

CHAPTER 10

On the Problem of Direction and Goal in Biological Evolution

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To doubt the fact of biological evolution today would be absurd—especially since, on the basis of the arguments developed by Darwin, a remarkably powerful theory of biological evolution is available. Its present main variant—connected, above all, with the name of Ernst Mayr—is the so-called synthetic theory, synthetic in the sense of including the state of present-day research of various biological sciences. In the following discussion, such phrases as “Darwinian theory” and “Darwinian explanation” always refer to the modern synthetic form of Darwinism.

The rejection of every form of teleological interpretation and the limitation to principally causal patterns of explanation are characteristic of Darwinian arguments. Highly simplified, the popular basic idea can be given as follows: the random occurrence of variations within a species (e.g., caused by gene mutations) leads, in the struggle for survival for limited vital resources, to a selection of the best-adapted individuals, whose survival advantages are passed on and preserved through reproduction. The principle of Darwinian evolution can thus be characterized as the *survival of the best adapted under the conditions of variation, selection, and reproduction*, or what I will call, in short, the (biological) “principle of survival.”¹ It is a principle because evolution is by definition nothing other than survival of the best

adapted for survival. What is meant by the “best adapted” in a specific situation is, in contrast, a question that can be answered only empirically.²

The principle of survival is not to be problematized in the following discussion (this was done in chapter 3); rather, it is accepted as a plausible basis of the Darwinian theory of evolution. Now, what are the philosophical implications of the principle of survival, especially concerning the direction and goal of evolution? What consequences do such explanations have? Interest in these questions arises out of the special position of *Homo sapiens* as the most highly developed animal. More concretely, the questions to be discussed in the following chapters are: (a) Is there a tendency toward higher development in evolution? (b) If so, is man then to be considered the goal of evolution? (c) With regard to this, how is the role of the mind to be valued? (d) What are the anthropological implications of the answers to these questions? and (e) What, then, are the implications for a metaphysics of nature?

THE PROBLEM OF DIRECTION IN EVOLUTION

The process of evolution suggests an effective underlying tendency toward more highly developed organisms. How does the biological principle of survival pertain to this tendency, and what does *higher development* mean? As a rule, biologists do not like such normative attributes; Darwin himself noted, “Never use the words higher or lower.”³ Nonetheless, a development toward higher complexity is obvious. As the philosopher Wolfgang Stegmüller summarizes the theory put forth by Manfred Eigen,⁴ “[T]he formation of ever more competitive mutants . . . is really compelled by thermodynamic laws” and “for this reason can even be described as *physically necessary*.”⁵ *Higher* accordingly means “more capable.” However, does it also mean “more capable of survival”? There is a widespread opinion that it does. The philosopher Nicolai Hartmann, for example, considers it obvious that the higher type is “the more effective in the competition of the struggle for existence.”⁶ *Homo sapiens*, as the last link of evolution, should then be the organism most capable of survival.

At this point doubts arise. Compare the chance of survival of, say, infusoria with that of humans:⁷ risk increases with an increase in capability. A glance at inorganic structures makes this even clearer. The Alps are obviously characterized by considerable stability. The proton is absolutely stable (or at least is considered to be almost stable) according to physicists. In short, as the philosopher Hans Jonas has emphasized, stability, the ability to survive, cannot be everything in the

process of evolution: "The survival standard itself is inadequate for the evaluation of life. If mere assurance of permanence were the point that mattered, life should not have started out in the first place. It is essentially precarious and corruptible, being an adventure in mortality, and in no possible form as assured of enduring as an inorganic body can be."⁸ The stability of inorganic forms obviously cannot be exceeded by that of living species. Yet how can evolution be said to progress if maximal stability is already attainable in the inorganic realm? Is the principle of survival not so relevant for Darwinian arguments after all?

One could object that for Darwinian arguments it is not simply the ability to survive that is decisive but the ability to survive in a particular situation—that is, the *adaptation* of an organism to its environment. Yet in this case too the previously mentioned arguments apply: protons are also optimally "adapted." Are humans better adapted than infusoria? "In my view," according to the biologist Leo von Bertalanffy,

there is . . . not the slightest glimmer of a scientific proof that evolution, in the sense of a progression from simple to more complex organisms, has anything at all to do with increased adaptation, selectional advantage, or the production of a larger progeny. Adaptation is possible at every level of organization. An amoeba, a worm, an insect or a nonplacental mammal is just as well adapted as a placental mammal; if it weren't, it would have become extinct a long time ago. The equivalence of evolution and adaptation can, therefore, in no way be considered as proven.⁹

"Each of these levels," Hoimar von Ditfurth also says, "is perfect in itself." And, he continues, "The secret of the continual progress of evolution appears to be even greater in view of this fact."¹⁰ So the question is posed more urgently: How can there be progress in evolution at all, and how can it be explained?

As for the first part of the question, Bertalanffy and biologists generally consider it a fact that "a general progress in evolution manifests itself in the direction toward higher organization"¹¹—that is, toward more intense differentiation and consequently higher complexity. We proceed from these generally accepted conclusions in what follows.

At this point, however, a problem arises: In terms of Darwinian argument the principle of survival is extraordinarily plausible, but what does it have to do with higher complexity? Because of the uncertainty on this point, the principle of survival is accepted by some biologists, such as Bertalanffy and Adolf Portmann, only with reservations. We therefore need some clarification.

It will be instructive first to consider a form of evolution *not* connected with higher development, a development that is instead horizontal, extending in breadth. It must be remembered that evolution, according to Darwinian theory, presupposes competition, which is, for the most part, for the same territory, food, and so forth, since individuals of the same species are competing for them. Competition does not take place between earthworms and tigers, who have completely different needs and biospheres. Earthworms and tigers can coexist; they are, to use an expression from Leibniz, *compossible* species, which as such exist in different "ecological niches." How does this happen? To use a striking example, one can argue that because land exists, land-living animals finally develop from aquatic animals, with which they no longer compete and with which they are thus compossible. Because air exists, birds, too, develop from aquatic or land-living animals, with which they no longer compete and with which they are compossible as well.

To generalize: competition leads to a selection pressure in the direction of the occupation of niches and biospheres that are still free, and so to "horizontal" development in breadth. That means a negation of competition and, as a result, a multiplication of compossible species. Horizontal evolution leads to diversification.

In this regard, an interesting insight arises: such Darwinian processes of selection are doubtless driven by the principle of survival, as the term *selection pressure* indicates, but selection in this sense does not lead to an increase in the capacity for survival: its result is not more stability but diversification. What takes place is the occupation of still available niches, and that means biospheres already available—in the sense of a horizontal development that extends in breadth.

The other form of evolution has, in contrast, a vertical character: it is a development not in breadth but in "height." Horizontal evolution consists of the occupation of available biospheres, but vertical evolution creates new biospheres. For example, the existence of plants makes the existence of herbivores possible; the existence of herbivores, in turn, makes the existence of carnivores possible. In the first case the botanical world created by evolution provides a food resource, but only for a completely different kind of living being, namely herbivores, and these in turn provide a food resource for carnivores. The level of development reached by evolution itself becomes at this point a "niche," the basis of existence for new forms of life. Each level attained becomes the starting point for a new development. The result of this vertical evolution is a series of levels, a development in height, in the sense of a *self-upgrading of nature*, as I will call it.

The process of self-upgrading necessarily has consequences for the organization of living beings. For example, herbivores must possess completely different

functions from plants. They need a chewing apparatus to chew up plant food and a digestive system to utilize it. But that does not suffice; they must first look for food, namely the plant species that are good for them, and that means they must move around; they cannot take root but need limbs for movement that must be coordinated and controlled; this demands a nervous system and brain as a control center. Furthermore, the ability to move around presupposes the ability to orient in the environment, and consequently a sensory organization associated with information processing by the nervous system and brain.

In short, herbivores exhibit fundamental differences in organization from plants: they are necessarily more complexly organized than the latter. Because their existence presupposes that of plants, they need functions that exceed those of plants. Of course, they also lack certain things that plants have, such as chlorophyll and the capability for photosynthesis. But they no longer need to meet their energy requirements as plants do because they can eat plants instead. And they are not really lacking chlorophyll and photosynthesis, for these are necessary only for the growth of plants, which are in turn necessary for the herbivores' nourishment. What has been attained at one level is—at least (as in the example of photosynthesis)—indirectly available at the following level. In this respect, the later level of development in vertical evolution is in fact more complex and in this sense higher. I admit that much more could be said about “higher.” Evolution here tends toward higher complexity brought forth by itself. This form of self-upgrading of organic nature explains, therefore, the appearance of not only new but also more highly developed species on the basis of a strict Darwinian argument.

Although the principle of survival drives this “vertical” tendency of evolution toward higher complexity, higher complexity does not produce an increase of fitness for survival in any way. A chimpanzee is not more capable of survival than a tick. What can be said about this in the light of the argument developed?

In the case of horizontal evolution, it has already been shown that selection on the basis of the principle of survival leads, not to an increase in fitness for survival, but rather to a diversification of the species. Similarly, in the case of vertical evolution, the principle of survival drives development toward more complex structures of organization, yet this form of evolution is not connected with an increase in fitness for survival; it is simply based on the fact that selection pressure toward vertical evolution is effective. And selection pressure, though based on the principle of survival, indeed leads to new species, but in no way to species more capable of survival. This is because nature is perfectly satisfied with survival. Survival alone is required by the principle of survival; and that is also true in the case of vertical evolution.

The apparent paradox of a process of upgrading controlled by the principle of survival without an increase of the fitness for survival makes the difficulty facing evolutionary theorists understandable: although they justifiably adhere to the universal validity of the principle of survival, they cannot gain a yardstick from it for the height of development. Thus the connection between the principle of survival and higher development can be characterized by the formula that nature is satisfied with simple survival but not with the survival of the simple. Rather, a vague but “goal-directed” urge toward the complex is effective in it, an urge that drives the process of the self-upgrading of nature. That can be firmly based in the framework of Darwinian arguments

It must be emphasized that we are not describing the actual course of evolution here but rather formulating an ideal-typical statement. In Darwinian theory, it would be expected that an undisturbed, continual evolution of organisms would lead to higher development in the long run: that is, development toward more complex forms of organization and consequently toward acquisition of new biospheres. But the qualification *undisturbed* is important here because the immanent dynamics of evolution can be crucially disturbed by natural catastrophes. Evolution in the Darwinian sense unavoidably includes variation; thus an element of chance influences the course of evolution, which may also regress from the level of organization already attained or lead up various blind alleys and side streets. Nevertheless, the characterized vertical tendency of evolution remains—as a tendency—unaffected by this: there always remains a tendency toward higher development in evolution.

If the direction of evolution is not only horizontal but also—in tendency—vertical, one can further ask whether the tendency toward higher forms of organization is directed toward a goal in the sense of an end of biological evolution. This question is discussed next.

DOES BIOLOGICAL EVOLUTION HAVE A GOAL?

Before we can address the question of a possible goal of biological evolution, we must clarify what “development to higher complexity” means concretely; “higher complexity” is still a very comprehensive expression. The example of the transition from plants to herbivores at least shows that the organization of the latter demands not only limbs for motion and a digestive system but also organization of the senses, a nervous system, and a brain. The animal must look for its food; to do this it must move around, orient itself in its environment, process information,

and regulate, coordinate, and control sequences of motion. These demands evidently increase with the level of organization. Orientation, regulation, and control mechanisms are more complex in higher animals than in lower ones. The perceptual capacities of the organism are decisive for this: orientation, regulation, and control are information-related processes and are thus very dependent on perceptual capacities.

Perception at first gives information about the external environment. Animals already necessarily possess knowledge of objects, though this is not the same as "objective knowledge," which is available only at the level of abstract thought. The perception of an animal is subjectively colored. It has, for example, a strongly selective character: the animal perceives only what is existentially relevant for it—in other words, what is beneficial or detrimental to it. Such subjectivity is not at all to be understood as a shortcoming. On the contrary, because it directly concerns the existentially meaningful relationship of the animal-subject to its object, it is especially efficient economically. It is simply the matching of object knowledge to a specific animal subject. Besides, perception's subjective coloring does not alter the fact that we are dealing with a highly remarkable cognitive accomplishment of animals.

Higher animals are more complex and live in more complex environments. The demands concerning orientation, regulation, and control are accordingly higher. Thus it becomes increasingly important for behavior that perception include not only data from external situations but also subjective data like skin contact and muscle tension; even data of an "existential" character, like pain, are "inserted," as it were, into the perception of the environment. Higher evolution has thus led to a crossing over of outer and inner perception and consequently to the capability of sensation.¹² Regarding the sensation of touch, for example, what I sense about a stone I sense about myself at the same time. The same goes for the sensation of pain when I touch a hotplate. This reflexivity of perception, made possible by the crossing over of outer and inner perception, results in quite new possibilities for orientation and fine regulation of movements and, consequently, behavioral efficiency. At the same time a completely new sphere of being has been established: an inner dimension of the organic subject, the world of the psychic—a sphere of self-perception in which the subject meets itself and acquires reflexivity.

Of course, numerous unsolved problems are involved here, which are addressed by a widespread and controversial contemporary discussion on the mind-body problem.¹³ Nevertheless, in the present connection, it is essential for the plausibility of my argument only that in the course of biological evolution a development of sensation finally takes place, and thus a crossing over of outer and inner,

or existential, perception. The subject continually senses itself in its perception and thus explicitly becomes the focus of its own intended actions and executed actions. Implicitly, this has always been the case because of the organism's instinct for self-preservation. In short, through the evolution of sensation, the animal subject is simultaneously present and thematic to itself in perception. Sensation means continual "self-thematization" of the subject.

In summary, two principal tendencies are important for higher forms of evolution: the development of *cognition* and of *self-thematization*. Both developments make sense within the framework of organic behavior. That they make sense is guaranteed by the fact that they have already passed their test, so to speak, as a result of the evolutionary process. That means that, normally, animals automatically possess adequate cognition and action impulses precisely so that they optimally succeed at subsisting in the realm of life to which selection has fitted them. They can rely on their innate instincts.

Unfortunately, as philosophizing biologists¹⁴ suggest, evolution seems, nevertheless, to have made a mistake with the development of man. Through hypertrophy of the cerebrum, a completely "heady" being came into existence. His brain was no longer the "ratiomorphic apparatus" (as the normal brain of the animal has been called)¹⁵ optimally adapted to a specific realm through natural selection but rather the seat of reason emancipated from all vital bonds, which, as the history of humankind appears to confirm, turns everything upside down. Man is consequently no longer only animal but also mind—as will be shown, a precarious, momentous combination of vitality and reason.¹⁶

At first, the occurrence of mind had consequences that aided life: with the development of language new forms of cooperation became possible. Consequently, the group hunt, for example, could be organized more efficiently. Techniques for securing subsistence, such as those for making clothing, food, and tools, could be developed. However, with the development of language, thought also arose and with it the dimension of *consciousness*. Consciousness is, however, due to the characteristic tendency toward self-thematization typical for higher animals, principally connected with the capacity for self-awareness. Self-awareness, in turn, is to be understood as the root of the essential consciousness of freedom for human beings.¹⁷ In other words, with the occurrence of *mind* the consciousness of freedom also arose in humans and with it the potential for questioning natural relations, dissociating and possibly freeing oneself from them.

One expression of this is the development of technology. It aims at freeing humans from natural constraints, but at the same time it always raises the possibility

of being able to oppose nature.¹⁸ The history of humankind, which can be viewed as a continual process of the perversion of the natural order, also illustrates that this is no illusion. Man, although himself a child of nature, develops unnatural ways of life, causes damage of civilization, employs weapons of destruction, destroys ecological systems, and conceives of ideologies destructive to life. Even more: with the mind "evil" entered into the world—not the "so-called evil" that Konrad Lorenz¹⁹ has expounded, with terrifying harmlessness, simply as "aggression." Certainly aggression exists in animals and, as a phylogenetic heritage, in humans too; however, consciously created evil is a pure human specialty.²⁰ On the other hand, mind has also brought forth forms of the most highly developed humanity, outshining all that is natural. In short, the rise of human mind is at the same time a process of the separation of man from nature and of the self-authorization of man, negatively as well as positively—the establishment of another, thoroughly artificial nature: *culture*.

In this sense man has been designated (by Herder) as the being freed from nature.²¹ Human freedom, as Schelling²² tells us, is an expression of the fact that mind has stepped out of the center of nature (and thus also has the potential to go mad). In this respect, it even has the ability to oppose God; this would be the metaphysical origin of evil. Similarly, from an anthropological perspective, Helmut Plessner²³ characterizes man as that eccentric being who has freed himself from the "centered" adjustment of the animal to its environment. And for Max Scheler,²⁴ the ability to say "no," the capacity to transcend every factual situation, belongs constitutively to the nature of mind. In other words, not only is culture an artificial nature, but it transcends nature to become a supernature.

The undeniable consequence is the end of natural selection. This simply results from the fact—hinted at already—that the contrivances of culture have made the mechanisms of natural selection obsolete. In a world in which sickness can effectively be cured, clinics and spas are at people's disposal, artificial limbs are applied, and replacement organs are implanted, the biological principle of survival has been "unhinged" (*ausgehängt*).²⁵ And that means, too, that natural evolution has come to an end. In this respect, man stands at the end. Is man, then, the goal of evolution?

One could object that the human species changes biologically even today—for example, in muscle structure, susceptibility to sickness, and life span. That cannot be denied. But these changes are manifestations of the "self-domestication" of man and thus consequences of civilization, which as such are not the results of *natural* selection. On the contrary, they are expressions of an evolution that is now

taking place under completely different conditions, namely those of *cultural evolution*. This is the continuation of natural evolution only in a temporal sense; in its character, it is completely different from the former. Though the biological principle of survival has been unhinged, an analogous principle is operating on the cultural level with regard to competing strategies, institutions, theories, and so forth.²⁶ The motors of cultural evolution are intellectual and technological innovations. Linguistic communication, forms of passing down traditions (e.g., through written language), and creative processes play an important role.

A central aspect of this development is the speed with which it takes place. The speed of natural evolution is obviously dependent on the reproductive rate of the organisms. Cultural evolution, on the other hand, has accelerated more and more in its historical course—think only of the development in technology. All these processes initiated by human consciousness are far more rapid than natural selection, which blindly gropes along its way. For this reason alone it would have no chance against cultural evolution, if the disconnection with the biological principle of survival were not already reason enough. To return to the objection mentioned, if humans have also biologically changed in the course of history, then the changes are due not to natural selection but to culture alone.

We can conclude, then, that natural evolution does have an end, and that it is man himself. The idea is not strikingly new. In the Judeo-Christian tradition, man has always been the "crown of creation." Criticisms of this view are also not new. Biologists tend to suspect it of anthropocentrism. From a phylogenetic perspective, man too is only an animal, even if late on the scene. That he has the advantage of reason, in contrast to other animals, does not warrant assigning him a special position. Animals have other advantages, such as perfect instinct, that man lacks.

Besides, biological natural selection has by no means been turned off. Where man does not control, the selection mechanism regulated by the principle of survival continues, for example, (unfortunately) in the case of pathogenic viruses and bacteria, which due to their high rate of reproduction²⁷ can change very quickly and thereby become resistant to treatment. Thus new evolutionary lines arise continually that, according to the previous considerations, will show a tendency toward development of higher complexity. One could, then, speculate that such continual evolutionary processes outside the sphere of man could lead at some time to the origin of another species of humanoid being and, in the long run, even to a superman. According to this viewpoint, an evolutionary development that would surpass man himself would refute the idea that natural selection ends with man.

What might such a development look like? The trend toward higher complexity concerns, above all, the development of the brain, so, to evoke a brief science fiction scenario, mind might at some point appear in such an extrahuman line of evolution. Once mind appeared, however, natural selection would be finished here too, because it would again be replaced by cultural development, and the principle of survival would thus be unhinged. Indeed, through natural evolution, other, again humanoid, beings could arise perfectly well, but, in any case, not of a kind that would surpass man with regard to the character of his mind. That would be impossible through natural selection, whereas the succeeding cultural evolution of intellectual and also biological traits would lead to the greatest differences.

All in all: With the appearance of mind, natural evolution, which is at the same time a development toward higher complexity, is irrevocably ended, and in this sense man—or (with respect to the structure of his mind) indeed any humanoid being—represents the end of natural evolution both positively and negatively (negatively since, as was mentioned, “evil” came into the world by means of mind). Seen in this way, man is the crown and cross of the creation in one.

MIND AS THE ELEVATION OF NATURE

On one important point I would like to amend what I have stated thus far. If the goal of natural selection is the evolution of mind, and if mind is the negation of naturalness, then is not the goal of natural evolution the negation of naturalness?²⁸ That would indeed be a strange consequence.

To clarify this, it is important to see what the appearance of mind means concretely. In comparison with animals, it means more richness of being: language, thought, law, art, religion, science, technology, and so on are dimensions principally closed to animals. In this respect it could be said that the negation of naturalness carried out by mind does not mean a loss for man; from the perspective of natural selection theory, however, it seems highly paradoxical.

At this point it is helpful to recall the difference in cognitive abilities between animals and men: animal “cognition” is, as already mentioned, strongly subjectively colored perception. Due to his emancipation from natural bounds, man, in contrast, strives for objective knowledge: that is, a knowledge of the object that no longer depends on subjective-private states but rather does justice to the thing itself. That is the basic ethos of science. The object of natural science is, accordingly,

nature as such and not one’s subjective experience of nature. No animal is able to abstract from its subjective experience and thematize nature itself.

But what is “nature itself”? Certainly not the actual state of nature in its transient manifestations. For knowledge of nature, only the lawfulness underlying nature can be of interest; accordingly, the object of science is not any single natural object existing here and now but rather the law of nature: that is, a universal of nature that transcends time and space or—to use a classical philosophical term—nature’s underlying essence.

The essence of nature is not just any part of nature, so in space and time the essence of nature will be sought in vain; it cannot be found there as one would find a stone. Consequently, if scientific cognition aims to discover the essence of nature, then it is searching for something that does not exist in natural reality because it remains hidden as the essence underlying it. Cognition reveals something that completely determines natural being but that itself does not possess the form of natural reality. In other words, insofar as knowledge of nature comprehends the underlying essence of nature, it accomplishes something that nature cannot. So something is added to the being of nature that is not realized in it—precisely knowledge of the essence of nature.

An instructive example in this regard is again technology. It can be characterized as the venture that frees the possibilities lying in the essence of nature. Indeed, the fact that nature essentially holds possibilities results from its lawlike character. For example, the movement of the earth around the sun is determined by the law of gravitation, but that law’s validity is not limited to the earth and sun: it holds for bodies in general. Thus the law contains possibilities that go far beyond this case of the movement of planets. Nature, which at first appears to be a finished order willed by God, presents itself from a technical perspective as a field of unforeseeable possibilities. Think of the taming of fire, the airplane surmounting gravity, or the transistor making worldwide communication possible. Technology adds something to the actually realized being of nature that stems from the dimension of possibility in nature, from the lawfulness essentially underlying it. Technology brings something from the hidden essence of nature to light to create a second, artificial nature.

As already said, this endeavor becomes possible through the knowledge of natural laws, which, in turn, is an accomplishment solely of mind. Animals are not in the position to develop physical theories and translate them into technology, let alone plants and stones: nature possesses—as nature—no knowledge of itself. Knowledge of nature transcends the possibilities of nature. Mind can accomplish

something that nature itself cannot, namely to understand nature. Nature only exists; it is not aware of existing.

Now, man himself is a child of nature. Nature thus appears to have brought forth, in humanity, a being that is capable of understanding nature, and in this way it remedies the previously named flaw in nature. In the form of man, evolution has developed the organ of cognition that nature itself lacks. Only the activity of man's cognition can make visible what nature is in its essence. From this perspective, mind appears as the completion and perfection of nature, which, as we have said, also manifests in the completely new possibilities of technology in contrast to those of "biologically developed" nature.

As mind, man has the ability to oppose nature and to pervert and destroy it, yet nature has completed itself only in the human mind. Both results come from the same root: the ability to understand the underlying essence of nature. Animals can perceive only the outer appearance of nature. But man's ability to understand the essence is simultaneously his liberation from natural limitations and the negation of naturalness.

The mind's negation of naturalness has the consequence that man constitutes the end of natural selection. Consequently, I have asked whether the negation of naturalness is to be understood as the goal of natural evolution, a thought that appears paradoxical. Now the case presents itself as follows. Nature, in the form of mind, has in fact brought forth a being that can transcend nature by means of reason and can understand nature in its essence and translate it into technical reality. Viewed in this way, evolution is a gigantic process of the self-clarification of nature that is completed in man. In this sense, nature develops, beyond its mere natural being, an organ of self-cognition that nature itself lacks. The negation of naturalness by means of the mind is thus at the same time the completion and elevation of nature—though in the ambivalent sense that this can always turn into a perversion of the natural order. Everything shows this fundamental ambivalence, the possibility of positive or negative manifestation, and inevitably this is also true for the human mind. Nevertheless, it can also be said that with man nature, as it were, gains a consciousness of itself.

We had asked about the goal of evolution. From the argument developed here, we can conclude that evolution *has* a goal: the human mind. In it nature transcends itself as nature and gains at the same time the potential to reveal the essence underlying nature. One thus underestimates mind if one views it only as something unnatural. It is also basically the *supernatural* and thus the potential for the completion and elevation of nature.

ANTHROPOLOGICAL IMPLICATIONS

A brief comment is in order concerning the consequences of this line of argument for an understanding of human beings and especially of human cognition and action. Since we are dealing here only with the characterization of the essential difference between animals and humans, their extensive common ground, which of course also exists, will not be considered. Such a common ground is manifested in the explorations, by both evolutionary epistemologists and sociobiologists, of what is, in a certain sense, a continuum of development from the animal to the human mind. These extraordinarily interesting and important results for epistemology as well as for ethics will not be treated here, since we are dealing only with the difference between humans and animals.

Our argument has consequences for cognition: (nonhuman) animals are optimally adapted to their environment, so their perception supplies them with automatically adequate cognition within their subjective circle of life. For humans, in contrast, an epistemological problem results from the nature of thought. Because of liberation from natural constraints, thought is indeed an act of will and thus an arbitrary act in principle as well. This means thought can also miss its goal, it can make mistakes. Mistakes in this sense can be viewed as the price of freedom. Animals cannot make mistakes because they have no freedom of thought. Precisely for this reason, they also are not capable of objective knowledge. Only a being that can make mistakes can also possess objective knowledge.

The argument also has consequences for action. The instinctual behavior of animals is adapted to the environment and thus, like their perceptual faculties, is automatically adequate. In contrast, human action, freed from the constraints of instinct, is entirely problematic; it must at first find its purpose and may therefore also miss it. Further, the nature of the human mind makes possible genuine human behavior like lying, deceit, and malice. In short, due to its liberation from instinctual constraints, human behavior is no longer automatically correct. Consequently, moral laws are needed, and humans can negate and break them. So, together with mind, the possibility of guilt has entered into the world. This is, as it were, "original sin," belonging to man from the very beginning, basically only a religious metaphor for man's self-authorization connected with the appearance of mind and transcending the natural order: not only a theological but also an evolutionary fact!

To sum up: the mind frees man from his natural constraints; the possibility of error and guilt is the price of freedom. But this freedom is also the surmounting

of naturally given limits. Cognition and freedom on the one hand and error and guilt on the other thus belong intrinsically together, metaphorically and biblically speaking: hell always belongs to heaven, the two cannot be separated. To exist in this ambivalence is man's inevitable destiny.

METAPHYSICAL IMPLICATIONS

In conclusion, we must ask what presuppositions enter into the argument carried out here. Let us first recall the basic ideas developed earlier: I showed that in evolution there is a tendency toward higher development—that is, a self-upgrading of nature—and toward the development of cognition and “self-thematization” and thus finally of mind. The appearance of mind, as was further argued, has as a consequence for man the possibility of freeing himself from the constraints of nature. At the same time, it also makes possible for him to understand what nature is in its essence.

What has been presupposed in this argument? In each case, it is the fact that in the process of nature, precisely in the form of evolution, the appearance of new forms is possible. In other words, using Darwinian arguments, we assume from the very beginning that nature contains possibilities that are still hidden in primitive forms and become visible only in more complex structures. The concept of natural evolution makes sense only under this assumption that nature is more than its factual being in that it contains potentials that increasingly appear in the natural process.

But where does the potential contained in natural being come from? Doubtless from natural laws. Only that which is compatible with them is naturally realizable. This holds for technology as well as for the development of nature itself, especially biological evolution. The basic presupposition for this is a natural being of a lawlike character. Incidentally, the main point of Darwinian theory is that it reasons only according to the law of causality and thus can do without the Aristotelian premise of a nature that is purposive in itself. This causal nature of the Darwinian approach becomes apparent with regard to the biological principle of survival: variation is based on the mutation of genes, for instance, due to radiation; natural selection in its broadest sense on the “interaction” of organic systems with their environment; and reproduction on the function of hereditary mechanisms. Viewed in this way, the lawfulness of nature is in fact the basis of the Darwinian explanation of natural evolution. According to recent theories, it even includes the abiotic formation of life from inorganic material.²⁹

The lawlike character of nature cannot, of course, be founded in experience, since the claim to universality connected with the concept of natural law transcends every possible experience. On this point, Hume's criticism must be accepted. In fact, we are dealing here, not with a result of empirical research, but with its premise, which, viewed more closely, represents a metaphysical presupposition underlying all natural sciences.

Indeed, the laws of nature have a completely different character of being than the being of nature. The law of the motion of planets is not itself in motion; the law of electromagnetism is not itself electromagnetic; the law of the earthworm is not itself a worm. The laws of nature are rather like the logic determining the process of nature: they do not exist in time and space like a stone or an earthworm but possess *ideal* character. This ideal, then, is what was described above as the essence of nature underlying the natural being. In short, the concept of natural evolution implies that nature contains potentials that, in turn, stem from the laws of nature and thus from an ideal basis of nature—an inevitable metaphysical premise for all natural sciences.

At this point the question arises of how this metaphysical aspect is to be valued from a philosophical point of view. This is the question of the philosophical concept of nature, which I have discussed in detail elsewhere.³⁰ This much can be said about it: we are forced to assume something like a logic underlying nature in the form of natural laws, and this logic leads to the evolution of the faculty of cognition, which in turn is capable of directing itself toward nature and of penetrating and understanding it logically. All in all, this points to an (objective-) idealistic ontology of nature. Mind you: *objective* here designates an idealism not of a Berkeleyan but of a Hegelian type, for which there are, I think, good reasons and to which we owe probably the most well-thought-out philosophical concept of nature that occidental philosophy has brought forth.

I have argued here that biological evolution finds its end in the appearance of mind, with the new potential for understanding the laws of nature and translating them into technology. In this manner the biological principle of survival is “unhinged”: cultural principles take its place (which may well be analogous to the principle of survival) in the course of a new form of evolution, the cultural evolution of man.

Thus the condition for natural evolution (including abiotic evolution) is the lawlike character of nature. This ultimately leads to the appearance of mind, which, in turn, understands the lawfulness of nature as the ideal essence underlying it and thus adds something to nature that, to be sure, belongs to it but that is, nevertheless, not realized within its own horizon: precisely a knowledge of the lawfulness of

nature as the ideal essence underlying it. In other words, the ideal underlying nature initiates an evolution that finally reveals this ideal, or, expressed more trenchantly, the ideal underlying nature prosecutes its own self-revelation by means of evolution. This would have to be, I think, the final answer to the question of the direction and goal of evolution from a metaphysical standpoint.³¹ At the same time this result, it seems to me, can be thought of as a restitution of teleology, not in an Aristotelian sense but in a new, modern sense that is no longer incompatible with science.

The metaphysical character of this answer transcends every possible experience. Surprisingly, the arguments developed here have shown this. The answer, however, follows as a consequence of Darwinian arguments and indeed relies only on the presupposition of lawfulness underlying nature—a general premise of all natural science too, as has already been said. But what distinguishes Darwinian arguments from other forms of natural scientific thought is that, thought out to its end, it also reveals the metaphysical implication contained in it: that the ideal essence underlying nature drives an evolution that develops—in the form of the human mind—an organ for cognition of precisely this ideal. The natural scientist makes the immanent logic of nature visible qua knowledge of nature; in the Darwinian view, he himself is a product of this logic that he makes visible and that reveals itself in him at the same time. In this respect, this apparently completely unmetaphysical, causal-analytically oriented Darwinian theory ultimately reveals a metaphysical dimension of nature as a whole³²—indeed, including the understanding mind itself—an interrelation that suggests an objective-idealist ontology of nature and that is adequately comprehensible, and probably only comprehensible, within this framework.

NOTES

This chapter has been translated from the German by Edward Kummert and edited in association with Timo Klein. Elisabeth Magnus made a thorough, judicious final revision.

1. The core of this idea can already be found in Empedocles, as described by Aristotle in his "Lectures on Physics" (198b–199a): namely, only animal species with sharp teeth suitable for chewing and fighting were able to survive; otherwise they would have become extinct. What is missing in Empedocles's thought is the element of variation and the transmission of acquired features by means of reproduction.

2. Whether the principle of survival amounts to a tautology is the subject of a controversial discussion. See, e.g., L. von Bertalanffy, "Gesetz oder Zufall: Systemtheorie

und Selektion," in *Das neue Menschenbild: Die Revolutionierung der Wissenschaften vom Leben*, ed. A. Koestler and J. R. Smythies (Vienna, 1970), 80; R. Dawkins, *The Selfish Gene* (Oxford, 1976), 92; N. Hartmann, *Philosophie der Natur: Abriss der speziellen Kategorienlehre* (Berlin, 1950), 646; R. Spaemann and R. Löw, *Die Frage Wozu? Geschichte und Wiederentdeckung des teleologischen Denkens* (Munich, 1981), 242; W. Stegmüller, *Hauptströmungen der Gegenwartsphilosophie*, vol. 2 (Stuttgart, 1975), 439; V. Hösle and C. Illies, "Der Darwinismus als Metaphysik," in *Jahrbuch für Philosophie des Forschungsinstituts für Philosophie Hannover 1998*, vol. 9, ed. P. Koslowski and R. Schenk (Vienna, 1997). Hösle and Illies, in "Der Darwinismus," mention a "quasi-tautology" (114); see the clarifying explanations about this too (104). See also V. Hösle, *Moral und Politik: Grundlagen einer Politischen Ethik für das 21. Jahrhundert* (Munich, 1997), 259; V. Hösle and C. Illies, *Darwin* (Freiburg Br., 1999), 98 ff.

3. Quoted in Hösle and Illies, "Der Darwinismus als Metaphysik," 106.

4. See, e.g., M. Eigen, "Wie entsteht Information? Prinzipien der Selbstorganisation in der Biologie," *Berichte der Bunsen-Gesellschaft für physikalische Chemie* 80 (1977): 1059–81; instructive, too is the representation of Eigen's theory in Stegmüller, *Hauptströmungen der Gegenwartsphilosophie*.

5. Stegmüller, *Hauptströmungen der Gegenwartsphilosophie*, 441.

6. Hartmann, *Philosophie der Natur*, 652, see also 651, 679.

7. See the report in *Der Spiegel*, May 1, 1981: "Tardigrades, e.g., were heated in a cryptobiotic state up to over 150 degrees centigrade for several minutes and showed as little damage as anorganic matter would. Freezing down to 0.008 degrees above absolute zero did not affect them either. The tiny beings resisted ionizing radiation with an energy of 570,000 röntgens for 24 hours (they would survive an atomic war the best). Even after a stay in a vacuum, as in space, they became mobile again."

8. H. Jonas, *The Phenomenon of Life: Toward a Philosophical Biology* (New York, 1968), 106.

9. Bertalanffy, "Gesetz oder Zufall," 82. Compare also the clueless discussion of the experts on this point at the end of the article.

10. H. von Ditfurth, *Der Geist fiel nicht vom Himmel: Die Evolution unseres Bewusstseins* (Hamburg, 1976), 321.

11. Bertalanffy, "Gesetz oder Zufall," 81.

12. For a more detailed discussion of this point, see D. Wandschneider, "Das Problem der Emergenz von Psychischem: Im Anschluss an Hegels Theorie der Empfindung," in *Jahrbuch für Philosophie des Forschungsinstituts für Philosophie Hannover 1999*, vol. 10, ed. V. Hösle, P. Koslowski, and R. Schenk (Vienna, 1998).

13. See P. Bieri, ed., *Analytische Philosophie des Geistes* (Königstein/Ts., 1981); Hösle and Illies, "Der Darwinismus als Metaphysik," 121 ff., 124 ff.; Hösle and Illies, *Darwin*, 176 ff.

14. For instance, R. Riedl, *Biologie der Erkenntnis: Die stammesgeschichtlichen Grundlagen der Vernunft* (Berlin, 1980), 28 ff., 79, 185 ff.

15. *Ibid.*, 35, following E. Brunswik.

16. See the instructive discussion in V. Höhle, "Sein und Subjektivität: Zur Metaphysik der ökologischen Krise," in *Prima Philosophia* 4 (1991): 519–41. Höhle emphasizes that mind itself has a natural aspect: only because of this it is possible to influence natural being and to destroy it too—which, of course, would lead to an endangering of its own natural existence (520, 535, 537).

17. See D. Wandschneider, "Selbstbewusstsein als sich selbst erfüllender Entwurf," *Zeitschrift für philosophische Forschung* 33 (1979).

18. Cf. Höhle, *Moral und Politik*, 288: "Man is that organic being that completes the tendency of life by his ability to negate life."

19. See K. Lorenz, *Das sogenannte Böse: Zur Naturgeschichte der Aggression*, 9th ed. (Munich, 1981).

20. "If by this we understand a kind of behavior that damages others but offers no advantage for itself and even sometimes disadvantages, then . . . it becomes immediately clear that malice cannot be a result of genetic evolution" (Höhle, *Moral und Politik*, 267); on this, see also D. Wandschneider, "Ethik zwischen Genetik und Metaphysik," *Universitas* 38 (1983): 1139–49.

21. J. G. Herder, *Ideen zur Philosophie der Geschichte der Menschheit*, vol. 1, bk. 4 (Leipzig, 1897).

22. F. W. J. Schelling, *Philosophische Untersuchungen über das Wesen der menschlichen Freiheit und die damit zusammenhängenden Gegenstände* (1809; reprint, Stuttgart, 1964).

23. H. Plessner, *Die Stufen des Organischen und der Mensch: Einleitung in die philosophische Anthropologie* (1928; reprint, Berlin, 1975).

24. M. Scheler, *Die Stellung des Menschen im Kosmos*, 6th ed. (1928; reprint, Bern, 1962).

25. This expression, I think, has been introduced by A. Gehlen.

26. See, e.g., Höhle and Illies, "Der Darwinismus als Metaphysik," 116, 119; Höhle and Illies, *Darwin*, 109, 180.

27. It is said that these species reproduce about once every twenty minutes.

28. Cf. Hegel's assertion that "the goal of nature is to kill itself and to break through its rind of the immediate and sensual, to burn itself as Phoenix in order to go forth rejuvenated out of this superficiality." *Hegel-Werkausgabe*, 20 vols., ed. Eva Moldenhauer and Karl Markus Michel (Frankfurt am Main, 1969 ff.), 9538 add.; "add." refers to the editorial additions to Hegel's *Enzyklopädie der philosophischen Wissenschaften im Grundrisse*. See also the impressive discussion on this subject, above all concerning the problem of human identity, in Höhle, *Moral und Politik*, ch. 4.2.1., especially 293 f.; see also n. 18.

29. See M. Eigen, "Wie entsteht Information?" as well as the presentation of Eigen's theory in Stegmüller, *Hauptströmungen der Gegenwartsphilosophie*.

30. See, e.g., D. Wandschneider, "Die Absolutheit des Logischen und das Sein der Natur. Systematische Überlegungen zum absolut-idealistischen Ansatz Hegels," *Zeitschrift für philosophische Forschung* 39 (1985); D. Wandschneider, "Das Problem der Entäußerung

der Idee zur Natur bei Hegel," in *Hegel-Jahrbuch 1990*, ed. K. Bal and Heinz Kimmerle (Bochum, 1992), 25–33; D. Wandschneider, "From the Separateness of Space to the Ideality of Sensation: Thoughts on the Possibilities of Actualizing Hegel's Philosophy of Nature," *Bulletin of the Hegel Society of Great Britain* 41/42 (2000): 86–103; D. Wandschneider, "Hegel und die Evolution," in *Hegel und die Lebenswissenschaften*, ed. O. Breidbach and D. von Engelhardt (Berlin, 2001).

31. In the light of the argument developed here, the ideal represents itself as fundamental and therefore—in comparison with natural being—as an outstanding mode of being that again refers to an (objective-)idealistic ontology.

32. "In man the whole of being manifests itself" (Höhle, "Sein und Subjektivität," 520).

DARWINISM & PHILOSOPHY

EDITED BY

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UNIVERSITY OF NOTRE DAME PRESS

Notre Dame, Indiana

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Notre Dame, Indiana 46556
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www.undpress.nd.edu

Manufactured in the United States of America

Library of Congress Cataloging-in-Publication Data

Darwinism and philosophy / edited by Vittorio Hösle and Christian Illies.

p. cm.

Includes bibliographical references and index.

ISBN 0-268-03072-3 (hardcover : alk. paper)

ISBN 0-268-03073-1 (pbk. : alk. paper)

1. Evolution. 2. Evolution (Biology)—Philosophy.

3. Darwin, Charles, 1809–1882—Influence.

I. Hösle, Vittorio, 1960— II. Illies, Christian.

B818.D26 2005

146'.7—dc22

2005016191

∞ This book is printed on acid-free paper.

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