EVOLUTION AND THE MEANING OF LIFE

by William Grey

Abstract. The last century has witnessed a succession of revolutionary transformations in the discipline of biology. However, the rapid expansion of our understanding of life and its nature has had curiously little impact on the way that questions about life and its significance have been discussed by philosophers. This paper explores the answers that biology provides to central questions about our existence, and it examines why the substitution of causal explanations for teleological ones appears natural and satisfying in the case of physical theory but meets widespread resistance in the case of biology.

Keywords: biology and values; human purpose; meaning of life.

To talk about the "meaning of life" is to introduce a set of issues which are raised, often facetiously, either by philosophers as an exemplary instance of fruitless inquiry or by nonphilosophers as an illustration of the impotence of the discipline to come to grips with the important issues to which they imagine philosophers should address themselves. The fact is, however, that over the last few years an increasing number of philosophers have confronted this rather vaguely delineated set of issues. Two comparatively recent anthologies entitled *The Meaning of Life*, one edited by Steven Sanders and David Cheney (1980), the other by E. D. Klemke (1981), have appeared. Also, Richard Routley (now Sylvan) and Nicholas Griffin (1982) have produced a discussion paper addressing this topic.

My indebtedness to these and other writers is extensive, as will be indicated in what follows. The main difference between my approach to the problems and that of the majority of the other writers to whom I

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[*Zygon*, vol. 22, no. 4 (December 1987).]
 ISSN 0591-2385

shall refer lies in the injection of considerations derived from the discipline of biology. It would certainly be an exaggeration to suggest that philosophers are altogether ignorant of biology or, conversely, that biologists are unmindful of some of the far-reaching implications of discoveries in their discipline. Biological thought nevertheless has had curiously little impact on the way that philosophers have discussed, and continue to discuss, some important aspects of life and its significance. I hope this paper will contribute to the task of rectifying this deficiency.

Although there are plenty of disputed issues in evolutionary biology today, the facts to which I shall appeal are fairly uncontentious. We can dismiss the claims of the burgeoning school of creation "scientists," who misleadingly, and to my mind dishonestly, contrive to present the biological controversies about the *structure* of the process of evolution as a controversy about whether the processes of evolution really occur at all. Evolution is being ably defended (see, e.g., Ruse 1982) and requires no additional assistance from me.

Biological thinking has had surprisingly little impact on the conduct of philosophical inquiry over the last century and a quarter. During this time two far-reaching and complementary innovations in biological thought have taken place: Charles Darwin's theory of the evolution of species by natural selection and the elucidation of the structure of DNA by James Watson and Francis Crick. These are not just the most significant discoveries in recent biological history; they are without question the most important discoveries in biology ever made. To show how these revolutionary innovations in biological thought relate to some old philosophical worries is one of the main aims of this paper. However, before taking up the biological story I will set the stage by introducing the philosophical problems which I claim that biology can illuminate.

In the first section of the paper I offer some reflections about the so-called problem of the meaning of life, both as it has traditionally been raised and also from the perspective of biology. Since biology is the discipline devoted to the study of life, we should expect it to illuminate these issues. Nevertheless, I do not believe that biology can silence all the worries which cluster around uses of the phrase *the meaning of life*, and some of the issues which biology fails to address are among the most important. However, I think that rehearsing a few solid biological platitudes can help show us how the search for significance should *not* be conducted, and that is an essential preliminary to any worthwhile inquiry. This is the task addressed in the second section. Finally in the last section of the paper I examine why the conclusions reached in the second section are so often found to be both unsatisfying and unsettling.

The Theistic Legacy

The questions raised by the serious use of the phrase *the meaning of life* are multiply ambiguous and vague. The phrase can be used to refer to the purpose or significance of life of any form, of human life in general, of the life of a group or a society, or of the life of an individual. Furthermore, the question can relate to the reason, purpose, significance, or cause of life in any of these senses. In this paper I shall concentrate on problems which concern the significance that individuals attach to their lives. The major source of confusion will emerge as a failure to clearly distinguish a teleological and a causal sense of the question "Why are we here?" The biological facts, I will argue, provide a solid foundation for a comprehensive causal answer to this question in a way that undercuts the need for a teleological account. There are no grounds for believing that there is purpose or significance in the world in any grand or cosmic sense—indeed there are good reasons for rejecting any such proposal.

A contrary view, expressed in the writings of some religious thinkers, is that human life could be worthwhile only if it were part of some divinely ordained cosmic scheme. On this view, our lives could be significant only if they had a role in such a divine plan. Thinkers who hold this view have often maintained, moreover, that if death is *really* the end of our existence, then life as a whole would be deprived of its significance: "If we are to believe that all our striving is without final consequence, life is meaningless . . . it scarcely matters how we live if all will end in dust and death" (Clark [1958] 1967, 467). Life would be meaningless on the view expressed here by C. H. D. Clark, either if it were not part of a divinely ordained scheme or if it were not eternal.

Clark here mistakenly supposes that if something comes to have no significance later, then it can have no significance now. Yet events in our lives are not deprived of significance purely as a result of their transience.[1] Conversely, Thomas Nagel (1971) has argued that if something lacks significance now, then it is hard to see how some *later* occurrence could invest it with significance. In general (at least in the long term) significance cannot be retrospectively added or removed from what happens in the world.[2] The claim that anything must be eternally significant to be significant at all is mistaken.

Both of Clark's claims, namely that if a life is significant it must be (a) part of some grand cosmic design and (b) eternal, must be rejected. Kurt Baier (1957, 102-10) has suggested, moreover, that a life whose sole point was to serve the purpose of another, even a divine other, would be a degrading life of serfdom.

The view that death deprives life of its significance has been vigorously challenged from a different direction by Bernard Williams (1973,

82), who has argued that it is mortality rather than immortality which would make our lives meaningless. Williams's argument is very different from the one advanced by some existentialists, who have suggested that death gives meaning to life because the *fear* of death gives meaning to life—a view suggested in some places, for examples, by Fyodor Dostoyevski. Williams's argument is based rather on the claim that the nature of human motivation and happiness are such that life without end would be intolerable. *Pace*, Dr. Johnson, eventually one tires even of London.

Against Clark's view that life can have point, and our existence a reason, only if it plays a role in some grand design, one can readily construct ironical arguments analogous to those which David Hume ([1779] 1948) directed against the argument from design, to the effect that the "grand scheme" looks more like the work of an exceedingly indifferent artisan than that of an omniscient and benevolent architect. I shall not pursue this line of polemic. I want to question such views from a different direction.

What seems to me to be especially dubious, and what I want to question, is the idea that the significance of life can be derived only from some externally imposed goal. If life can be said to have any significance, then that significance must be accounted for in some other way. The facts—in particular the biological facts—reveal that any cosmic design or purpose is quite superfluous. Although purposive answers are a common response to "Why?" questions, there is an important range of cases in which they are often invoked but in which they serve no explanatory purpose. In order to appreciate this point it is necessary to say something about the ascription of significance.

A familiar way of ascribing significance to artifacts and natural objects is in terms of the roles which they play, or might play, in our lives. Indeed the significance of a great many items is quite properly provided in functional terms in relation to our projects. Artifacts are usually shaped intelligently, precisely with a view to their role in our lives. This fact has undoubtedly led thinkers to suppose that the *only* way we can ascribe significance to items in the world, including human beings, is in terms of such functional significance.

Indeed the idea that functional aptness is incontrovertible evidence for intelligent design is so natural that it was long regarded as self-evident. To suppose that design or adaptive fitness could be the product not of intelligence but of quite impersonal forces was a disturbing idea implicit in Darwin's account of phylogeny. This possibility however had already been anticipated by Hume ([1779] 1948, Part V), who had pointed out that although it might appear that a ship, for example, was the outcome of ingenious design, it could as well have been pro-

duced by a long period of trial and error from generations of "stupid mechanics." Darwin conjectured, in effect, that the "mechanics" of evolution were nothing like divine architects but were entirely natural forces: the exquisite mechanisms of biology could be explained without appeal to an intelligent creator.[3]

The erroneous view that significance can only be ascribed to items in terms of their role in an intelligently designed project is an important source of the misconception that human life can have significance only if it is part of some grand, superhuman purpose or project. An analogous view operates in the other direction of the "Chain of Being" in the claim that animal species and the natural world are good only insofar as they (or it) are good for humans or their purposes (see Passmore 1974, Part I). This pattern of thought may then be uncritically extended to the question: "What are humans good for?" Such extrapolations are the product of weak analogies which are, of course, quite unwarranted. Whatever significance human life may have, it should *not* be modelled on the sort of functional significance associated with artifacts. It is this insight which lies at the heart of Baier's rejection of a theistic account of human value, mentioned above. We should also resist the instrumental model as the sole basis for the value of natural items—but that is another story (see Godfrey-Smith 1979).

The Revolution in Biology

The synthetic theory of evolution, that is, Darwin's theory of evolution combined with modern genetics, can provide a comprehensive answer to the question: "Why are we here?" Although an answer to the causal question does not exhaust the issues associated with the significance of life, it does serve to clarify them. From the point of view of biology, there is no reason to suppose that the question why human beings exist will be any different in kind from the question as to why whales or tigers or starfish exist. Why on earth should we expect a special answer for the existence of just one biological species? The reason for the existence of any biological species is, briefly, the differential survival rate of self-replicating molecules. A comprehensive understanding of the principles involved and the mechanisms of the process (though not of course all the detail) has been provided by modern genetic theory, and in particular by molecular biology.

Modern genetic theory has provided a solid foundation for evolutionary theory in that it has provided a mechanism for evolution. Darwin of course had an account of evolution: it was the result of what he called "natural selection."[4] However, he was compelled to present his argument for evolution by selection in abstract and metaphorical terms because he had no idea how to account for the cause of variations

or how it was that favorable variations came to accumulate (Young 1971, 488). He was able to demonstrate conclusively *that* speciation occurred but was unable to explain *how*. In fact Darwin had no mechanism for evolution, only an analogy with artificial selection. In particular, he lacked a particulate theory of heredity, the distinction between somatic and germ cells, and the concept of dominance. Gregor Mendel had provided the basis for a conception of hereditary units as indivisible particles, but no one then realized the significance of his discovery, almost certainly not even Mendel (Dawkins 1976, 36).

In the absence of a particulate genetic theory it is hard to explain how any favorable variations are not diluted out of existence—the problem of "swamping." This was the basic objection wielded half a century earlier with great effect by Archdeacon William Paley to refute the evolutionary theory proposed by Darwin's grandfather Erasmus Darwin (Young 1971, 488).[5]

Lacking a satisfactory mechanism for the process of evolution, Darwin hedged and qualified his theory. "I am convinced," he wrote, "that natural selection has been the main but not the exclusive means of modification" (Young 1971, 493). The longer he lived the less exclusive was the role he assigned to natural selection. He was greatly troubled, for example, by the structure of the vertebrate eye. How could such an exquisitely refined mechanism possibly evolve through piecemeal incremental changes? It seemed to demand a purposive explanation for its development: "To suppose that the eye with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection seems, I confess, absurd in the highest degree" (Gould 1977, 103). This sort of objection to Darwin's theory is addressed in Stephen Jay Gould's paper "The Problem of Perfection." As Gould puts it, "the dung-mimicking insect is well-protected but can there be any adaptive advantage in looking only five per cent like a turd?" (Gould 1977, sec. 12). What, we may ask, is the adaptive advantage of 5 percent of an eye? The twentieth century has provided a vindication of the earlier and less compromising Darwin, and numerous Nobel prizes have been won by scientists who have uncovered the fine structure of mechanisms by which evolution can be explained by natural selection, and by natural selection alone (Young 1971, 497).

The most important post-Darwinian development in the theory was the elucidation of the structural basis of replicative invariance by Watson and Crick. According to Jacques Monod (1972, 103) this is without doubt the most important discovery ever made in the history of biology. Although some might award this laurel to Darwin, it is clear that

the major honors must be divided between these two discoveries. Why is the unravelling of the structure of DNA a fact of such profound significance? The answer has considerable philosophical interest (Monod 1972, 98-113).

We can begin by observing two fundamentally opposed stances in the history of Western philosophy reaching back over two and a half millennia to (the usual) Greek origins. (Here I abandon analytic caution and paint with a broad brush.) On the one hand there is the conviction that truth and reality reside in stable and immutable forms—the tradition of Parmenides and Plato. On the other hand there is the conviction that reality is ceaseless flux, change, and decay—the tradition exemplified in the philosophy of Heraclitus. These opposed metaphysical conceptions have continued, after a fashion, to the present.

Many philosophers of distinction, especially those with an interest in the natural sciences, have favored the Platonic tradition. This perhaps is not surprising since science is, after all, an attempt to formulate theories about the world which take the form of immutable truths. The basic aim of science is to analyze phenomena by penetrating the mutable appearances and revealing the underlying invariants—that is, characteristics which do *not* change. The laws of physics, for example, specify invariant relations, and in general the fundamental statements of a science are expressed as conservation principles. In fact the analysis of *any* phenomenon is possible only if we analyze it in terms of some invariant which is conserved throughout the change. The formulation of the laws of kinetics by Sir Isaac Newton was a discovery which demanded the invention of differential equations, that is, a method of defining change in terms of something which remained unchanged. Without invariants, whether the subject be physics or economics of demography, it is impossible to formulate precise testable laws. Certainly descriptive inquiry is possible in the absence of law-like statements, but at this stage of their development an inquiry is inchoate and phenomenological; it is perhaps an essential preliminary, but only a preliminary, to the establishment of mature science, which is quantitative and not just descriptive.

It is of course much debated whether there *are* any absolute invariants in reality. One school of thought holds that invariants are not features of reality we discover but are fictions we invent and employ in our models; and while they may be indispensable tools for thinking about the world, there is no reason to suppose that they actually reflect the structure of reality. This is a crude characterization of an anti-realist position which could take the form of conceptualism, instrumentalism, or pragmatism. Whether the invariants are to be lo-

cated in our heads (conceptualism), in our theories (instrumentalism), in our practices (pragmatism), or in the world (realism), any decent explanatory theory has to locate them *somewhere*. The debate between realists and anti-realists is one which we do not however need to take up here. The important point to note is that significant progress in theoretical understanding typically takes place as a result of the unification of a field of inquiry brought about by the discovery of some new invariant principle.

Biology is no exception. The global significance of Darwin's theory lay in its power to unify. Instead of a vast variety of immutable species whose ultimate origin and purpose God alone knew, it became possible to conceive that all species had developed by a slow process of incremental adaptation from a small number, perhaps a single variety, of organism. Like other great unifiers, Darwin of course stood on the shoulders of giants, among whom must be included Carolus Linnaeus, and the much-maligned Jean-Baptiste Lamarck. Linnaeus must be credited with much of the groundwork of tracing the continuities and patterns from the seemingly chaotic gestalt of the biological community. The patterns which emerged from the taxonomies of Linnaeus, however, were purely formal. It was Lamarck who proposed that the relations between species were causal, replacing the "Great Chain" by what has been called the "Escalator of Being." The revolutionary importance of Lamarck's suggestion has been unfortunately overshadowed by his discredited proposal that speciation occurred because individuals inherited favorable characteristics from their parents.

We can broadly characterize the development of biology over the last two hundred years as follows. The work of Linnaeus (in particular) in the late eighteenth century established taxonomies which suggested that there were underlying continuities or patterns which could be traced between different species. In the nineteenth century Darwin (and Lamarck) suggested that these patterns were not merely formal similarities but represented a systematic causal relatedness between species, with Darwin's account prevailing over Lamarck's. The discovery of *formal* patterns of continuity between species was not too upsetting to the prevailing religious orthodoxy: all this discovery showed, it was thought, was that God used a basic set of blueprints (or archetypes) when creating species. Darwin's suggestion however could not be accepted with equanimity. Finally, in the twentieth century Watson, Crick, and others elucidated the causal mechanism by which the process of evolution takes place.

Darwin's unified conception of the biological world naturally invites comparison with two other great triumphs of synthetic thought.[6] These are Euclid's demonstration that a huge body of incorrigible geometri-

cal truths could be systematically generated from a small number of axioms and postulates, and Newton's synthesis which showed how the motions of material objects could be explained in terms of a few underlying physical principles. Euclid, Newton, and Darwin each showed how a huge body of not obviously related facts could be understood and explained in terms of a single unifying framework of principles. Each of these achievements has had a profound and exciting impact on subsequent generations of thinkers, who have attempted to emulate these exemplary models of systematic thought. To be called a "Darwin" or a "Newton" is the highest compliment that can be paid to a theoretical innovator. Thus, Karl Marx has been called the Darwin of the social sciences, Adam Smith the Newton of civil society.

Darwin's synthesis of the biological world has been progressively strengthened by advances in biochemistry over the past fifty years, which have revealed "the profound and strict unity, on the microscopic level, of the whole living world" (Monod 1972, 101). We now know that all organisms, from microscopic bacteria to blue whales, rely on chemical machinery which is the same in its structure and its function. This is a truly awesome discovery.

The chemistry of life as we know it is universal in its structure because all living beings without exception are made up from two principle classes of macromolecular components: proteins and nucleic acids. These, moreover, are made up from the same basic structural units: twenty amino acids for the proteins and four kinds of nucleotides for the nucleic acids. It is the same in function because the same sequences of reactions are used by all organisms for their essential chemical operations: the mobilization and storage of energy, and the biosynthesis of components. The unification of the biological world, which received its first solid theoretical foundation from Darwin, has been profoundly deepened and entrenched by the discovery by Watson and Crick of the fundamental biological invariant, DNA.

DNA is the uniquitous initiator of all biological replication, providing the coded instructions for generating the elaborate protein structures—the somatic tissues—which constitute the "life support systems" for the nucleic acids. This has led some sociobiologists to envisage individual organisms as mere instruments employed by genes as vehicles for their propagation. An enthusiastic exposition of this frequently overstated conception is presented in Richard Dawkins (1976).[7]

Changes in the DNA code are changes in the sequence of nucleotides. These changes—mutations—are due to various copying errors and scramblings. However, once they have occurred, they will be copied faithfully in subsequent generations, thanks to the organization effected through the laws of chemistry.

Changes in the genetic text are random occurrences in the sense that they occur with no preferred adaptive direction. In particular, there are no grounds for supposing that changes are the result either of divine intervention or of some striving toward perfection. The situation has recently changed with the advent of genetic engineering. It may be that not all *future* changes in the genetic text will be the exclusive product of chance; we have now acquired the capability to edit the genetic text deliberately. This is a possibility which some thinkers find very disturbing.[8] Putting that special case to one side, pure chance is otherwise the source of all variation. All evolutionary changes are accidental. It is through the imperfections of the copying mechanism that modifications have occurred, when the information in the code has become contaminated with fortuitous "noise" which, thanks to the structure of DNA, has been faithfully replicated along with what Monod (1972, 114) has called "all the music of the biosphere." The selection for change takes place at the phenotypic level and admits only acceptable mutations, which are those that do not lessen the coherence of an organism's somatic character. Continuing the musical metaphor, the only "noise" admitted is that which is in harmony with the music of the biosphere.

The synthetic theory has been tested by many disparate lines of criticism. It has been claimed that the theory is unfalsifiable, and thus really metaphysical rather than an empirical theory. This criticism is indeed sometimes justified, for the theory has frequently been carelessly presented in a tautological form, although careful expositions do not make this mistake (see Ruse 1973).

There are also a battery of empirical objections that have been directed at the theory. It has been claimed, for example, that speciation demands the heritability of acquired characteristics (Lamarckism); that the account of evolutionary change as gradual, serial, irreversible, and governed by selection of genes through the interaction of an organism with its environment is not sufficient; and that the account must be supplemented with instant "macromutations."

These and the many more objections which have been (and continue to be) raised have not proved fatal to the Darwinian research program. They have on the contrary led to its strengthening and improvement through modifications to and elaborations of the theory. In Kuhn's ([1962] 1969) terminology, they constitute anomalies or puzzles, the solution of which has led to the elaboration and articulation of the Darwinian paradigm. The articulation of the theory and the solving of its puzzles are by no means exhausted. The molecular reduction of genetics has transformed the synthetic theory into a truly formidable structure; it is not credible to envisage any large scale changes to the unifying framework which the theory provides for biology.

The theory of evolution and its molecular mechanisms provides a conclusive, comprehensive, and satisfying causal answer to the question: "Why are we here?"—which I said at the outset is one of the central questions which people have addressed in reflecting upon the meaning of life. The problem, from a biological perspective, undergoes a Wittgensteinian dissolution ("The riddle does not exist"). We are here as a result of chemical principles of organization, which provide the explanation for the existence of organisms. There is no reason, purpose, point, end, or externally employed goal at all which gives, or is needed to give, a reason for our existence. The search for an answer in terms of a role in some grand cosmic scheme is gratuitous and vain.[9]

The plain fact is that, thanks to the accumulation of fortuitous errors in the copying of self-replicating molecules, one species of organism—our species—has managed to acquire the intellectual capacity (through the development of a highly complex central nervous system) that has enabled it to ask—and to *answer*—the question, "Why are we here?" However, our existence is utterly contingent, an accident, or a long series of accidents of evolution. Appeals to teleological principles or cosmic purposes are gratuitous. We are here for the same reason that tigers and whales and starfish are here—because of our adaptive fitness to our biological circumstances. More precisely, it is because of our ancestors' adaptive fitness to *their* circumstances. It is not unreasonable to conjecture that our rapid and violent transformation of our surroundings may in fact be generating an environment for which human beings are not adaptively fit. The fact of species extinction demonstrates that adaptive fitness is not an eternal property.

We can still raise the question of how one should live in order that one's life should be meaningful. I said at the outset that this is an important question that the biological considerations raised thus far leave almost untouched. Nevertheless, I think that here too biology can be of assistance by clarifying the sort of life to which human beings are adapted (see Midgley 1978, 358). Biology provides constraints which exclude various modes of life as unfitting, or simply "inhuman." In particular our species has evolved (most recently) from social primates, and this contingent evolutionary history has provided us with a legacy of a particular motivational structure and an associated set of values.[10] We are not infinitely malleable; we must choose our lives from within a received set of biological constraints. It is however up to *us* to provide purpose or point to our lives from within these constraints; we cannot expect it to be dictated to us externally, either causally from biology or theistically from the dictates of a deity.

That purpose is dependent on *our* decisions is of course a thought that can be extracted elsewhere, in particular from various existentialist thinkers, although I will argue below that they exaggerate the

amount of human autonomy in determining how a meaningful life is to be realized. Even if one could, with qualifications, agree with Jean-Paul Sartre that "All existing beings are born for no reason, continue through weakness, and die by accident," it does not follow, as Sartre thinks, that "It is meaningless that we are born; it is meaningless that we die" (Sartre 1956, 547). David Wiggins (1976) has also suggested, from rather different premises, that purpose must to a great extent be dependent on human invention.

The Uneasy Consequence

To have reached this point in our discussion, however, is unsatisfying. We can accept all of the biological story and still suspect that a problem of real significance has somehow slipped through our fingers. I want to pursue the problems further to try to determine whether this feeling that we have somehow missed a crucial point is well grounded. It is helpful here to compare the maturation of biology with that of some other sciences.

Typically, a science takes a significant step towards maturity when it dispenses with teleological explanations of natural phenomena. Physics came of age when Galileo and Newton showed that the motions of physical objects did not require an Aristotelian explanation in terms of goal-directedness. Rocks do not fall in order to achieve some sought after goal state: we can replace teleological statements which have the form "X does Y in order to . . ." with causal statements of the form "X does Y as a result of . . ." (e.g., rocks fall as a result of the law of gravity). In the case of physics, despite inevitable resistance, the elimination of the teleological story is profoundly satisfying. Likewise, primitive explanations of recurrent patterns of experience in other domains have given way to objective causal accounts; only in our more superstitious moments do we invest inanimate objects with an intention to thwart us.

The parallel development in biology, however, has proved to be profoundly disturbing. Darwin, in a sense which I shall qualify shortly, banished teleology from biology. However, his causal account of the biological world has quite evidently not produced the same universally agreeable and intellectually satisfying unification that the Newtonian research program provided. Why is banishing teleology from physics perfectly acceptable whereas banishing it from biology is so disturbing?

I suspect that one worry is that a world which is the product of random or accidental events seems to be a world devoid of objective purposes. Without objective purposes we are deprived of the most obvious ground for objective values, that is, the removal of cosmic purposes from the world removes (at least one attractive basis for) objective values.

Existentialists respond ambivalently to this evaporation of objective values. In some moods they seem to be prepared to accept the consequent absurdity of human existence but still advocate a continuation of our pursuit of subjective goals and desires in a spirit of heroic defiance, shaking our fists at the uncaring world, as it were. This romantic bravado is expressed by Albert Camus in various places (see Nagel 1971). In other moods, existentialists rise above despair and suggest that the values and significance which we create by our autonomous decisions are perfectly adequate to provide us with rewarding and meaningful lives (see Barnes 1967).

It is questionable in any case that a divinely organized cosmic plan could be able to provide our lives with significance independently of our aims and desires. Suppose that God wanted me to participate in His divine plan, but I lacked any inclination or desire to do so. God's purposes and desires, of themselves, would then surely be of no help in providing significance or purpose in my life: at best we would have an instantiation of Baier's conception of an abject life of serfdom. So for the world to be meaningful to me it will still require my own desires and aims (see Joske 1974, 95), and once we have these individual subjective desires and aims to appeal to, we might start wondering why the transcendent authority of an omniscient being is still necessary.

It is misleading, in any case, to suppose that Darwin abolished teleology from biology entirely: it would be more accurate to say that he relocated it. The course of evolution *itself* certainly has no object or end; but biological organisms most certainly do strive for goals and manifest preferences in their lives—even though only a privileged sub-class can express or articulate their preferences. Jacques Monod acknowledges this fact, although he attempts to dissociate himself from what he regards as the disreputable associations of "teleology" and speaks instead of the *teleonomic* nature of organisms. The final result of the biological story is to show how life and purpose can arise in a lifeless and purposeless world. The fact that life and purpose have emerged from, and are based upon, the exquisite and impersonal processes of chemistry in no way compromises the existence of purpose, and hence of value and significance. Existentialists, while rightly rejecting transcendent cosmic purposes, are wrong in supposing that the only source of significance and value is located in individual (human) choice and commitment. Their claim that human beings have no nature or are free to create their own nature through their autonomous decisions, is a significant mistake.

I suggested above that biology can help throw some light on the question of what sort of life we ought to pursue. Any acceptable answer will have to take into consideration important constraints that derive

from the nature of human nature, and biological considerations can be of assistance here (as I suggested above) by helping to elucidate the sort of life to which the species homo sapiens is best adapted. This involves an Aristotelian supposition that organisms, including ourselves, have natural ends: teleology is in fact built into our nature. This innately programmed purposiveness, which is of the greatest importance for the project of establishing significance in our lives, is itself the product of the aimless processes (and "mistakes") of evolution. An Aristotelian account can not only provide the basis for a naturalized ethic for mankind; it can also provide the basis of an ethic for nature.[11]

This does not involve, as existentialist writers like Hazel Barnes (1967) suppose, an intolerable imposition of some straight jacket of conformity on human values and behavior: a unitary conception of human nature is quite compatible with an indefinitely rich variety of ways in which this nature can be expressed. The existentialist worry is as absurd as supposing that a piano's permitting the production of only a finite number of chords is a lamentable restriction of the expressive powers of the instrument. Quite the contrary! Without some conception of human nature we could not make sense of a wretched, impoverished, degraded—literally "inhuman"—existence. Of course, pontificating about what is and is not "natural" has clear and well-known dangers, but they are not as great as the dangers of denying that there are limits in the treatment of our fellows (human and animal) which it is intolerable to transgress.[12]

Yet I suspect that this biological story will not have silenced everyone's worries. It may still be felt that if there is no transcendent or cosmic purpose, human life and choice must appear trivial and inconsequential. This tiny speck of matter which we occupy for a fleeting moment of time is, from a grand cosmic point of view, so inconspicuous and insignificant. It is this process of stepping back and locating the here and now in the vastness of time and space which appears to reduce all to something quite trivial.

One surely legitimate response to this apparent dwarfing of human concerns from a grand cosmic perspective was advanced by Frank Ramsey in reply to Bertrand Russell. Ramsey (1931, 291) declared himself quite unimpressed by the stars, however overwhelming their size, as they were incapable of thinking or feeling love. (Ramsey, being distinctly more generously proportioned than Russell, was perhaps less inclined to be overawed by sheer physical bulk!)

The temporal dwarfing of value, to which I have already alluded, is a more commonly articulated worry. If time annihilates all that we do, what then is the point?[13] This worry is based on a confusion. As Thomas Nagel (1971) has pointed out, if nothing matters in a million years, then

by the same token nothing that will matter in a million years matters now. In particular, the fact that in a million years nothing will matter, does not matter now. That is, the (alleged) future insignificance of the present entails the present insignificance of the future, and hence the present insignificance of the future insignificance of the present. Likewise, if nothing matters from a cosmic point of view, the fact that nothing matters from a cosmic point of view does not, from that point of view, matter. We cannot validly infer our cosmic insignificance but only our cosmic nonsignificance; that is, we can infer only the irrelevance of such a perspective for considerations of significance, and this does nothing to undermine the fact of significance from our more parochial temporal and spatial perspectives.[14]

NOTES

1. Plato seems to have held the same belief about "the good," to which Aristotle famously replied: "It [the good itself] will not be good any the more for being eternal; after all, that which lasts long is no whiter than that which perishes in a day" (*Nichomachean Ethics*, 1096b3). Likewise, significant events in our lives are not rendered the less so as a result of their transience.

2. I say "in general" because it seems plausible that in the short term the significance of events often *is* tied up with the causal outcomes which the event may set in motion. We might reasonably suppose, for example, that the assassination of Archduke Ferdinand may be an event of greater significance than the assassination of Lord Mountbatten, and it may be that this is a judgment which can only be made retrospectively. I will say some more about the way that temporal considerations can affect questions of significance in the final section of the paper.

3. One might still invoke an intelligent creator to explain the origins of the physical universe, and perhaps the laws which govern its development. There may, that is, still be room for a theistic response to ultimate questions about origins. Such a response, arguably, does not really resolve these ultimate questions but serves merely to relocate them. However the naturalistic story of the development of life, for which there is overwhelming evidence, certainly removes God's hand from the tiller of biological evolution.

4. The phrase *survival of the fittest* is not Darwin's; it was the coinage of Herbert Spencer. Also, Darwin seldom used the word *evolution*, preferring to speak of "descent with modification." This was partly because *evolution* was associated with Albrecht von Haller's untenable "homuncular" theory of embryology and partly because Darwin did not want to suggest that the modification of species implied any sense of progress. There is no sense of improvement apart from that of better adaptive fitness (see Gould 1977, sec. 3).

5. Paley appears to have provided a *locus classicus* for several notable lost causes: another major claim to fame of his derives from his statement of what is probably the most widely quoted version of the argument from design—some twenty-three years *after* Hume's ([1779] 1948) devastating refutation!

6. It appears likely that within the foreseeable future physicists will achieve another spectacular synthesis: the incorporation of the fundamental forces of nature into a single unified field theory (see Davies 1984). It can be argued that the theoretical unifications provided by physics and biology provide a basis for empathy with the nonhuman world (see Grey 1986).

7. The account is reminiscent of Arthur Schopenhauer's conception of a *species* imposing its will upon individuals, which is used as an instrument for the species' propagation (Schopenhauer [1818] 1958, vol. 2, chap. 44). For an attempt to temper the overstated claims of Richard Dawkins, Richard Alexander, et al., see Stephen Jay Gould

(1977, 267), Mary Midgley (1979), and Michael Ruse (1979). Notable attempts to articulate the sociobiological paradigm in the area of human affairs are Edward Wilson (1978) and Alexander (1979). Alexander ambitiously interprets human history and culture as the result of individuals attempting to maximally propagate their genes, either directly through parenthood or indirectly by supporting propagation of and by close relatives. Much of his energy is (not surprisingly) devoted to attempting to square his "inclusive fitness" model with a plethora of counterexamples. It is certainly quite credible that a sociobiological account can be provided for general behavioral tendencies, such as aggression, altruism, and sexual behavior. It is much less plausible to suppose that the more detailed manifestations of behavior, such as the creation of specific sex roles or the expression of emotions like depression and anger, can be explained in terms of an underlying genetic fine structure. Developing and articulating the sociobiological paradigm—and in the process tempering its more extravagant claims—is one of the most vital tasks on the agenda of social scientists.

8. A somewhat alarmist expression of these anxieties can be found in Jeremy Rifkin (1983).

9. To appropriate another gnomic utterance from Ludwig Wittgenstein ([1921] 1961, 6.521): "The solution to the problem of life is seen in the vanishing of the problem."

10. These values include (very schematically and neither exhaustively nor in order of importance) enthusiasm, curiosity and wonder, exaltation from problem solving and discovery, group identification, ethnic and national pride, satisfaction from triumph in competition (see Wilson 1978, chap. 9). Advocating even this modest claim invites the charge of biological determinism. This I reject. Many of the worst forms of social degradation are precisely impositions which offend against the sorts of life to which we are adapted. Biology does not dictate a unique form of life to which we should all conform: constraints are not straight jackets. Part of our nature is precisely to choose how to live, but our (biological) nature is a factor which conditions the satisfaction which we gain from our choices. (See Lorenz [1963] 1966, chap. 12.)

11. For Aristotle, it is a factual matter what conditions are required for an organism to flourish and thrive. If this manner of deriving an "ought" from an "is" involves the claim that it is a good thing to flourish and thrive, and right to act so as to assist others (or at least not to prevent them) in their flourishing and thriving, it is one that I at least am prepared to accept. The rather vacuous naturalistic maxim which suggests itself is that one ought to pursue the kind of life to which one is suited. However dubious Aristotelian physics may appear now, his moral philosophy (and his biologically based metaphysics) contains much of contemporary value, as Stuart Hampshire (1977) and Alisdair MacIntyre (1981) have argued.

12. A good deal of opposition to the sociobiological claim that we have a biologically based motivational structure is based on an analogous error (although some of the more extravagant pretensions of sociobiology are ill-founded: see n. 7). For an evolutionary account of the development of our motivational structure see George Pugh (1979).

13. Benedict Spinoza advocated viewing the world *sub specie aeternitatis* as a means of consolation, suggesting that the phenomenon of dwarfing can be exploited to positive advantage. On a suitably generous perspective, present pain, distress, and injustice can seem relatively insignificant. That is, when conceived as part of an indefinitely vast cosmic order, we transcend our relatively parochial human preoccupations. For Spinoza of course the vast cosmic order was itself something at which to marvel, indeed *the* thing at which to marvel; so turning from the temporal world did not in any way undermine questions of significance but rather provided a means by which they could be properly located.

14. Any alternative perspective which appears to show the unimportance of what we recognize to be important thereby rules itself out of order just because it fails to take account of what we know to be the case.

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