a Physical Necessity

Long before the proclamation of the end of history came into fashion, it was already a mark of good breeding to look down on the nineteenth century's unquestioned optimism about progress. It cannot be doubted that the belief in historical progress was an essential component of the political and historical convictions in that century. But, as is well known, this belief was neither peculiar to the nineteenth century nor did it

originate with it. It was particularly the eighteenth century that developed the idea that the history of man is a development ruled by laws and following a determined direction—mankind overcoming its barbaric beginnings and achieving ever “higher” forms of civilization. In contrast with this, the historians of the nineteenth century became more and more hesitant to subscribe to laws of history and progressive development.

However, my subject matter is neither the question of whose confidence in historical progress was less deliberate, that of the eighteenth or that of the nineteenth century, nor the attempt to delineate the peculiarity of the nineteenth century’s ideas on progress. Rather, my theme is a certain strand of these ideas which apparently occurred first in the nineteenth century—the conviction that the progression of history is governed by a *law of nature*. As the quotation from Haeckel’s opening address shows, the use of the term “law of nature” in this context was neither merely metaphorical, nor a rhetorical analogy, nor a reference to the “nature” of man. Rather, it was literally about a law of nature, that is, a law also functioning in nature and which can—at least in principle—be established scientifically.

The fact that convictions of that kind occur within the views of history in the nineteenth century marks a sharp dividing line with respect to earlier ideas on progress. For, by assuming such laws of nature, all the familiar sources and guarantees of progress are dismissed—the perfectibility peculiar to man, man’s creativity and inventiveness, and, above all, his ability to reason (*Vernunft*). It was precisely by abandoning the dominant belief that the historical development of man is ultimately determined by the mind—either the human or the divine—that the idea of a progress as a “physical necessity” distinguished itself from the known views of progress and why it deserves attention as an interesting element of nineteenth century’s materialism.

The assumption of progress as a physical necessity was as little the outcome of Darwin’s theory of evolution as the general idea of a progressive development in history. That becomes immediately obvious if we remember that Herbert Spencer’s (1820-1903) theory of universal laws of development, probably the most prominent instance of a theory of progress as a physical necessity at that time, was shaped in its essential features before the appearance of Darwin’s *Origin*. Spencer’s programmatic essay *Progress: its Law and Cause* was published in 1857.⁸ Furthermore, such theories of progress as a physical necessity were not reflections of a historization of the image of nature (*Naturbild*) dawning within the sciences. Notwithstanding evolutionary speculations of nature around the turn of the eighteenth century,⁹ the sciences of the first half of the nineteenth century did not actually understand nature as something which evolves historically. The approaches to a historical cosmology or, at least, to a history of the solar system, which Immanuel Kant (1724-1804), Johann Heinrich Lambert (1728-1777) and Pierre Simon Laplace (1749-1827) had attempted in the eighteenth century were all but forgotten by the middle of the nineteenth century, dismissed as a speculative ballast by the scientific community of astronomers. It is true that the geologists of the time did agree, in light of the then known palaeontologic facts, that the state of the planet Earth must have undergone considerable changes in its past. But whereas these antiquities of the Earth testified to a history of repeated catastrophes intelligible only as God’s interventions for those in the tradition of George Cuvier (1769-1832), for those in the tradition of Charles Lyell (1797-

1875), they proved the periodical oscillations of states that show the Earth in a state of dynamic equilibrium if a sufficient long period of time is taken into account. It seems to be clear that neither can be called a historical theory of nature. Darwin's theory of evolution was so desirable and attractive for those who believed in progress as a physical necessity precisely because they had not been able, up to that point, to refer to a scientific theory that dealt with historical developments in nature to support their conviction. For instance, Spencer's starting-point within the realm of science was neither cosmology nor geology, but the morphological theories of the 1830s and 1840s, which claimed that the arrangement of the morphological forms within taxonomic classes conformed to a principle of increasing differentiation of function, to the principle of increasing "physiological division of labour" as Henri Milne Edwards (1800-1886) put it.

Given this state of affairs, one may ask what explanatory models of development did exist then that could legitimately be invoked as models of scientific explanations? To my knowledge, there are only two such explanatory models of development within the realm of sciences of modern times preceding Darwin. One is a pure mechanistic model, in which development results from the mechanical interactions between the entities involved. Rene Descartes' (1596-1650) cosmology, or Kant's and Laplace' hypotheses on the emergence of the solar system, are good examples for this first model. The other model supposes a special cause of development in the developing object. Good examples for this second model are theories of ontogenesis supposing an inner mechanism of development, either a specific force, a formative drive, or the working of a specific structure.

1.1.1. Accumulation of Effects

The first model, which explains development as result of merely mechanical interactions between material entities, allows a variety of forms in which states can succeed each other—oscillating successions like the alternation of day and night, or successions periodically moving through a cycle of states like the sequence of the seasons, or irreversible successions following a determined direction like the sequential order of geological strata. Furthermore, it is possible to connect this last form of succession with the assumption of progress. This would be the case, for instance, if the succession of states is not understood merely as a transition from one state to another but as a process of cumulative transformation, that is, as a process in which the structures achieved at a certain moment serve as new points of departure for further advances or further differentiation. Herbert Spencer's law of "advance from homogeneity of structure to heterogeneity of structure" (Spencer 1891, 19) seems to exemplify to this model, as does Jean Baptiste Lamarck's (1744-1829) theory of transformation of species from the beginning of the nineteenth century.¹⁰ Needless to say that it is impossible to achieve neat results, like a sequence of animal forms in the case of the latter theory, from purely mechanical interactions without explicitly or implicitly assuming that certain stable constraints and necessary prerequisites are always given.

However, because of its indefinite nature, this mechanistic model was not very suitable as an explanatory model of progress in history. It is true that this model is

strictly deterministic, and supposes that every given state of the natural world is completely determined by a former state. This meant that if the state of the world at its beginning were known, it would be possible to calculate every state of the world, the present as well as any of the future—possible, that is, at least in principle, or for the *Laplacean Demon*. But, as Friedrich Engels (1820-1895) has observed,¹¹ it makes no real difference whether you call an event completely determined in this sense or a coincidental result. One should recall that this mechanistic model was originally framed by philosophers like Descartes and Kant for demonstrating the possibility to comprehend a *given* structure of high complexity, namely the solar system, as the mere result of mechanical interactions between particles of matter. No wonder, therefore, that this explanatory model had to yield more than it could if applied as a framework of laws that have to guarantee the progress of historical development.

1.1.2. Programmed Development

The second explanatory model, developed in the context of biological theories and assuming an inner mechanism of development, was as strictly non-teleological and strictly deterministic as the first one. It was, however, at the same time, an attempt to overcome the limits of the mechanistic model. In the framework of the latter, it was not possible to explain plausibly why a germ covers all the stages of ontogenesis peculiar to its species and matures to the specific adult form of its species purely by a blind mechanistic interaction with its environment. The supposition of an inner mechanism seemed to be much more adequate for an account of the ontogenetic development regardless of how the biologists conceived this inner mechanism of development—as a specific force, a *vis vitalis* (*Lebenskraft*) inherent in all organic matter as assumed by Caspar Friedrich Wolff (1738-1794), as a formative drive (*Bildungstrieb*) peculiar to all organisms as supposed by Johann Friedrich Blumenbach (1752-1840), or as the outcome of the specific structure of organisms (Lamarck).

It was the epigenetic view of the processes of ontogenesis that forced biologists to grant the germ the ability to develop, under normal conditions, in a way typical to its species from an almost unstructured stage at the beginning to the articulated and differentiated form of the adult organism. It was not a valid scientific assumption to take this ability as a faculty which anticipated the mature stage in the manner of subjective teleology. Natural processes of development therefore had to be conceived which were non-teleological but nevertheless followed a determined direction. If it is permitted to call the mature stage of an organism a “higher” stage of development than that of the fertilized egg, then they would constitute in addition a form of “progress.” While it is true that my expressions become more and more tautological as I progress, there seems to be an inevitability to it at this point, because the process of ontogenesis, if conceived of as an epigenetic process, is the proper paradigm for the idea of a progressive development towards a “higher” stage of perfection—a paradigm with precarious consequences.

1.2. Progress as Destination and Justification

The ontogenetic process of maturation apparently served as *the* natural model-process of development, at least for the nineteenth century's ideas of progress. It did so entirely independently of the explanatory efforts of biologists and the philosophical orientations of those convinced of a progressive development, that is, regardless of whether they subscribed to a materialistic or an idealistic philosophical system.

This paradigm of maturation points back to primeval forms in which history was conceived of according to the paradigm of the life-cycle. This paradigm was not silent about decline and death that comes after the mature stage, considering (and rationalizing) it as a necessary stage in the reproductive process by which life renews itself. This cyclic view of history, rooted in a relationship with nature peculiar to dominantly agrarian societies, imagined the life of the collective as lasting eternally. Taking all stages of the life-cycle to be present at the same time, this view of history comprised neither past nor future nor the idea of a destination which had to be realised in the course of history.

By confining its view to the rising half of the life-cycle, the paradigm of maturation makes ideas of development conceivable in which the subject of history has a future, a destination. It is advancing towards the state that corresponds to its essential nature. Oversimplifying matters tremendously, we can distinguish two basic views of the form in which the subject of history accomplishes its course.

According to the first of these views, history is a process in which several obstacles have to be overcome and in which pains and problems connected with birth and growth are an inevitable part of a ceaselessly advancing process—*per aspera ad astra*. Good examples for this view are Auguste Comte's (1798-1857) three-stages theory of the development of the human mind, the ideas of progress as a physical necessity nourished within and by Haeckel's *Monistenbund*, or the confidence in future developments widespread among German Social Democrats following Eduard Bernstein (1850-1932).

According to the second view, the development towards the essential state of mankind is a highly dramatic process in which phases of steady advance are interrupted by upheavals, revolutions, and crises in which the entire success of the process is at stake. With respect to nineteenth-century Germany, it is inevitable to mention Georg Wilhelm Friedrich Hegel (1770-1831) in this context. His conception of development is also shaped by the paradigm of ontogenetic maturation,¹² but it is not the conception of a steady and gradual process of development from the stage of "in itself (*An sich*)" to that of "for itself (*Für sich*)."¹² Hegel conceives of this process rather as a contradictory one, comprising struggles for life and death in which the essential state can only be achieved through stages of "self-externalization (*Selbstentäußerung*)" and "self-alienation (*Selbstentfremdung*)."¹² The conception of loss-of-oneself (*Selbstverlust*) as an indispensable prerequisite for gaining one's proper nature goes back not only to Jean Jacques Rousseau (1712-1778), but also to the above-mentioned mythological rationalizations of death. It is, however, essential to notice a decisive difference here. In the old paradigm of the life-cycle, death was rationalized as a necessary mediating step in the reproduction of life. In contrast with this, within the frame of the ontogenetic paradigm, death is rationalized as a ferment of maturation.

Alienation from oneself as the essential intermediate stage of the course from undeveloped beginnings to the fully evolved essential nature remained a fundamental pattern in the conceptions of development among the disciples of Hegel, and even of those who had publicly renounced the doctrines of their former master. This pattern occurs in Ludwig Feuerbach's (1804-1872) philosophy as well as in the writings of the young Karl Marx (1818-1883)—the “complete loss of man” is thought of as a prerequisite of its “complete re-winning” in the famous *Foreword* to his critique of Hegel's *Philosophy of Right*¹³—and of the old Friedrich Engels who distinguished three principal steps—primeval communism / private property / modern communism—through which world history accomplishes its course.¹⁴

It is not possible to discuss here the precarious implications of the ideas of development following the ontogenetic paradigm as elaborately as they deserve. To mention just a few: by assuming an inner force of development—regardless of whether in a teleological or in a non-teleological sense—these ideas suppose a subject of development which is, in principle, the unit of development in the same way an organism is the unit of the ontogenetic process. The mind of historical mankind (Comte), or the Human species (Feuerbach), or communism (Engels), was then embryonic in its beginning stage, like an organism, and developed in a programmed way towards its mature form. Such an elevation of abstractions to the rank of autonomous entities which, in this case, are moving as maturing spirits, does certainly not favour sober-minded studies of historical processes and their forms, but might deserve respect as an indication of an understandable belief in history having a sense, even one justified by nothing more reliable than a *horror vacui*. Much more precarious than this is probably the fact that these ideas are not less deterministic than the mechanistic model framed within the context of cosmology, as discussed above. Views of development that follow the ontogenetic paradigm not only understand the future fatalistically as destiny. They also consider the mutilations and devastation of human lives produced by real history vindicated within this model of development. They are justified as pains of martyrs, as sacrifices, or merely as inevitable costs of progress.

In this contribution, I will content myself with the remark that those models of development in the second half of the nineteenth century that claimed progress according to laws of nature did not provide alternatives to this precarious paradigm. Rather, they must be seen as mere variants of this archaic scheme. The theoretical naiveté of these models can probably be best made clear by a confrontation with Darwin's theory of evolution or, at least, with those features of his theory which are of special interest in this respect.

2. DARWIN'S THEORY OF EVOLUTION¹⁵

“Variation” and “natural selection” are key notions for the mechanism by which Darwin tried to explain the alterations of species. This is well-known. It might be less known that the assumption of an alteration of species became originally attractive for Darwin as a possible scientific explanation of the phenomenon that species are generally well adapted to their natural environment.

The often stupefying phenomena of adaptation had long served as an inexhaust-

ible reservoir of suitable objects for physico-theological contemplation. As long as one could assume a by-and-large stable natural environment, these phenomena could be admired as the “wise pre-ordination” of nature by its “author.” If, however, the natural environment proved to be not stable, such a “wise pre-ordination” did not any longer suffice. Rather, one was in need of an account not only for the phenomenon of adaptation as such but also for its continuous adjustment. And this was exactly the situation in the first half of the nineteenth century when geology and paleontology showed historical changes in the conditions of life—changes of the “places,” in Darwin’s words—which could not be ignored. On the background of these geological changes, a scientific explanation of adaptation, that is, one without recourse to supernatural causes, was an entirely new challenge. This was Darwin’s starting-point from which the decisive assumptions that shaped his initial investigations become clear.

From the outset, Darwin ruled out the possibility that species may undergo alteration because of an internal developmental cause like that of the ontogenesis of an individual organism. In view of the problem of adaptation, a conception of the phylogenetic development of species as an internally determined process would lead to the monstrous assumption of a “pre-stabilized harmony” between the geological processes of the Earth and the supposed developmental determination innate to species. This is the background to why Darwin consistently did not use the term “evolution.” This starting point shaped furthermore his initial view of the alterations of species which considered them merely reactions to the changing geological states of the Earth. Geological changes played the active part in this process, the living beings the passive role. Moreover, in connection with that view, he took the historical development of species to be a process of replacement of poorly adapted variants of a species by fitter ones. As he later grasped, this may account for the phenomenon of adaptation, but not for the historical development of living beings on the Earth. Their development is in general characterised by an increase of the number of species, in spite of massive extinction and, above all, the differentiation of species into descendent species with different directions of development (“development of divergence”).

Darwin achieved his final solution not through deeper consideration of the general problems of development but by gaining new insights into the peculiarity of his object—the *teleonomic*¹⁶ nature of the relationships among organisms and with their environment. In order to clarify the point it might be helpful to look at some of the crucial revisions of certain of his initial assumptions which helped Darwin finally understand the development of divergence as the key for the historical development of the life forms.

Firstly, he modified his understanding of adaptation. Whereas his initial conviction had been that the pressure of selection leads to a “perfect” adaptation to a certain “place,” he later came to assume that it only caused adaptations sufficient for a given constellation of competition among certain species. That means Darwin no longer believed that the “place” completely determined the structure of the organisms that utilized it as a resource of their life. Rather, the “place” determined the parameters of performances in connection with its utilization only in the rough sense of a frame, but did not determine the structures of organisms that proved to be suitable for such performances.

Linked with that, Darwin revised secondly his initial conception of an one-way

dependency of the organism's evolution on the "place." As Darwin came to realize, the perspective that the "place" determined the development of organic structures (in the aforementioned rough sense) had to be completed by the opposite perspective that the organic structures developed at a certain time also determined what counts as a "place." To give an example, without structures that enable organisms to live outside of the sea, land is only potentially a "place." It was only with the development of the first organisms with structures suitable for a life on shore that it was realised as a "place."

Based on that realization, Darwin developed thirdly a view which was crucial for his understanding of the development of divergence: the pressure of selection favours not only those mutants better able to use an already realised "place," but also those able to use new, not yet realised "places" as resources. In addition, this "creation" of new "places" was two-sided: new organic structures did not only make new resources of life accessible, but constituted themselves new resources of life, if other new structures used them as such resources.

The historical process of development and differentiation of the organic forms thus appeared as a process induced and propelled by this differentiation. With respect to the ideas and models of development discussed in this contribution, I would like to summarise this process as follows.¹⁷

Alteration is part of the reproduction of living beings. These alterations are not caused primarily by external factors, i.e. changes in inorganic conditions. The prevailing development of divergence in the realm of living beings, the increasing differentiation of function and the organic structures' increasing capacity for performance are therefore not side effects caused by geological changes. Thus, evolution is not the result of an accumulation of effects originating in periodic adaptations to different geological states. Based on such adaptations to the respective inorganic conditions, the historical development of organic forms is an internal process to the extent that it results from the 'self-relation' of the biosphere. That must not be mistaken as a 'self-relation' of "life." We are not dealing with relationships that abstract concepts might have in this article. Rather, our topic is the relationships between species, or to be more precise, among the individuals of such species, which are external and independent beings to each other.

It is true, this internal development of organic forms does not rest on a developmental urge innate to organisms. It is a process, however, which is initiated and maintained independently of external impulses and incentives. In addition, it is a process with the general tendency to multiply types of organisms through a development of divergence, to create structures with more differentiation of function, and to make them more suitable for fulfilling increasingly difficult tasks.

This tendency cannot be comprehended adequately by the concept of an accumulation of effects. It is true that within this process, the result reached at a certain time serves as the starting point for further development, and it may be possible to plausibly explain differentiation in this way. But it does not explain the correlation among the types of organisms, which makes up the peculiarity of this differentiation along with its tendency. This correlation has a teleonomic character. Within this correlation, each organic structure constitutes a means of appropriating resources and is, at the same time, itself a potential resource. Furthermore, the development of structures

suitable for the appropriation of such potential resources receives its impetus from the “struggle for life.” The process then continues on a higher level. It is this teleonomic peculiarity of the correlation among the types of organisms that introduces what can be characterised as the tendency to develop and optimize “Nature’s technology” (Marx and Engels 1991, XXXV 375 fn 4; 1956 XXIII 392 fn 89).

The historical development of the types of organisms thus has a “logic”; it is subject to the laws governing the development of “Nature’s technology.” That does not mean, however, that the process involved can be calculated. It is impossible to predict how the potential within a certain stage will be realised, because the factors which work together in this process are not coordinated by a law. Each tiny accidental step, which partly releases such potentials, generally has irreversible consequences and cuts off the realization of others. The accidental event thus irrevocably determines the further development, and becomes a necessary condition of it. The historical development of organisms is thus not only an irreversible process, but also unique and unrepeatable. It is an open process, in spite of its “logic” of development, to the extent that its results cannot be derived from origins that predetermined them. The historical development of the organic forms on our planet is thus, according to Darwin’s theory, a self-activating, irreversible, and unrepeatable process which is subject to certain laws and tendencies. It does not, however, have a goal. Despite uninterrupted causal determination, the outcome of this process is not “inevitable,” but necessary and accidental at the same time.

Naturally, it was not the intention of this short depiction of some basic features of Darwin’s theory of evolution to recommend the replacement of certain old yet still influential paradigms of development by this theory. Darwin’s theory is one¹⁸ theory of the historical development within a special sphere of nature, that is, within the realm of living beings, which deserves attention - not because it can be generalized but because it comprises possible ways to frame theories on development which are not yet well-known. The purpose of this depiction was, rather, to show that in the second half of the nineteenth century, the peculiarity of development Darwin had conceived of was not grasped fully by the advocates of ideas of development thought to be supported by Darwin. Although one has to admit that Darwin can be misunderstood easily, since the basic features of his theory emphasized here remain rather implicit in *The Origin*, these faulty interpretations of his model of development were probably not due to misunderstandings alone.

In any case, with respect to one crucial point, Darwin was not misunderstood by his adherents. They understood that he did not offer any explanation of the direction of development; they realised that his theory did not grant a permit to conceive of, for instance, the origin of *homo sapiens* as a necessary result of the biological evolution. “I believe [...] in no law of necessary development” Darwin wrote in *The Origin* (Darwin 1859, 351). Even though he used the term “progress” in *The Descent of Man* (1871), he never distanced himself from this position. That was soon generally considered a decisive fault of his theory of evolution and ultimately led to the first neo-Lamarckistic reaction. Thus, his adherents tended to “amend” his theory in the sense of the old paradigms of development rather than searching for new insights from it.

3. A DARWIN OF THE HISTORY OF MANKIND?

A contribution on materialism and views of development in the nineteenth century that mentioned the name Karl Marx only casually would probably look strange even now when his theories have lost much of their appeal. On the other hand, it would not be reasonable to discuss his theory of history briefly in the final section of such a contribution, since the interpretation of this theory is still highly controversial.¹⁹ It might be fitting instead to discuss some of Marx' remarks on Darwin's theory, which can lead to insights into his understanding of history.

3.1. "Natural-historical Basis"

About one year after the appearance of Darwin's *Origin*, Marx observed in a letter to Engels that Darwin's book provided the "natural-historical basis for our opinion."²⁰ A short time later, he wrote to Ferdinand Lassalle (1825-1864) that Darwin's book "serves me as a basis in natural science for the class struggle in history."²¹ This latter phrase has often impelled Marxists to stress hastily that Marx never used this formulation again²² defending Marx against the suspicion of Social Darwinism. Marx doesn't need this protection.

To my knowledge, Marx and Engels were among the first who opposed the opinion that the "struggle for life" was an universal law which provided a key for the understanding of the history of man as well as for that of the biological species. This issue was their main objection to Friedrich Albert Lange's (1828-1875) essay *Die Arbeiterfrage*.²³ This critique is by no means only a tactical one,²⁴ that is, it cannot be derived from the fact that Marx and Engels considered Lange a rival in their struggle for influence upon the German working class. Rather this critique pertained to the core of Marx' argument against classical economical theories' conception of economical laws originating with and peculiar to capitalistic economies as universal laws valid in all historical eras. This critique also constituted the background of Marx' well known statement that, in Darwin, "the animal kingdom figures as civil society."²⁵ Marx considered a rendering of economical laws of the modern capitalistic societies as historically universal laws not only confusing, but an ideological deception that created the illusion that these laws were the "natural" laws of every economy. Thus, it does not need much fantasy to imagine how he assessed essays in which modern social relations were portrayed as relations that are basically not different from that between animals and plants.

For an understanding of what Marx might have meant when he wrote that Darwin's work provided the "natural-historical basis for our opinion," it is important to remember that Marx and Engels had believed since the 1840s that "positive science" (*positive Wissenschaft*), which they thought should replace philosophical speculations, had to be a *historical* science which addressed nature as much as the world of men. To quote a famous phrase from the *Deutsche Ideologie*: "We recognize only one kind of science, namely the science of history. Seen from two different points of view, history can be classified as history of nature and as history of men. The two sides are inseparable, however."²⁶ But, as stated above, the scientists of the nineteenth

century before Darwin did not understand nature as something that evolved historically. Hence the enthusiastic reaction with which Engels hailed Darwin's *Origin*: "Never before has so grandiose an attempt been made to demonstrate historical evolution in Nature, and certainly never to such good effect."²⁷

It was not for the sake of coherence of his theoretical system why Marx was particularly interested in the connection between history of men and history of nature (Arndt 1985, 96). For Marx, both histories were "inseparable" in practice. In the 1840s, his attention may have centred mainly on the historical changes of nature caused by the historical development of agriculture and industry, but in the 1850s, he was more interested in the question whether nature might constitute a limit for the historical development of man (Arndt 1985, 84). In 1851, he wrote in a letter to Engels: "But the more I go into the stuff, the more I become convinced that the reform of agriculture, and hence the question of property based on it, is the alpha and omega of the coming upheaval. Without that, Father Malthus will turn out to be right."²⁸ It is not by chance that Marx was among the first (if not the first) who recognized the implications of Darwin's theory for Malthus' "law of population." In economic drafts of the early 1860s, he noted with evident satisfaction: "In its excellent book, Darwin did not see that he toppled Malthus' theory by discovering the 'geometric' progression within the kingdoms of animals and plants. [...] In Darwin's work [...] the natural-historical refutation of Malthus' theory can be found in detail as well as in fundamental principle."²⁹

For Marx, the history of man possessed a "natural-historical basis." According to his own understanding, the materialistic character of his view of history depended not at least on the insight that the history of the relation between man and nature constituted the basis of the history of man.

3.2. "The Law of Development of Human History"

In the address delivered at Marx' burial, Engels stated: "Just as Darwin discovered the law of development of organic nature, so Marx discovered the law of development of human history."³⁰

Was it not Marx and Engels who emphasized that the laws which rule social life possess a historically specific character, and that it was decisive not to be content with establishing laws valid in all historical ages but to investigate in detail how they act within specific historical forms of society? Thus, Marx reproached F.A. Lange's Social Darwinistic essay *Die Arbeiterfrage* for "subsuming the whole history [...] under a single law of nature," namely under the "struggle for life." "Instead of analyzing how the 'struggle for life' turns out within different forms of society, one has merely to insert the phrase 'struggle for life' for any real struggle and to put this phrase in the Malthusian 'population-fantasy'."³¹

Nevertheless, Marx did state very general principles concerning history. There is, for example, the well known *Preface* to his *Zur Kritik der politischen Ökonomie* from 1859 with its famous phrase: "The general conclusion at which I arrived and which, once reached, became the guiding principle of my studies, can be summarized as follows: In the social production of their existence, men inevitably enter into definite

relations, which are independent of their will, namely relations of production appropriate to a given stage in the development of their material forces of production," and so on.³² These propositions contain not only the "principal features" of the "materialist conception of history," as Engels understood it,³³ but can also be read as the formulation of a law of human history applicable to all historical epochs. There are other general statements of this kind in Marx' writings which can be understood as laws of history. For instance, comments on the mode of transmission and continuity peculiar to the history of man, in contrast with genetic heredity in biology and thus with the specific mechanism of transmission and continuity in biological evolution: "The simple fact that every succeeding generation finds productive forces acquired by the preceding generation and which serve it as the raw material of further production, engenders a relatedness in the history of man, engenders a history of mankind."³⁴

With arguments like these, which had to be completed by further ones,³⁵ Marx tried to frame mechanisms of development peculiar to the history of man. It is precisely the formulations of such general mechanisms by Marx that can be compared with Darwin's findings and formulations regarding the general mechanisms peculiar to the biological evolution of living beings. Whereas hardly a counterpart can be found in Darwin's work to Marx' attempts to detect laws of development peculiar to historically specific types of society, it is possible, in my opinion, to draw a parallel between Marx' arguments about *general* forms in which human societies develop historically and Darwin's arguments about *general* forms of the evolution of species. No matter how different their contents, these arguments seem to be situated on the same level.

It is not only the categorical level that these arguments have in common, there is further correspondence. A predictable course of history follows neither from the general forms of historical development that rule the human history, according to Marx, nor from the forms detected by Darwin for biological evolution. It is just as difficult to derive from Darwin's theory of evolution that reptiles had to arise from fish, and birds and mammals from reptiles, as it is to derive the scheme of history known as *Historical Materialism* from the general laws of human history stated by Marx. According to this scheme, mankind's historical development, beginning with primal communistic collectives, covers a fixed sequence of specific societies with private property and a class-structure—societies based on the exploitation of slaves, feudal societies, bourgeois societies—and will necessarily reach a final form of society without class differences: the modern communism. Rather, according to Marx' general laws, history is not only an irreversible and unique process which cannot be repeated but also a process with open end despite its conformity to laws. In these respects, there is a striking congruity between Marx' theory of the history of mankind with Darwin's theory of the historical development of the realm of living beings—with possibly one exception: Darwin's general mechanisms of biological evolution include a tendency; it seems unclear to me if the same is true with respect to the general mechanisms of human history formulated by Marx.

3.3. "Necessary Progress"

Except for the so called "Chapter on Feuerbach" of *Deutsche Ideologie*, written jointly with Engels in 1844/45 but not published during his lifetime, Marx never set down his general theory of history in an essay or book. His main interest was the specific historical dynamics of modern bourgeois society, and he produced well known, controversial, extremely far-reaching statements on the tendencies inherent in this type of society.

It was the goal of his life's work to prove not only that the dynamics of the capitalistic economic system is a *circulus vitiosus* but that this system also necessarily produces precisely the results which, according to Marx, constitute the decisive prerequisites for a new form of society—namely, means of production that could only be applied by society, not by private owners, and a class of workers who, not being private proprietors of these means, were able to apply them co-operatively. He was convinced that the capitalist society created these prerequisites independent of the awareness and will of its acting subjects. At least until the 1870s, he believed, additionally, that the capitalist system was a necessary, inevitable form of society that could not be omitted by revolutionary will because it provides the starting-points for a socialist society. Thus, as he wrote in the *Foreword of Das Kapital*: "And even when a society has got upon the right track for the discovery of the natural laws of its movement—and it is the ultimate aim of this work, to lay bare the economic law of motion of modern society—it can neither clear by bold leaps, nor remove by legal enactments, the obstacles offered by the successive phases of its normal development. But it can shorten and lessen the birth-pangs."³⁶ In view of the social developments in Russia, Marx later modified his conviction that the capitalism constituted an inevitable stage of development, even for those societies which were not yet affected by it.³⁷

What is important in the context of this article is the following point. Marx risked statements about crucial prerequisites for the historical emergence of a certain form of society and about whether these prerequisites are produced by the preceding form of society by chance or by necessity. But such statements must not be mistaken for the claim that the historical succession of different types of societies results from a law of development. One has to be the more careful in this respect since Marx, indeed, attempted repeatedly to design schemes of the historical succession of types of society. In this contribution, it is neither possible to discuss elaborately which schemes Marx tried out at different times nor to show how their increasing complexity reflected his expanding historical knowledge, especially his studies on historical as well as contemporary economic systems outside of Europe.³⁸ I will only try to outline their principle.

Marx saw the coexistence of different types of economy in history as well as the different ways in which these forms had developed in the past—partly independent of each other, partly in interaction. He realised, furthermore, that a given constellation of coexisting forms of society is just as decisive for the further development of each of the forms involved as their inner potential of development. In order to grasp this complicated relationship, he made use of the geological concepts of "stratum" and "formation." He distinguished, on the one hand, the different forms of society chro-

nologically in correspondence to different “strata” with which their type originated and, on the other, marked the complex patterns shaped by coexisting forms as different “formations” and tried to classify these latter as “secondary,” “tertiary” etc. formations (following the example of the geological distinction between “secondary,” “tertiary” etc. transformations).

The most precarious point of this procedure was, of course, classifying the “formations.” The geological analogy suggested two different possibilities. First, a morphological classification, in which the degree of transformations the aggregation of originally independent strata has undergone provides the criterion, and second, a diagnostic classification, in which the absence or presence of certain strata is decisive, similar to paleontology where the absence or presence of certain fossils, the so called “characteristic fossils” (*Leitfossilien*), is the key for the diagnosis of strata. Interestingly, in his several attempts to schematize, Marx did not classify the “formations” morphologically in correspondence to degrees of entanglement but by whether or not certain “characteristic strata” occur in them. The key was whether the “formations” consisted of forms of society that all belong to the type of “primal collective” (*Urgemeinschaft*), whether they contained as well forms “based on slavery, serfdom,” or, finally, whether they comprised even “bourgeois” forms.³⁹ However, these “characteristic strata” were not actually of the same diagnostic significance for Marx that “characteristic fossils” are for the paleontologist. Rather, the types of society which characterize these strata are singled out by Marx because of the significance he accredited to them with respect to the emergence of prerequisites necessary for the genesis of the modern form of society.⁴⁰

Marx was not only completely conscious of the methodical procedure applied but also explained it with his famous aphorism that “human anatomy contains a key to the anatomy of the ape.”⁴¹ The significance of certain historical developments for a subsequent development only becomes visible through the latter. Starting with the already developed matter in question, more precisely with the insight in the preconditions of its existence, the historian can single out those factors which can or must be understood as prerequisites for the emergence of these preconditions. This methodical procedure is entirely normal and inevitable, and is, either with consciousness or not, applied in every historical reconstruction of a given result of history. However, as Marx warned and stressed,⁴² this procedure of retrospective reconstruction of historical prerequisites can easily cause the illusion that the identified historical prerequisites of a historical matter came into being because of that matter.

It is an extremely important warning, indeed, since these retrospective historical reconstructions are not only necessarily one-sided, but suggest a teleological understanding of history if the historian loses sight of their heuristic function. In addition, by singling out historical developments as significant, since some components of the interesting historical result originated with them under certain circumstances, the historian inevitably presents these developments as necessary stages of the historical emergence of the result. It is, however, obviously that this necessity arises from the theoretical insight into the framework which these components form within the *already developed* historical matter in question. Thus, it may seem as if this framework itself secretly directs the historical process. And this illusion might become the

source of the *quid pro quo* of mistaking the theoretical development of a subject, i.e. the theoretical unfolding of the interrelations among its components, for the reconstruction of the intelligible core of its historical development that is ruled by laws and can be understood rationally.

Such a lack of a clear distinction between the “logical,” that is, the conceptual unfolding, and the “historical,” the historical development in time, was not only the secret core of Hegel’s conception of development, as Marx rightly saw.⁴³ It was also a characteristic feature of the interpretations of Marx’ writings since their beginning. We could start with Engels, who took Marx’ theoretical development of the form of value (*Wertform*) in *Zur Kritik der Politischen Ökonomie* (1859) to be an account of the crucial stages through which this form developed historically—“only stripped of the historical form and diverting chance occurrences.”⁴⁴ But understood in this way, the development of this form follows the model of development shaped by the paradigm of the ontogenetic process of maturation, with all its precarious implications for the doctrinal *Historical Materialism*.

Coming back to Marx’ “formations”-schemes of the historical forms of society, we had seen that he combined in these schemes the sober-minded mechanical model of development-as-accumulation-of-effects applied by geologists with the retrospective methodical procedure of reconstruction applied by historians. This complex combination misled even Marx now and then to take for historically necessary what seemed to be so only because of this kind of reconstruction. Two remarks with references to Darwin may substantiate this point. In 1866, in a letter to Engels, Marx mentioned a book almost unknown today, Pierre Trémaux’s *Origine et transformations de l’homme et des autres êtres*, and praised it because “progress, purely accidental according to Darwin, is here [sc. according to Trémaux] necessary.”⁴⁵ Necessary progress? One year later, again in a letter to Engels in which Marx drafted topics for a planned review of *Das Kapital* by Engels, we find the following formulation, which shows that the above-mentioned parallel between Darwin and Marx seems to be an invention of the latter: “By proving that the present society, regarded economically, bears the seeds of a new higher form, he [sc. Marx] is demonstrating only the same gradual process of revolution within the field of society that Darwin has demonstrated for the field of natural history.”⁴⁶ What had Marx proved, according to his own understanding? Had he proved that the present society is necessarily producing prerequisites which permit the realization of a socialist form of society based on the collectivization of the means of production, or had he proved that “the present society bears the seeds of a new higher form”? In any case, it is possible that such formulations indicate only that Marx, in spite of his theory, was not less influenced by the belief in progress of his time than Darwin, in spite of his theory as well.

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NOTES

- * This is the translation of a slightly revised article with the title “Darwin, Marx und der garantierte Fortschritt: Materialismus und Entwicklungsdenken im 19. Jahrhundert” published in: Arndt, Andreas and Jaeschke, Walter (eds.): *Materialismus und Spiritualismus*. Hamburg 2000. I wish to thank the editors for granting permission to this republication.
1. My translation. “Rückschritte im staatlichen und sozialen, im sittlichen und wissenschaftlichen Leben, wie sie die vereinten selbstsüchtigen Anstrengungen von Priestern und Despoten in allen Perioden der Weltgeschichte herbeizuführen bemüht gewesen sind, können wohl diesen allgemeinen Fortschritt hemmen oder scheinbar unterdrücken; je unnatürlicher, je anachronistischer aber diese rückwärts gerichteten Bestrebungen sind, desto schneller und energischer wird durch sie der Fortschritt herbeigeführt, der ihnen unfehlbar auf dem Fuße folgt. Denn dieser Fortschritt ist ein Naturgesetz, welcher keine menschliche Gewalt, weder Tyrannenwaffen noch Priesterflüche, jemals dauernd zu unterdrücken vermögen.” (Haeckel 1924, V 28.)
 2. The first German edition of Darwin’s *On the Origin of Species*, translated by the palaeontologist Heinrich Georg Bronn, appeared in 1860.
 3. See (Lefèvre 1992).
 4. See, for example, (Darwin 1871, ch. 5; Greene 1977).
 5. In accordance with (Zmarzik 1963), I will apply the term Social Darwinism only to those social or political views referring to biological theories that particularly emphasise the topic of selection.
 6. See (Büchner 1872). Very similar arguments can be found in (Lange 1865).
 7. See, for example, (Bayertz 1982).
 8. Published again in (Spencer 1891, I 8-62).
 9. One has to be careful at this point. Many of these speculations—for instance, those of Johann Gottfried Herder (1744-1803) or of Jean-Baptiste Robinet (1735-1820)—were embedded in the Great-Chain-of-Being idea which is basically a-historical. The same holds more or less for the *Deutsche Naturphilosophie*. Its conception of nature as evolving through different levels of complexity meant generally a conceptual unfolding of these levels rather than their historical evolution in time. The confusions that are easily prompted by this conception with regard to views of history will be addressed in the last section in the context of Marx’ revisions of Hegel’s conception of development.
 10. See, for example, (Lefèvre 2001).
 11. See (Marx and Engels 1956, ff., XX 486ff.; 1991, XXV 497ff).
 12. Ironically, Friedrich Engels later tried, in a letter written at the end of the 1850s, to clarify the embryology of his time by returning to Hegel: “The cell is Hegelian ‘being in itself’ and its development follows the Hegelian process step by step right up to the final emergence of the ‘idea’—i.e. each completed organism”—(Marx and Engels 1991, XL 325). “Die Zelle ist das Hegelsche Ansichsein und geht in ihrer Entwicklung genau den Hegelschen Prozeß durch, bis sich schließlich die ‘Idee’, der jedesmalige vollendete Organismus daraus entwickelt.” – (Marx and Engels 1956, XXIX 338).
 13. (Marx and Engels (1991, III 13). Der “völlige Verlust des Menschen” als Bedingung seiner “völligen Wiedergewinnung” - (Marx and Engels 1956, I 390).
 14. See, for instance, (Engels 1884; Marx and Engels 1956, XXI; 1991, XXVI).
 15. The following interpretation of certain features of Darwin’s theory of evolution is not always adapted to the prevailing accounts of this theory and needed therefore many quotations and detailed argumentation for its support. However, since that is not possible in this contribution, I want to refer generally to the detailed argumentation in (Lefèvre, 1984, ch. 6).
 16. See for this notion (Mayr 1974, 91-117).
 17. The following four paragraphs are taken from (Lefèvre 1984, 260-62).
 18. The partly far-reaching modifications of the theory of evolution during the twentieth century are not of interest in the context of this contribution.
 19. To my knowledge, the most differentiated interpretation can be found in (Arndt 1985).
 20. Marx and Engels (1991, XLI 231) “[...] die naturhistorische Grundlage für unsere Ansicht” (1956, XXX 131).
 21. (Marx and Engels (1991, XLI 245) “[...] paßt mir als naturwissenschaftliche Unterlage des Klassenkampfes” (1956, XXX 578).

22. See, for instance, (Bayertz 1982, 108).
23. See above all Marx' letter to Kugelmann from June 27, 1870, - (Marx and Engels 1956, XXXII 685f.; 1991, XLIII 527f).
24. See, for instance, (Groh 1981, 233f).
25. Marx and Engels (1991, XLI 380) "[...] figuriert das Tierreich als bürgerliche Gesellschaft" (1956, XXX 249).
26. My translation. "Wir kennen nur eine Wissenschaft, die Wissenschaft der Geschichte. Die Geschichte kann von zwei Seiten aus betrachtet, in die Geschichte der Natur und die Geschichte der Menschen abgeteilt werden. Beide Seiten sind indes nicht zu trennen." (Marx and Engels 1956, III 18.)
27. Marx and Engels (1991, XL 550) "[...] ist bisher noch nie ein so großartiger Versuch gemacht worden, historische Entwicklung in der Natur nachzuweisen, und am wenigsten mit solchem Glück." (Marx and Engels 1956, XXIX 524.)
28. Marx and Engels (1991, XXXVIII 422) "Je mehr ich aber den Dreck treibe, um so mehr überzeuge ich mich, daß die Reform der Agrikultur [...] das A und O der kommenden Umwälzung ist. Ohne das behält Vater Malthus recht." (Marx and Engels 1956, XXVII 314.)
According to Thomas R. Malthus (1766-1834), a figure of significance for Darwin as well as Social Darwinistic views of history and society, a fundamental discrepancy exists between the ratio in which the human population tends to grow, namely in geometric proportion, and the arithmetical proportion of the actual growth ratio of the animal and plant population which serve as food for mankind.
29. My translation. "Darwin in seiner vortrefflichen Schrift sah nicht, daß er Malthus' Theorie umstieß, indem er die 'geometrische' Progression im Tier- und Pflanzenreich entdeckte. [...] In Darwins Werk [...] findet sich auch im Detail (abgesehen von seinem Grundprinzip) die naturhistorische Widerlegung der Malthusschen Theorie." (Marx and Engels 1956, XXVI.2 114.)
30. Marx and Engels (1991, XXIV 467) "Wie Darwin das Gesetz der Entwicklung der organischen Natur, so entdeckte Marx das Entwicklungsgesetz der menschlichen Geschichte." (Marx and Engels 1956, XIX 335.)
31. Marx and Engels (1991, XLIII 527f) "[...] die ganze Geschichte [...] unter ein einziges großes Naturgesetz zu subsumieren." "Statt also den 'struggle for life', wie er sich geschichtlich mit verschiedenen bestimmten Gesellschaftsformen darstellt, zu analysieren, hat man nichts zu tun, als jeden konkreten Kampf in die Phrase 'struggle for life' und diese Phrase in die Malthussche 'Bevölkerungsphantasie' einzusetzen." (Marx and Engels 1956, XXXII 685f.)
32. Marx and Engels (1991, XXIX 262) "Das allgemeinen Resultat, das sich mir ergab, und einmal gewonnen, meinen Studien zum Leitfaden diente, kann kurz so formuliert werden: In der gesellschaftlichen Produktion ihres Lebens gehen die Menschen bestimmte, notwendige, von ihrem Willen unabhängige Verhältnisse ein, Produktionsverhältnisse, die einer bestimmten Entwicklungsstufe ihrer materiellen Produktivkräfte entsprechen. [...]" (Marx and Engels 1956, XIII 8f.)
33. Marx and Engels (1991, XVI 466). "Grundzüge" der "materialistischen Auffassung der Geschichte" (1956, XIII 469). Compare also the argument in (Arndt 1985, 88ff).
34. Marx and Engels (1991, XXXVIII 96) "Dank der einfachen Tatsache, daß jede neue Generation die von der alten Generation erworbenen Produktivkräfte vorfindet, die ihr als Rohmaterial für eine neue Produktion dienen, entsteht ein Zusammenhang in der Geschichte der Menschen, entsteht die Geschichte der Menschheit." (Marx and Engels 1956, XXVII 552.)
35. Of special interest in this context seems to me a distinction by Marx with respect to the prerequisites for the existence of any special type of society, namely whether or not these prerequisites, which were historic in the first place, could be reproduced by the respective type of society once it had come into being. See (Arndt 1985, 153ff.).
36. Marx and Engels (1991, XXXV 10) "Auch wenn eine Gesellschaft dem Naturgesetz ihrer Bewegung auf die Spur gekommen ist - und es ist der letzte Endzweck dieses Werks, das ökonomische Bewegungsgesetz der modernen Gesellschaft zu enthüllen -, kann sie naturgemäße Entwicklungsphasen weder überspringen noch wegdekretieren. Aber sie kann die Geburtswehen abkürzen und mildern." (Marx and Engels 1956, XXIII 15f.)
It is probably superfluous to state that Marx' theory, in spite of expressions like "law of nature" or "natural stages of development," does not belong to the nineteenth-century ideas of development depicted above that claimed that progress was a physical necessity. See, for instance, (Groh 1981, esp. 236f.).

37. See (Arndt 1985, 103ff.).
38. See (Arndt 1985 104f.).
39. Above all, see his drafts for the letter to Vera Zasulic from 1881 in (Marx and Engels 1956, XIX 384ff.; 1991, XXIV 346ff.).
40. See the passage “Formen, die der kapitalistischen Produktion vorhergehen” in (Marx 1939, 375-413; Marx and Engels 1991, XXVIII 399ff.; see also Arndt 1985, 81f.).
41. See (Marx 1939, 26; Marx and Engels 1991, XXVIII 42). This aphorism was written 1858; thus, for chronological reasons, it did not allude to Darwin’s theory and its implication that the man is a descendant of the ape. It seems more probable that Marx had knowledge of the “lines of development” of the contemporary morphology, which constituted, as already mentioned, a decisive starting-point for Herbert Spencer’s theory of development.
42. Ibid.
43. See (Arndt 1985, 140f. and 184f.).
44. Marx and Engels (1991, XVI 476) “[...] nur entkleidet der historischen Form und der störenden Zufälligkeiten” (1956, XIII 475). The Hegelian manner in which Marx discussed the form of value in the first edition of *Das Kapital* was certainly as ill-suitable to prevent such misunderstandings as was the use he made of I.I. Kaufmans review of the *Kapital* in the afterword of its second edition (1956) XXIII 25 ff.; 1991, XXXV 30f.).
45. See (Marx and Engels 1956, XXI 248; 1991, XLII 304).
46. “Wenn er [sc. Marx] nachweist, daß die jetzige Gesellschaft, ökonomisch betrachtet, mit einer neuen höheren Form schwanger gehe, so zeigt er nur sozial denselben allmählichen Umwälzungsprozeß nach, den Darwin naturgeschichtlich nachgewiesen hat.” (Marx and Engels 1956, XXXI 403ff.; 1991, XLII 496f.).

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