

CHAPTER II
FRIEDRICH ENGELS:
EVOLUTION AND THE DIALECTICS OF NATURE

When Darwin published *The Origin of Species* in November 1859, Engels immediately procured a copy and became one of Darwin's earliest converts. Within a few weeks of its publication, he wrote to Marx:

Darwin, by the way, whom I am just now reading, is quite splendid. There was one aspect of teleology that had not yet been destroyed, but now that has been done. Never before has such a wonderful attempt been made to prove historical development in nature, and certainly never with such success.¹

From that time on, Engels lauded Darwin's theory as one of the greatest scientific accomplishments of the nineteenth century. He paid Darwin the highest compliment by repeatedly comparing him with his colleague Marx: "As Darwin discovered the law of evolution of organic nature, so Marx discovered the law of evolution of human history."² However, his admiration for Darwin did not prevent him from criticizing aspects of Darwin's theory that he considered problematic, such as the struggle for existence.

Engels' adoption and propagation of evolutionary theory had an even greater impact on the German socialist movement than did Marx's views on the subject. Although Engels was the junior partner in his intellectual relationship with Marx, he was decidedly superior to Marx in his knowledge of some fields, including natural science. He preceded Marx in reading Darwin's *Origin* and perused far more works on evolutionary theory than did Marx. After retiring from his career in business in 1870, he devoted his time to the study of natural science and intended to write a book outlining a dialectical view of nature. When Marx died in 1883, Engels sacrificed his

project for what he considered an even more significant task--the editing and publication of Marx's manuscripts. Important as natural science was to Engels, he did not consider it as crucial as political economy.

While only fleeting references to biological evolution surface in Marx's publications, Engels devoted considerable attention to it, especially in *Herrn Eugen Dühring's Umwälzung der Wissenschaften* (1878, commonly called *Anti-Dühring*), and in his uncompleted manuscripts of 1873-1883, which were posthumously published as *Dialektik der Natur* (1925, *Dialectics of Nature*). Since *Anti-Dühring* was one of the most influential books among German socialists in the late nineteenth-century, Engels' views on evolution received wide circulation.

Engels' grappled with evolution, science, and natural laws, not in order to infuse Marxian socialism with principles of natural science, but to harmonize natural science and socialism within a broader, coherent world view unified by the principle of dialectical development. While pointing out parallels between Darwinism and Marxism, he relegated them to separate spheres of explanation. Although he admitted that Darwin's theory, including natural selection, may be valid for the natural realm, he never permitted Darwinism to dictate social theory. On the contrary, he always subjected Darwinism to Marxism when discussing social development. Marxist theorists in the late nineteenth century would follow his example.

Engels' concern with formulating a lucid and consistent position on nature and evolutionary theory was not just theoretical. He was responding to the non-Marxian socialist Darwinists, especially Ludwig Büchner and Friedrich Albert Lange, whom he disdained for their application of Darwinism to social thought. Engels believed their social theory was dangerous, and he sought to undercut its effect. In the 1870s various varieties of socialism, including Marx's and Engels', were competing for supremacy in the German socialist movement, and it was not at all clear whether Lassalle, Lange, Büchner, Marx, or someone else would emerge triumphant in the struggle to win the sympathies of the German working class. Thus Engels' discourse on nature was an attempt to provide a satisfactory view of society and nature that would undermine the effect of the non-Marxian socialist theorists. If he could help

it, Engels would not permit the non-Marxian socialist Darwinists to present themselves as more scientific or more Darwinian by their appropriation of Darwinian theory.

Engels' writings on science and evolution shared the same prestige among late nineteenth-century socialists that caused them to accept without question Engels' interpretation of Marxism. They believed that Engels' world view was essentially the same as Marx's. Despite many recent attempts by Marxists to radically dissociate Marx's and Engels' thought, there are good grounds for maintaining their unity.³ Their close friendship, literary collaboration, and voluminous correspondence suggest substantial intellectual harmony. Furthermore, we have their own testimony concerning their agreement. In 1859 Marx wrote that in the 1840s Engels had arrived at the same position as he had, which led to their collaboration.⁴ Marx once sent someone a copy of *Anti-Dühring*, remarking that Engels' book "is very important for a correct evaluation of German socialism."⁵ In a forward to the French edition of "Socialism: Utopian and Scientific" Marx lauded Engels as one of the foremost representatives of socialism and hailed this work as "an *introduction to scientific socialism*."⁶

This is not to suggest that Marx and Engels thought alike on every topic all the time. Indeed, perhaps nowhere are their disagreements more evident than in their pronouncements on evolution, especially in their dispute over the significance of Trémaux's evolutionary theory. However, their disagreements were not on fundamental issues and Engels' treatment of evolution displays many points of contact with Marx's world view.

Engels' Receptivity to Darwinism

Engels' first remark concerning Darwin's theory was that it demolished teleology in nature. This was important to Engels, because it confirmed his atheistic world view by dispensing with the need for God or supernatural design to explain order in the cosmos. In *Anti-Dühring* Engels underscored this point by insisting that

adaptation in natural selection must proceed without any conscious purpose or intent, since conscious purpose in nature implies the existence of a creator God.⁷

Engels, like Marx, embraced the Feuerbachian analysis of religion in the early 1840s and viewed God as merely the hypostatization of humanity.⁸ Later he was grateful for any scientific evidence or theories that could be used to attack religion and disdained any scientific explanations that required the existence of a supernatural being. After reading Lyell's and Huxley's works on human evolution, which were the earliest scientific works to apply Darwinism to humans, Engels exulted that religion was now being assaulted from all sides.⁹ Although he thought Lyell's and Huxley's 1863 books on human origins "interesting and quite good," he--like Marx--was disappointed that Huxley would not espouse a thorough-going materialist philosophy.¹⁰ Despite his antipathy for the leading German scientific materialists, Vogt, Moleschott, and Büchner, he approved of their efforts to use science, presumably including evolutionary theory, to advance the cause of atheism.¹¹ He rejected as stupid Lord Kelvin's theory that the universe is progressively cooling, because this seemed to require a God to produce the original condition of heat.¹²

Although he disdained the mechanistic materialism of Vogt, Moleschott, and Büchner, Engels' position was clearly materialistic, since he ultimately reduced all phenomena to matter in (dialectical) motion. Engels' materialism was, in fact, quite close to that of Büchner or Haeckel, since they all espoused a developmental rather than static materialism.¹³ Engels' attack on materialism as a world view that supposedly upheld the priority of matter over motion and energy in *Dialectics of Nature* was based on a misquote from Haeckel and caricatured the true position of the German scientific materialists.¹⁴ Both Haeckel and Büchner agreed with Engels that energy and motion are inseparable from matter. The real contention between Engels and the scientific materialists concerned the mode of development, since Engels insisted that Hegel's dialectic, if stripped of its idealism, could account for development in nature. The scientific materialists had nothing but contempt for Hegel.

Engels' materialism is clearly portrayed in his explanation of the origin of life. Engels believed that life was merely the manifestation of certain chemical configurations. He asserted, "Life is the mode of existence of protein bodies, and this mode of existence consists essentially in the constant self-renewal of the chemical components of these bodies."¹⁵ When chemical conditions are favorable for the proteins to join together, protoplasm will form, then cells, and then other organisms. Engels believed scientists could produce life artificially if they could only synthesize protein.¹⁶

Oddly, despite Engels' materialism, he was not comfortable with the complete elimination of teleology from nature, so he resurrected a form that did not depend on a supernatural being:

The old teleology has gone to the devil, but the fact firmly stands that matter in its eternal cycle moves according to laws, which, at a certain stage--sometimes here and sometimes there--necessarily produces the thinking mind in organic beings.¹⁷

Engels was not at all content with the explanation of Darwin or Haeckel that the human mind was merely the product of chance. Darwin, because he was intent on forging a naturalistic explanation for the origin of species, denied the existence of any purposeful design in nature and rejected any goal toward which evolution was striving. He wrote in 1881 that he disagreed "that the existence of so-called natural laws implies purpose."¹⁸ He did not envisage evolution as a linear development in a specific direction with a pre-determined goal, but as a branching movement with numerous dead-ends. One of the reasons Darwin conceived of evolution in this way was that he found the idea that natural laws were predetermined by a divine will completely unacceptable, since it made God responsible for evil.¹⁹

Engels agreed that natural laws do not imply purpose or conscious design, and he too had no sympathy with natural theology, but unlike Darwin, he thought that evolution was moving toward a goal. He argued that it is the nature of matter to develop in the direction of a thinking being. This does not mean that thinking beings will develop everywhere, since evolution in this direction depends on the proper

conditions existing.²⁰ His position manifested vestiges of the Hegelian view of nature as teleological with the Idea and *Geist* as the goal of development.²¹ By taking this position, Engels was rejecting the strictly mechanistic and reductionist approach to biological laws espoused by Hermann Helmholtz and Emil DuBois-Reymond. However, by no means was he reviving Hegelian idealism; his ideas seem closer to the teleomechanism of Ernst Mach or Karl Ernst von Baer, who saw the telos in biology as the result of ordered necessity rather than the product of rational purpose.²²

On one level, Engels viewed evolution as essentially progressive, culminating in rational beings. However, on a cosmic scale, he advanced a cyclical view of evolution with "matter in its eternal cycle." Apparently by 1875-76 he had reconciled himself to at least part of Kelvin's theory, for his assessment of the prospects for human evolution on the earth was rather bleak: Some day the earth would become too cold for any life to exist on it and inevitably humans and their minds would be extinguished. However, in another time and place, life and thought would reappear just as inevitably, according to Engels.²³

Engels' first impression of Darwin was that, in addition to having destroyed teleology, he had demonstrated historical development in nature. Despite the fact that Kant and Laplace in cosmology and Lyell in geology had preceded Darwin by portraying development in nature, Darwin's theory revolutionized Engels' conception of science. Just a few months before reading Darwin, Engels had written that "all sciences are historical which are not natural sciences."²⁴ After Darwin, Engels would emphasize that natural science is also historical and this allowed him to more easily portray Marx as a scientist akin to Darwin.

Natural Law and Social Law

There is no doubt that Engels was a determinist in human affairs and believed that society was ruled by laws analogous to those holding sway in the natural realm. Freedom, for Engels, consisted not in emancipation from deterministic laws, but in rationally manipulating these immutable and ineluctable laws of nature and society. Thus scientific and technological advances were a prerequisite for freedom, since to

be free, decisions would have to be based on knowledge and the ability to predict the consequences of actions. It would be a mistake, however, to assume, as some scholars do, that since Engels compared social laws with natural laws, he was thereby reducing social laws to natural laws or applying natural laws to society.²⁵ Engels consistently denied that he was doing this, and his treatment of evolutionary theory clearly proves his point.

Unlike Marx, Engels used the term "natural law" to refer to economic and social laws long before Darwin published *Origin*. In 1844 he referred to the economic law of supply and demand as a "pure natural law, not a law of the mind (*Geist*)," which, Engels claimed, produced periodic economic crises. He explained that it is a natural law because it operates independently of human consciousness. The law could be set aside if humans would produce consciously rather than according to chance. Thus, although he used the term natural law, he did not mean that it was ineluctable, except within certain conditions.²⁶

Within the framework of particular contexts, though, social laws operate with iron necessity, according to Engels. The law of the centralization of property was immanent in private property and could only be circumvented through the abolition of private property.²⁷ The reaction of workers to their demoralizing circumstances in England was the inevitable consequence of their treatment by the bourgeoisie.²⁸ Because of his deterministic view of society, Engels claimed it was easy to prophesy a revolution for England. That the English bourgeoisie would be overthrown was "as certain as any mathematical or mechanical law."²⁹

In the 1870s Engels explained more fully his position on natural laws. He argued that they were both eternal and historical. After asserting that natural laws are eternal, Engels continued, "All true knowledge of nature is knowledge of the eternal, infinite and therefore essentially absolute."³⁰ This does not seem to square at all with his statement earlier in *Dialectics of Nature*: "*The eternal natural laws are being transformed ever more into historical ones.*" This latter statement sounds as though he was remarking on the history of science with the introduction of the Kant-Laplace cosmology, uniformitarian geology, and Darwinian biology. However, the example

he gave of historical natural laws belies this. He explained that it is an eternal natural law that water is liquid at zero to one hundred degrees Celsius. However, this law only applies if water, the given temperature, and normal pressure are present, and thus there are many places in the universe where it cannot apply. Thus a historical natural law is one that has validity only within certain conditions (and thus almost all natural laws are historical). Engels' position here is consistent with his use of the term natural law in 1844 to refer to economic laws, as well as with Marx's use of the phrase "historical natural laws" after 1860 to refer to social and economic laws.

In *Anti-Dühring* Engels does not clearly distinguish between natural and social laws, and this has undoubtedly led to much confusion in interpreting Engels' position on this matter. He clearly affirmed Marx's view that the laws of political economy differ in each stage of historical development. They are historical laws valid only under certain conditions.³¹ However, he seemed to regard natural laws as eternal and implied in *Anti-Dühring* that humans are eternally subject to natural laws:

Freedom does not consist in the illusory independence from natural laws, but rather in the knowledge of these laws and in the possibility this gives of making them operate in a planned way to definite ends.

This is valid with respect to the laws of external nature, as well as to those which govern the physical and mental being of men themselves--two classes of laws that we can separate from each other at most only in concept, but not in reality.³²

Engels never explained his view on the historicity of natural laws in *Anti-Dühring* and this statement does not seem congruent with his earlier view. Certainly his contemporaries would have understood natural laws to mean laws valid for all time.

In the above passage, Engels could not have stated more clearly that there are inescapable laws governing not only the non-human, but also the human realm. He rejected any mind-body dualism, so laws apply to all facets of human existence, not just physical life. However, it is important to note that Engels does not thereby claim that the laws of nature are applicable to society. He only claims that both operate with the same kind of necessity. This also holds true of Engels' other statements

comparing natural and social laws: "The forces effective in society function just like the forces of nature: blindly, violently, [and] destructively, as long as we do not recognize them and do not reckon with them."³³ That natural and social laws function in the same manner does not imply that the same laws rule in both realms.

Indeed Engels specifically denied that laws applying to animals could be applicable to human society. Based on his dialectical law that quantitative change produces qualitative distinctions, Engels argued that there is a qualitative difference between humans and animals, despite their close similarity. The chief discrepancy is not physical or even mental, but rather economic. "The essential difference between human and animal society is that, at most, the animals *collect*, while humans *produce*." Engels argued that this disparity makes it impossible to apply identical laws to animals and humans.³⁴ Darwin, on the other hand, continually stressed the continuity between animals and humans, and his *Descent of Man* (1871) is largely an exercise in applying natural laws to humans.

At times Engels implied, though, that despite the qualitative difference between humans and animals, humans were still bound in present society to some of the laws of the animal realm. Because capitalist society is still anarchical and not rationally planned, the law of the jungle still holds sway. When humans take hold of their destiny by consciously planning their society, especially their economic production, then they will elevate themselves finally above the animal realm and will become fully human. "It is the leap of humanity out of the realm of necessity into the realm of freedom."³⁵ Thus Engels could explain parallels between nature and present human society as a manifestation of the capitalist mode of production. In the future these parallels would evaporate. Any natural laws presently constraining human society would have no validity in communist society.

However, Engels repeatedly emphasized, and to an even greater extent than Marx, that human society is governed by a universal law of development, which is comparable to--but not identical with--the evolutionary laws formulated by Darwin. Once Engels even compared Marx's "great law of the development of history" with the law of the transformation (*Verwandlung*) of energy.³⁶ Of course, Engels was

referring to the law of energy conservation, but he wanted to emphasize the changes that energy can undergo, so the parallel between Marx's and Helmholtz's laws would be more striking (conservation is too static a term). He credited Marx with discovering the law of social development, which states that the mode of production and the economic stage of development form the foundation for politics, religion, law, art, etc.³⁷ Engels considered this law eternally valid, since even in communist society the mode of production would determine the social and political superstructure.

Despite his insistence on a sharp distinction between most natural and social laws, Engels formulated laws of dialectical development that encompassed both nature and society. He asserted, "But the dialectic is nothing other than the science of the universal laws of the movement and development of nature, human society, and thought."³⁸ He expounded on these ideas to a much greater extent than did Marx, who only occasionally applied the dialectic to nature. Carl Schorlemmer, a distinguished chemist and a close friend of Engels, also studied Hegel and encouraged Engels in his dialectical interpretation of nature.³⁹

Engels delineated three dialectical principles or laws: (1) the conversion of quantitative change into qualitative change and vice-versa; (2) the interpenetration of opposites; and (3) the negation of the negation.⁴⁰ Engels, like Hegel and Marx, believed that these principles were valid for nature as well as history and thought.⁴¹ He provided illustrations for these principles from mathematics, physics, chemistry, geology, and biology. The simplest example of the first dialectical principle, according to Engels, is the qualitative difference between oxygen (O_2) and ozone (O_3), which have different quantities of the same atoms, but possess quite different physical characteristics. Many other chemical compounds differ from each other only in the number of atoms, but have dissimilar properties.⁴² Engels derived another example of this principle from Hegel—the conversion of water into steam through the increase of temperature.⁴³ The examples Engels used for the negation of the negation seem more contrived and less convincing, despite his claim that any child could grasp them. The reproduction of plants provided one of his simplest and best examples. A barley seed is negated when it grows into a stalk, but after the new seeds mature, the

stalk withers and dies. This negation of the negation produces a quantitative change, since one seed thereby produces many seeds. It can also produce a qualitative change, as organisms, such as ornamental flowers selected by gardeners, alter from generation to generation.⁴⁴

Engels' attempts to explain biology dialectically predated his reading of Darwin. In 1858 he requested that Marx send him Hegel's *Naturphilosophie*, because he thought it might shed light on his studies in physiology. Hegel as an idealist had conceived of nature as the finite alienation of *Geist*, and Engels, since he was a materialist, rejected this aspect of Hegel's philosophy of nature. However, Hegel also viewed nature as subject to dialectical development, and thus the product of contradictions. In its outer appearance, according to Hegel, nature is contradictory to logic, but in its essence it is logical, which makes it possible to formulate natural laws.⁴⁵ It was this dialectical methodology that Engels found so appealing in Hegel.

Many of Engels' later ideas on the dialectics of nature derived directly from his reading of Hegel.⁴⁶ In 1858 he wrote to Marx that he considered cellular development a confirmation of Hegel's ideas and appealed to the dialectical qualitative leap in a quantitative series as a nice explanation for the distinction between humans and animals.⁴⁷ It is surprising that Engels did not develop his ideas on dialectical development in nature further in the decade after he read Darwin, because Darwin's theory seems to present easy avenues for dialectical explanation. However, Engels had little time in the 1860s to study natural science and most of his writings from that period were on military affairs.

In his unpublished manuscripts of the 1870s Engels tried to show that biological evolution is dialectical. However, when Engels began developing his views on the dialectics of nature in 1873, he initially dealt with physics and chemistry, purposely avoiding any discussion of biology.⁴⁸ Only in 1875 did he explain the dialectical nature of evolution. First of all, he pointed to the theory's obliteration of fixed categories, which shows that the metaphysical mode of thought with its either-or mentality is inadequate. This characteristic, of course, would be true of any evolutionary theory, not just Darwin's, since species would be more fluid than in the

Linnaean system and could contain contradictory elements. Secondly, Engels asserted that there is a dialectical contradiction between heredity and adaptation in the process of evolution. Haeckel had explained evolution as a process in which adaptation accounts for change, while heredity is static and preserves an organism's traits. This contradiction fit Engels' dialectical schema perfectly.⁴⁹ Finally, Engels identified Darwin's reliance in *Origin* on chance to account for variation as an example of the dialectical resolution of the chance-necessity contradiction.⁵⁰

Although Engels referred to dialectical patterns in natural and human history as laws of development, many scholars deny that they are actually laws in the strict sense of the term. Jon Elster, for example, considers them "not infrequent patterns of change" rather than true laws.⁵¹ Judging from Engels' use of the dialectic to explain evolutionary theory, it seems that these "laws" are rather vague and are of little or no use for predicting anything. One of the most important attributes of a scientific law, though, is that it predicts phenomena. Indeed Engels specifically denied that the dialectic could be utilized to demonstrate the necessary development of history; rather empirical research should show historical development and then one could explain it dialectically.⁵² This is precisely what Engels did in applying the dialectic to evolution. He borrowed theories and ideas elaborated by biologists and showed how they were dialectical, whether the scientists recognized it or not. He did not use the dialectic to predict or form new theories or ideas. However, Engels did not consider the dialectic merely an organizing principle in the human mind. Rather it is inherent in nature and operates with the necessity of any other scientific law.⁵³

The Struggle for Existence and Society

Both Darwin and Alfred Russell Wallace arrived at the theory of natural selection through their reading of Malthus, whose principle of overpopulation they applied to plants and animals. Despite Engels' favorable reception of Darwin's theory, he was not at all enthralled with the Malthusian element, which he considered a blemish on an otherwise solid accomplishment. Engels' antipathy toward Malthus was evident long before he ever read Darwin. In 1844 he disparaged Malthus' population

principle as "this infamous, mean doctrine, this dreadful blasphemy against nature and humanity," which is "the coarsest, most barbaric system that ever existed."⁵⁴ Engels agreed with Malthus that there is surplus population in the world, but it is not the inevitable result of reproduction outstripping the food supply. Rather it is caused by the present capitalist system with its anarchic competition, resulting in some people working longer than necessary and others unemployed. Malthus' population principle also did not take into account, according to Engels, the almost infinite ability of science and technology to increase productivity.⁵⁵ Thus, at best, Malthus' law of population was a historical law valid only for capitalist society.

Engels first explicated his views on the relationship between Malthus' and Darwin's theories in a letter to Lange, who had embraced the Darwinian theory, including its Malthusian element, and applied it to human society. Engels considered this reliance on Malthus illegitimate:

Even upon my first reading of Darwin the striking similarity between his portrayal of plant and animal life with the Malthusian theory caught my attention. Only I concluded differently than you, viz.: that this is the highest disgrace for modern bourgeois development, that it has not yet progressed beyond the economic forms of the animal kingdom.⁵⁶

Engels further asserted that Malthus' law, like all economic laws, is historical, not eternal, and applies only to bourgeois society.⁵⁷

Despite Engels' complete repudiation of Malthusian economics, he wavered when confronted with Darwin's theory of natural selection based on the struggle for existence. Unlike Marx, he did not consistently criticize this element of Darwin's theory, but remained ambivalent. He was never fully content with Darwin's formulation of evolutionary theory, but he thought that the struggle for existence might have some limited validity. In a passage of *Dialectics of Nature* written in 1875, Engels characterized Darwin's theory of the struggle for existence as the translation into nature of Hobbes' *bellum omnium contra omnes*, bourgeois economic competition, and Malthusian economics. However, his point in this passage was not

so much that Darwin erred by so doing, but that those who retranslate the Malthusian element in Darwinism back into society with the confidence that it is a law of nature are making a fallacious claim.⁵⁸

Engels' comments on Darwinism in 1875 were stimulated by an article he read on the relationship between socialism and the struggle for existence by Peter Lavrov, a Russian sociologist. In a letter to Lavrov written about the same time as the passage in *Dialectics of Nature*, Engels criticized Darwin more freely than he did in his manuscript:

I accept from the Darwinian theory the *theory of evolution*, but accept Darwin's method of proof (struggle for life, natural selection) only as the first, provisional, imperfect expression of a newly discovered fact.⁵⁹

Engels called into question the Darwinian struggle for existence, because he thought it was too one-sided. Engels noted that before Darwin formulated his theory, scientists such as Büchner and Vogt had emphasized symbiosis in nature, but now they saw struggle everywhere. Engels argued that there is both harmony and struggle in nature, so the struggle for existence "can only be accepted with a grain of salt even in the realm of nature."⁶⁰

Despite Marx's and Engels' own private criticisms of Darwin for importing Malthusian economics into natural science, Engels criticized Dühring for arguing the same point. In the heat of his polemics with Dühring, Engels defended Darwin from Dühring's charge that his theory was tainted by Malthus' views. He argued:

Now it does not even occur to Darwin to say that the *origin* of the idea of the struggle for existence is to be found in Malthus. He only says that his theory of the struggle for existence is the theory of Malthus, applied to the entire animal and plant world.

Engels claimed that the truth of the struggle for existence could be ascertained independently from Malthus, since the discrepancy in nature between an organism's abundant offspring and the small number of individuals attaining adulthood is readily apparent. The contradiction finds its solution in the struggle for existence, which,

Engels admitted, can at times be gruesome.⁶¹ Engels' spirited defense of Darwin's theory, including the struggle for existence, in *Anti-Dühring* was widely read by German socialists, and it was not balanced by Engels' and Marx's sharper criticisms of Darwin in their correspondence and unpublished manuscripts.

Even in *Anti-Dühring*, however, Engels made it clear that Darwin's theory was not the final word on evolution. Darwin had made a significant contribution to science, but evolutionary theory was still in its early stages and further research would undoubtedly result in modifications of Darwin's theory. Engels thought Darwin ascribed too much weight to his own discovery and neglected the causes of variation in individual organisms. Further, Engels, like most evolutionists in the 1870s, esteemed Lamarck and his discoveries highly. Thus, although he never explicitly said so in *Anti-Dühring*, Engels hinted that natural selection might be a problematic aspect of evolutionary theory.⁶²

In *Dialectics of Nature* Engels was more frank in criticizing Darwin. He accused Darwin of erring by conflating two distinct mechanisms of evolution under the rubric natural selection. The first form is selection through population pressure, in which the strongest survive, but, Engels added, the weakest can often exist also. The second form is selection through the ability of organisms to adapt to altered environmental conditions. In this latter case, the surviving organisms are better suited for some particular environment, but the adaptation can result in either progress or degeneration.⁶³ In this passage Engels, like many of his contemporaries, was confused about Darwin's use of the phrase "survival of the fittest." Darwin defined fitness according to how well adapted an organism is to its environment, not how strong or fast or large it is. These traits may at times confer a selective advantage, but that is not always the case. Also, despite his own rhetoric at times, Darwin's idea of fitness did not include any notion of progress or degeneration, since both imply some standard of judgment other than the survival of the species.

Darwin would have had little trouble refuting Engels' objection that he conflated evolution by population pressure with evolution caused by altered environmental conditions. Darwin did not see these as antithetical, since even under

altered circumstances, there could still be excess population and competition for the new niches. Thus the struggle for existence could function to select organisms both in changing and static environments.

Engels, however, denied that the struggle for existence is universal. He limited its efficacy to plants and lower animals, where overpopulation leads to competition. However, other evolutionary mechanisms, such as climatic or geographical change or sexual selection, could account for speciation without any overpopulation or struggle for existence occurring. Thus Engels allowed some room for Darwin's struggle for existence in evolution, but he could not accept it as the sole or even the most important evolutionary mechanism. He further asserted that Haeckel's evolutionary theory centering on adaptation and heredity could account for the evolutionary process without natural selection and the Malthusian population pressure. Engels apparently forgot that Haeckel's theory fully incorporated Darwinian selection and Malthusianism, though it also blended in large doses of Lamarckism.⁶⁴

Another evolutionary mechanism Engels identified is the alteration in an organism's food supply. Engels thought that new types of food would cause chemical changes in an organism by putting different chemicals into the blood stream.⁶⁵

While Engels could tolerate the idea that there may be a struggle for existence among plants and some animals, he was incensed with those who considered human society eternally subject to the same kind of struggle. He was so riled up after reading the second edition of Büchner's *Der Mensch und seine Stellung in der Natur* (*Man and His Position in Nature*) in 1873 that he felt compelled to write a rebuttal, which broadened into a ten-year study of natural science, during which he wrote the unfinished manuscripts of *Dialectics of Nature*. Büchner had recommended radical social reforms on the basis of his conception of nature, but Engels viewed these reforms as ineffective measures and considered Büchner a dilettante in the field of economics.⁶⁶ In 1878, when Engels briefly sketched an organizational plan for his book, the refutation of social Darwinism was still a prominent feature, though Büchner was relegated to the background. Of the eleven major points his book would cover, the final one was on Darwinian politics and social theory, especially as

advocated by Haeckel and Oscar Schmidt. The tenth section was to be on Virchow's conception of the cell state.⁶⁷

At the time he drew up this plan, Engels was closely following the controversy in Germany over the relationship between Darwinism and socialism that Virchow had provoked in 1877. Engels' good friend Schorlemmer often attended the annual meetings of the Association of German Scientists and Physicians and was present at the one in 1877 when Virchow cast suspicion on Darwinism because of its relationship to socialism.⁶⁸ When Engels learned that Schmidt was planning to deliver an address to the Association of German Scientists and Physicians at their 1878 meeting, he sent Schmidt a brief letter and a copy of *Anti-Dühring*.⁶⁹ Shortly thereafter Engels received Haeckel's book, which contained an attack on socialism on the basis of Darwinism. He confided to his friend Lavrov that he considered it his duty to answer the anti-socialist arguments of Haeckel and Schmidt.⁷⁰ Unfortunately, he never found time to do this.

The main lines of Engels' arguments against Haeckel and Schmidt, however, had been clearly delineated in Engels' previous writings. First and foremost, he declared it fallacious to try to apply the laws of animal societies to humans, since humans produce their means of subsistence, while animals merely collect them. Human production, because of its ability to produce superfluous goods, invalidates the struggle for existence and inaugurates a new form of struggle--over access to pleasure and personal development. Engels specifically denied that the class struggle was a form of the struggle for existence.⁷¹ He criticized social Darwinists because they reduced humans to the level of animals:

Darwin did not know what a bitter satire he wrote about humans and especially about his fellow countrymen when he proved that free competition, the struggle for existence, which the economists celebrate as the highest historical achievement, is the normal condition of the *animal kingdom*.⁷²

While Engels denied the validity of the struggle for existence as an eternal natural law governing human affairs, he admitted that a struggle for existence

occurred in bourgeois society. For Engels, this was an argument against, not an apology for, capitalism. Engels described this human struggle for existence long before Darwin's *Origin* appeared in print. He depicted bourgeois society as a "war of all against all," and, paralleling Darwin's own terminology later, a "war for life, for existence."⁷³ In *Anti-Dühring* Engels further emphasized that the capitalist mode of production is responsible for the human struggle for existence. He asserted that the introduction of the capitalist anarchy of production destroyed the older peaceful economic stability and turned the workplace into a battlefield:

It is the Darwinian struggle for existence, transferred from nature to society with intensified violence. The natural condition of the animal appears as the summit of human development.⁷⁴

Since the economic struggle for existence was a product of the capitalist mode of production, Engels believed the struggle would last only as long as capitalism did. He described the future transformation from capitalist to communist society thus:

The anarchy in social production is replaced by planned, conscious organization. The struggle for existence ceases. Thereby humans for the first time finally separate, in a certain sense, from the animal kingdom and emerge from animal conditions of existence into truly human ones. . . . It is the leap of humanity from the realm of necessity to the realm of freedom.⁷⁵

Social harmony would replace the struggle for existence and no longer would there be any need for states or governments.⁷⁶

In an 1875 letter responding to Lavrov's article on socialism and the struggle for existence, Engels had taken a position on the social significance of the struggle for existence antithetical to the one he presented in *Anti-Dühring*. Engels argued in his letter that the struggle for existence does not operate in capitalist society, because human economic struggle is over pleasures and luxuries, not subsistence. Evidence for this is the overproduction of goods and subsequent crises occasioned by the capitalist system. Engels followed his analysis with a rather startling statement:

The struggle for existence can only still persist, when the producing class takes the control of production and distribution away from the class that has been entrusted with it up to now, but has now become incapable of it; and that is the socialist revolution.⁷⁷

The assertion in this passage that the struggle for existence can exist in socialist society, but not under the capitalist system, is the exact reverse of his position articulated a couple of years later in *Anti-Dühring*. It is an odd position for Engels to take, and he probably intended it to be ironic, especially since he claimed in the same letter that the struggle for existence only had limited applicability even in nature. Yet here he made the socialist revolution somehow correspond to nature by restoring humanity to the struggle for existence that capitalism had suppressed. This strips from the capitalist system any claim of being in harmony with laws of nature, particularly those of Darwinian theory, and makes the socialist system seem more natural. However, Engels' assertion here that socialism is a better system than capitalism for promoting the struggle for existence is tongue-in-cheek and was intended to undercut claims that capitalism is in harmony with Darwinism, not as an apology for the struggle for existence.

Engels on Human Evolution

Because Engels insisted on a radical distinction between humans and animals or between society and nature; and because he opposed Malthus' economic and social views, Engels rejected the validity of Darwin's theory of natural selection through the struggle for existence as an explanation for human evolution. However, he firmly believed in the evolution of humans from animals, so he had to rely on alternative explanations for this process. Some non-Darwinian theories of evolution were widely held in the late nineteenth century, so Engels had some choice in appropriating evolutionary ideas that would be compatible with his own world view. However, Engels not only incorporated others' views into his explication of human evolution, but he also developed a unique theory of human evolution that was distinctly Marxian. He elaborated his views in an article, "Anteil der Arbeit an der Menschwerdung des

Affen" ("The Part Played by Labour in the Transition from Ape to Man"), written in 1876 as part of a larger work that he never finished. It was published posthumously in 1896 in *Die neue Zeit* and later incorporated into *Dialectics of Nature*.⁷⁸

Engels' account of human evolution relied heavily on the Lamarckian theory of the inheritance of acquired characteristics, but also incorporated elements from environmental theories of evolution stemming from Büchner and other German scientific materialists. Engels clearly stated that physical traits could be acquired through the greater use of organs and the development of new abilities. These characteristics could be inherited by one's offspring and could thus increase from generation to generation.⁷⁹ The environment also could influence the course of evolution, though Engels did not develop this idea as fully as he might have. Indeed, despite Marx's insistence that Trémaux's environmental explanation for evolution was self-evident, Engels scoffed at the idea and never mentioned Trémaux's hypothesis in his numerous writings on evolution.⁸⁰ He had already discussed in other writings various kinds of environmental factors that might influence evolution, but in "The Part Played by Labour" he only mentioned one that he considered especially significant--alterations in an organism's food supply. Engels asserted that new forms of nourishment would alter the chemical composition of the blood and subsequently the entire physical structure of an organism. In human evolution the crucial shift was from vegetarianism to a diet including meat, which helped strengthen the body and also permitted an increase in brain size.⁸¹ This materialistic form of evolution seems to rely on Moleschott's emphasis on the efficacy of diet and the primacy of blood chemistry, which he had articulated in his popular book, *Die Lehre der Nahrungsmittel: Für das Volk* (1850, *The Theory of Nutrition: For the People*). Feuerbach had summed up this position in his famous dictum, "Der Mensch ist was er isst."⁸²

Engels' explanation as to why animals (and presumably the anthropoid ancestors of humans) would change their source of nourishment is interesting, because in it he slipped Malthusianism in the back door. Animals, according to Engels, are forced to alter their eating habits when they deplete their food supplies.

—Although population pressure is not mentioned, it is clear that Malthus would have smiled in recognition if he had been able to read this. However, unlike Malthus and Darwin, Engels believed that the population pressure would lead to new kinds of adaptation to the environment (such as new food supplies) rather than to a struggle to the death.

Engels' sketch of human evolution does not include struggle, because he believed that humans were essentially social animals, not inherently competitive. This was consistent with the philosophical anthropology expressed by Marx already in his 1844 Manuscripts. In 1875 Engels wrote to Lavrov that the earliest humans had not been engaged in a free-for-all struggle. Rather they must have lived in bands and their social instincts were one of the most important factors elevating them above the apes.⁸³ Engels borrowed Darwin's terminology when he referred to social instincts, but he refashioned it. Darwin claimed social instincts conferred a selective advantage to their possessors in the struggle for existence, while Engels implied that human social instincts dispensed with struggle. In 1883 Engels reiterated his position that primitive human society was harmonious rather than combative:

Where community, be it of land or of wives or of other things, exists, it is necessarily primitive, transmitted down from the animal kingdom.

The entire further development consists in the gradual dissolution of this primitive community . . .⁸⁴

It seems that Engels thereby rooted human sociality in nature, a move that is perilously similar to the social Darwinists' insistence that human competitiveness is natural.

The aspect of Engels' theory of human evolution that was most original was the idea that humans contribute to their own biological evolution through their labor. In formulating this conception he combined three important strands of Marxian thought: (1) the idea of the self-creation of humans contained in Marx's 1844 Manuscripts, (2) the notion of praxis, and (3) the materialist conception of history. This combination of ideas in Engels' 1876 essay demonstrates that he had not abandoned the humanistic concerns of the early Marx.⁸⁵

Engels clearly set humans apart from the natural world by ascribing to humans the capacity of self-creation. Two years before composing "The Part Played by Labour" he had written that "the human is the only animal that can work itself out of its animal condition," because humans can create themselves consciously.⁸⁶ In "The Part Played by Labour" he emphasized that labor and production have shaped the course of human evolution:

It [labor] is the first, fundamental condition of all human life, and indeed to such an extent that we must say in a certain sense that labor has created the human himself.⁸⁷

Since human labor is a conscious, purposeful activity, Engels thus reinfused teleology into the evolutionary process, though he restricted it to human evolution. This provides another parallel between Engels' explanation of human evolution and Lamarckianism, since Lamarck's theory was teleological.

The concept of praxis is contained in the idea of human self-creation through labor, but it is also just as clearly present in Engels' delineation of the relationship between nature and humans in the evolution of humans. Engels discussed this theme in a section of *Dialectics of Nature* written shortly before "The Part Played by Labour." Engels thoroughly rejected the notion that humans, even in their biological evolution, were passive when confronting the forces of nature. As humans have learned to alter nature, they have in turn grown in intelligence. Further, they have produced new conditions of existence, which, according to Engels' environmental view of evolution, can produce new human traits.⁸⁸ He further stated:

Only the human has succeeded in impressing his stamp on nature, not only by relocating plants and animals, but also by so altering the appearance and climate of his place of residence, and indeed, even the plants and animals themselves, that the consequences of his activity can only disappear with the general extinction of the earth.⁸⁹

Except for the final note of pessimism, this passage could have been written by Marx in 1844.

Since Engels appealed to human production as the chief trait distinguishing humans from animals, it is not surprising that, when discussing human evolution, he focussed on how humans reached the state of being able to produce. It is at this point that the technological determinism implicit in Engels' materialist conception of history influenced his biology. In *Anti-Dühring* Engels claimed that it was a technological discovery--fire--that gave humans control of nature and thereby lifted them out of the animal kingdom.⁹⁰ In "The Part Played by Labour" Engels explained that the development of the human hand and the resultant ability to create technology was the most important factor driving human evolution forward. The assumption of an upright posture by some anthropoid ancestor of *Homo sapiens*, which Engels did not attempt to explain, was one of the most momentous events in natural history, since it freed the hand to develop in new directions. The development of the hand contributed to evolution in two ways: by the Darwinian correlation of growth, whereby a change in one organ can impact other organs in an organism; and by the resultant development of labor. Human interaction increased as they began to produce their means of existence. Among many other results, this gave rise to a need for language, and consequently, the larynx evolved. This account of the rise of language is thoroughly teleological and Lamarckian.⁹¹ However, it is also in complete accord with Marx's view that teleology comes from human purposes, not those of a supernatural being.

After having so decisively opposed the applicability of natural selection and the struggle for existence to human evolution, Engels later admitted a role for it, albeit a strictly limited one. This volte-face occurred because of the influence of Lewis Henry Morgan, a committed Darwinian sociologist, who published *Ancient Society* in 1877. Engels' *Origin of the Family, Private Property and the State* is based largely on *Ancient Society*, which Engels characterized as an "epoch-making work" and "a decisive book, as decisive as Darwin for biology."⁹² Engels made room for a small measure of natural selection in human evolution by concurring with Morgan that the transformation of the family from communal marriage to pairing marriage was caused by natural selection, since this newer family form produced a stronger race of humans.

However, Engels argued that natural selection had no effect on further transformations of the family, which were the results of social, not biological forces.⁹³

Evolution and Revolution:

Socialist Tactics

Engels has sometimes been accused of mediating a shift from revolutionary Marxism to evolutionary socialism, and Darwinism is sometimes blamed for this shift.

Dieter Groh identifies *Anti-Dühring* as the first clear sign of a "socialist-evolutionary Weltanschauung" that tended to replace revolution with evolution.⁹⁴ Levine argues that Engels, despite his condemnation of revisionism and his formal acceptance of the need for revolution, nevertheless prepared the way for the gradualism of the Second International.⁹⁵

Engels' acceptance of evolutionary theory in biology, however, did not in any respect result in his adoption of evolutionary socialism. As we have seen, Engels, based on the Hegelian dialectic, continually rejected all attempts to use biology to understand human society. Engels rejected Darwin's tenet that *natura non facit saltum*, because it contradicted the dialectic.⁹⁶ Even if it were true that nature made no leaps, however, this would have no relevance to human society. According to Engels, revolutionary leaps are not only possible in society, but they are natural and inevitable.

Engels advocated his determinist view of revolution even before the Revolution of 1848 broke out. Revolutions, he asserted, are always "the necessary consequences of circumstances, which are completely independent of the will and the leading of particular parties and entire classes."⁹⁷ Just as Calvinists with their doctrine of predestination, Engels' economic determinism did not prevent him--indeed it probably stimulated him--to take an active role in the revolution when it broke out. He not only wrote in its favor, but marched into the field with the Baden insurrectionaries to battle the forces of reaction.

Engels' advice to the German socialist leaders to use parliamentary means for the present did seem gradualist at times. He wrote to Bebel in 1891 that it was

premature for socialists to take power immediately, though in eight or ten years it would probably be feasible:

Then our entrance into power is entirely natural and develops smoothly--relatively . . . Therefore I hope and wish, our splendid, sure development progressing with the tranquility and inevitability of a natural process, remains in its natural course.⁹⁸

However, Engels only favored "tranquility" until such a time as the revolution could succeed, and he had no illusions that the revolution could be non-violent. In 1889 he wrote to Gerson Trier, "That the proletariat cannot conquer its political power, the only door into the new society, without violent revolution, on this we are agreed." However, he continued, a revolutionary needs to be prepared to use any means--violent or peaceful--that will lead to that goal.⁹⁹

Thus Engels' theoretical commitment to revolution remained an integral part of his ideology long after he had synthesized evolutionary theory into his world view. It was not Darwinism, but the practical political and military situation in late nineteenth-century Germany that caused Engels to urge caution to his socialist colleagues and made him sound gradualist at times. Through his military studies he had become convinced that the age of manning the barricades had passed, since modern military technology gave the government in power an almost invincible preponderance. Thus he considered his and his contemporaries' task to be the organization of the working class to create a mass party capable of overthrowing the government.¹⁰⁰

Dialectics of Nature and *Anti-Dühring*--though the former remained unfinished--were intended as works to imbue the socialist party with Marxian theory and rescue it from false doctrines that were gaining currency. The former began as a project to refute the Darwinian socialism of Büchner, and both of Engels' works opposed reformism. Since Marx and Engels in 1875--two years after Engels began writing *Dialectics of Nature*--objected to the compromises Bebel and Liebknecht made to fuse their own socialist organization, the Verband deutscher Arbeitervereine (League of German Workers' Societies), with the Lassallean Allgemeiner deutscher

Arbeiterverein (General German Workers' Society), it seems clear that Engels' evolutionary views did not necessarily push him to reformism or accommodation with non-revolutionary socialism. During the time that Bismarck persecuted the socialist party with his Anti-Socialist Law from 1878 to 1890 it was clear that the socialist party did not enjoy the mass support it needed to initiate a revolution. Therefore, propaganda was the order of the day and Engels--especially in *Anti-Dühring*--forged a complete world view to captivate the masses and unify them in preparation for the coming revolution. Biological evolution was one facet of this world view that found a special resonance with many members of the socialist movement.¹⁰¹

Conclusion

While Engels has sometimes been accused of having replaced the Hegelian dialectic with biological evolution, it seems more accurate to view his ideas as a synthesis of Hegel and Darwin into a more comprehensive world view.¹⁰² Of course, he was very selective in borrowing elements from each thinker. Furthermore, his use of the Hegelian dialectic, which he was already applying to nature before Darwin's theory was published, strongly influenced the way he viewed evolution. His acceptance of biological evolution, however, had little or no impact on his conception of the dialectic, though it did provide him with further examples of it.

Engels appealed to evolution as confirmation of his and Marx's theories, since it undermined religion and showed that change, not stasis, is natural. However, he--like Marx--distinguished between humans and animals and between natural and social laws, especially when contending against the application of the Darwinian struggle for existence to human society. He stressed far more than Marx, however, the unity of nature and human society by subsuming both under dialectical laws and by focussing on the parallelism between nature and society.

Instead of Darwinism affecting his social theory, Engels' view of society shaped his reception of Darwinism, especially in that area where biology and society overlap--the evolution of humans. He rejected the applicability of the struggle for existence to humans, even though he admitted that it might be an evolutionary

mechanism in the rest of the organic world. He also fused Lamarckian evolutionary theory with the materialist conception of history to provide a unique explanation of human evolution that centered on labor and technology as evolutionary mechanisms.

Engels' position on evolution wielded tremendous influence in the burgeoning socialist movement in Germany, especially through his popular work, *Anti-Dühring*. Both Kautsky and Bernstein, two of the most important socialist theorists and publicists in Germany during the late nineteenth and early twentieth centuries, were converted to Marxism through *Anti-Dühring* and began following the views of Engels, including those on evolution. Engels' works, however, undermined the Darwinian socialist theories of Lange and Büchner, for whom he had little respect.

ENDNOTES

1. Engels to Marx, 11 or 12 December 1859, in *MEW*, 29:524.
2. Engels, "Begräbnis," in *MEW*, 19:335; Engels also compared Marx to Darwin in *MEW*, 4:581, 16:217, 226-27; 19:333; *MEGA*, I/29:142.
3. Some recent prominent attempts claiming divergence between Marx and Engels are: Avineri, *Social and Political Thought*, 69-70; Levine, *Tragic Deception*; Carver, *Marx and Engels*. Scholars forcefully arguing for their unity include J. D. Hunley, *The Life and Thought of Friedrich Engels: A Reinterpretation* (New Haven, 1991); Rigby, *Engels*, 8, 97-102, 150-60, and passim; Stanley and Zimmermann, "On the Alleged Differences," 226-48; Hoffman, *Marxism*, 48-56 and passim, as well as all Soviet and Eastern European Marxist-Leninist scholars.
4. Marx, *Zur Kritik der Politischen Oekonomie*, in *MEW*, 13:10.
5. Marx to Moritz Kaufmann, 3 October 1878, in *MEW*, 34:346. See Gordon Welty, "Marx, Engels and 'Anti-Dühring,'" *Political Studies* 31 (1983): 286, for evidence that Marx had knowledge of the contents of *Anti-Dühring* before its publication.
6. Marx, preface to Engels' "Socialisme utopique et socialisme scientifique," in *MEGA*, I/27:541-42.
7. Engels, *Anti-Dühring*, in *MEGA*, I/27:274-75.
8. Engels, "Die Lage Englands," in *MEW*, 1:545-46.
9. Engels to Marx, 8 April 1863, in *MEW*, 30:338.
10. Engels to Marx, 21 September 1874, in *MEW*, 33:119.
11. Engels, *Dialektik*, in *MEGA*, I/26:5.
12. Engels to Marx, 21 March 1869, in *MEW*, 32:286-87.
13. Frederick Gregory, "Scientific versus Dialectical Materialism: A Clash of Ideologies in Nineteenth-Century German Radicalism," *Isis* 68 (1977):220.
14. Engels, *Dialektik*, in *MEGA*, I/26:36; I/26a:876.
15. Engels, *Anti-Dühring*, in *MEGA*, I/27:283.

16. Engels, *Dialektik*, in *MEGA*, I/26:81-82, 40.
17. *Ibid*, I/26:34.
18. Quoted in Etienne Gilson, *From Aristotle to Darwin and Back Again: A Journey in Final Causality, Species, and Evolution*, trans. John Lyon (Notre Dame, 1984), 86.
19. On Darwin and teleology, see Gillespie, *Charles Darwin*, passim; John F. Cornell, "Newton of the Grassblade? Darwin and the Problem of Organic Teleology," *Isis* 77 (288): 405-21; and Francisco Ayala, "Teleological Explanation in Evolutionary Biology," *Philosophy of Science* 37 (1970): 1-15.
20. Engels, *Dialektik*, in *MEGA*, I/26:107.
21. J. N. Findlay, *Hegel: A Re-Examination* (London, 1958), 267-72.
22. Timothy Lenoir, *The Strategy of Life: Teleology and Mechanics in Nineteenth-Century German Biology* (Dordrecht, 1982), 14-16, 246-48, 270-72; Norton M. Wise, "On the Relations of Physical Science to History in Late Nineteenth-Century Germany," in *Functions and Uses of Disciplinary Histories*, ed. Loren Graham, Wolf Lepenies and Peter Weingart (Dordrecht, 1983), 6-7, 12, 19-22.
23. Engels, *Dialektik*, in *MEGA*, I/26:83-87.
24. Engels, *MEW*, 13:470.
25. Ted Benton, "Natural Science and Cultural Struggle: Engels on Philosophy and the Natural Sciences," in *Marxist Philosophy*, vol. 2: *Materialism*, ed. John Mepham and David-Hillel Ruben (Brighton, 1979), 133-34. Rigby, on the other hand, agrees with my position in *Engels*, 107.
26. Engels, "Umriss zu einer Kritik der National-ökonomie," in *MEW*, 1:514.
27. *Ibid*, 1:522.
28. Engels, *Die Lage der arbeitenden Klasse in England*, in *MEW*, 2:355-56.
29. *Ibid*, 2:252, 505.
30. Engels, *Dialektik*, in *MEGA*, I/26:134-35.
31. Engels, *Anti-Dühring*, in *MEGA*, I/27:340-41.
32. *Ibid*, I/27:312.
33. Engels, *Anti-Dühring* (3rd ed.), in *MEGA*, I/27:534. It is hard to see how Hunley can argue that Engels viewed laws merely as tendencies in light of his determinist language--e.g., inevitable, necessity, etc.; Hunley, *Life and Thought*, 89.
34. Engels to Lawrow, 12-17 November 1875, in *MEW*, 34:170; *Dialektik*, in *MEGA*, I/26:49-50; Benton, "Natural Science," 132; Rigby, *Engels*, 107.
35. Engels, *Anti-Dühring*, in *MEGA*, I/27:446.
36. Engels, *MEW*, 21:249.
37. Engels, "Begräbnis," in *MEW*, 19:336.
38. Engels, *Dialektik*, in *MEGA*, I/26:336; see also Ball, "Marxian Science, 252-54.
39. Martin Koch and Karl Heinig, "Friedrich Engels Beziehungen zu bedeutenden Naturforschern seiner Zeit," *Deutsche Zeitschrift für Philosophie* 34 (1986):70; see Schorlemmer's marginal notes to Engels letter to Marx, 30 May 1873, in *MEW*, 33:80-81.
40. Engels, *Dialektik*, in *MEGA*, I/26:175-82; *Anti-Dühring*, in *MEGA*, I/27:317-37.
41. *Ibid*, I/27:336, 494-95; *Dialektik*, in *MEGA*, I/26:48.
42. Engels, *Dialektik*, in *MEGA*, I/26:141.
43. Engels, *Dialektik*, in *MEGA*, I/26:179.

44. Engels, *Dialektik*, in *MEGA*, I/26:331-32.
45. Dieter Wandschneider, "Die Stellung der Natur im Gesamtentwurf der hegelschen Philosophie," in *Hegel und die Naturwissenschaften*, ed. Michael John Petry, (Stuttgart, 1987), 43-45; on Hegel's conception of nature, see also *Hegel and the Sciences*, ed. Robert S. Cohen and Marx W. Wartofsky (Dordrecht, 1984).
46. Anneliese Griese, "Engels' 'Dialektik der Natur.' Theoretische Konzeption und philosophiehistorische Voraussetzungen," *Deutsche Zeitschrift für Philosophie* 29 (1981):624-26; Werner Held, "Inhalt und Funktion der naturphilosophischen und naturwissenschaftlichen--besonders der biologischen und angrenzenden--Studien von Marx und Engels bei der Herausbildung der Entwicklungsbegriffe in der Geschichte der marxistischen Philosophie," (dissertation, University of Leipzig, 1983), 153-54; Jordan, *Evolution*, 98-99.
47. Engels to Marx, 14 July 1858, in *MEW*, 29:337-38.
48. Engels to Marx, 30 May 1873, in *MEW*, 33:81
49. Engels, *Dialektik*, in *MEGA*, I/26:47-48.
50. *Ibid*, I/26:139, 141.
51. Elster, *Making Sense*, 40; see also David McLellan, *Friedrich Engels* (NY, 1977), 90-91. Hunley argues that Engels construed laws merely as tendencies in *Life and Thought*, 89.
52. Engels, *Anti-Dühring*, in *MEGA*, I/27:330.
53. Engels, *Dialektik*, in *MEGA*, I/26:48.
54. Engels, "Umriss," in *MEW*, 1:518, 500-01. On Engels and Malthus, see John M. Sherwood, "Engels, Marx, Malthus, and the Machine," *American Historical Review* 90 (1985):837-65.
55. Engels, *Lage*, in *MEW*, 2:311; "Umriss," in *MEW*, 1:517.
56. Engels to Lange, 29 March 1865, in *MEW*, 31:466.
57. *Ibid*.
58. Engels, *Dialektik*, in *MEGA*, I/26:49.
59. Engels to Lawrow, 12-17 November 1875, in *MEW*, 34:169.
60. *Ibid*, 34:169.
61. Engels, *Anti-Dühring*, in *MEGA*, I/27:272.
62. *Ibid*, I/27:273-74, 277.
63. Engels, *Dialektik*, in *MEGA*, I/26:124.
64. *Ibid*, I/26:124. Darwin's own theory also contained some Lamarckian elements.
65. *Ibid*, I/26:92-93.
66. *Ibid*, I/26:5, 11.
67. *Ibid*, I/26:173-74.
68. *MEGA*, I/26a:585.
69. Engels to Oscar Schmidt, 19 July 1878, in *MEW*, 34:334.
70. Engels to Lawrow, 10 August 1878, in *MEW*, 34:337.
71. Engels, *Dialektik*, in *MEGA*, I/26:49-50.
72. *Ibid*, I/26:83.
73. Engels, *Lage*, in *MEW*, 2:306-7.
74. Engels, *Anti-Dühring*, in *MEGA*, I/27:439.

75. Ibid, I/27:446.
76. Ibid, I/27:444-45.
77. Engels to Lawrow, 12-17 November 1875, in *MEW*, 34:171.
78. For a modern anthropological analysis of Engels' "Part Played by Labour," see Charles Woolfson, *The Labour Theory of Culture: A Re-examination of Engels's Theory of Human Origins* (London, 1982).
79. Engels, *Dialektik*, in *MEGA*, I/26:89.
80. Engels to Marx, 2 and 5 October 1866, in *MEW*, 31:256, 259-60.
81. Engels, *Dialektik*, in *MEGA*, I/26:92-93.
82. "Man is what he eats." Frederick Gregory, *Scientific Materialism in Nineteenth Century Germany* (Dordrecht, 1977), 88-92.
83. Engels to Lawrow, 12-17 November 1875, in *MEW*, 34:172.
84. Engels to Kautsky, 2 March 1883, in *MEW*, 35:447.
85. On Engels' life-long commitment to Marxian humanism, see Hunley, *Life and Thought*, ch. 7.
86. Engels, *Dialektik*, in *MEGA*, I/26:34.
87. Ibid, I/26:88
88. Ibid, I/26:22-23.
89. Ibid, I/26:82.
90. Engels, *Anti-Dühring*, in *MEGA*, I/27:313.
91. Engels, *Dialektik*, in *MEGA*, I/26:82, 89-90.
92. Engels, *Der Ursprung der Familie, des Privateigentums und des Staats. Im Anschluss an Lewis H. Morgans Forschungen*, in *MEGA*, I/29:12; Engels to Kautsky, 16 February 1884, in *MEW*, 36:109-110.
93. Engels, *Ursprung*, in *MEGA*, I/29:24, 27, 30.

94. Groh, "Marx, Engels und Darwin, 218.
95. Levine, *Tragic Deception*, 180-91.
96. Diane Paul argues that Engels retained Darwinian gradualism by minimizing the leaps in the dialectic; "Marxism, Darwinism," 120-27.
97. Engels, "Grundsätze des Kommunismus," in *MEW*, 4:372; see also Hermann Bollnow, "Engels' Auffassung von Revolution und Entwicklung in seinen 'Grundsätzen des Kommunismus' (1847)," *Marxismusstudien* 1 (1954): 91-92.
98. Engels to Bebel, 24-26 October 1891, in *MEW*, 38:189.
99. Engels to Gerson Trier, 18 December 1889, in *MEW*, 37:326-27. Hunley, *Life and Thought*, ch. 6, refutes the charge that Engels promoted reformism.
100. Hunley, *Life and Thought*, ch. 6.
101. Gary Steenson, *"Not One Man! Not One Penny!": German Social Democracy, 1863-1914* (Pittsburgh, 1981), 193-94.
102. Naccache, *Marx*, 131.