NEW YORK TIMES BESTSELLER

NATIONAL BOOK AWARD FINALIST

The MEANING OF HUMAN EXISTENCE

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WINNER OF THE PULITZER PRIZE

"An invaluable analysis of who we are and the choices we now confront; it is a must-read for all."
— VICE PRESIDENT AL GORE

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THE REASON WE EXIST

HISTORY MAKES LITTLE SENSE WITHOUT PREHISTORY, AND PREHISTORY MAKES LITTLE SENSE WITHOUT BIOLOGY. KNOWLEDGE OF PREHISTORY AND BIOLOGY IS INCREASING RAPIDLY, BRINGING INTO FOCUS HOW HUMANITY ORIGINATED AND WHY A SPECIES LIKE OUR OWN EXISTS ON THIS PLANET.

1

The Meaning of Meaning

Does humanity have a special place in the Universe? What is the meaning of our personal lives? I believe that we've learned enough about the Universe and ourselves to ask these questions in an answerable, testable form. With our own eyes we can see through the dark glass, fulfilling Paul's prophecy, "Now I know in part; then I shall know fully, even as I am fully known." Our place and meaning, however, are not being revealed as Paul expected—not at all. Let's talk about that, let us reason together.

I propose a journey to this end, in which I ask to serve as guide. Our route will pass first through the origin of our species and its place in the living world, questions I initially addressed in a different context in *The Social Conquest of Earth.* Then it will approach, through selected steps from the natural sciences into the humanities and back again, the more difficult problem of "Where are we going?" and the most difficult question of all, "Why?"

The time has come, I believe, to make a proposal about the possibility of unification of the two great branches of learning. Would the humanities care to colonize the sciences? Maybe use a little help doing that? How about replacing

science fiction, the imagining of fantasy by a single mind, with new worlds of far greater diversity based on real science from many minds? Might poets and visual artists consider searching in the real world outside the range of ordinary dreams for unexplored dimensions, depth, and meaning? Would they be interested in finding the truth of what Nietzsche called, in *Human, All Too Human*, the rainbow colors around the outer edges of knowledge and imagination? That is where meaning is to be found.

In ordinary usage the word "meaning" implies intention, intention implies design, and design implies a designer. Any entity, any process, or definition of any word itself is put into play as a result of an intended consequence in the mind of the designer. This is the heart of the philosophical worldview of organized religions, and in particular their creation stories. Humanity, it assumes, exists for a purpose. Individuals have a purpose in being on Earth. Both humanity and individuals have meaning.

There is a second, broader way the word "meaning" is used and a very different worldview implied. It is that the accidents of history, not the intentions of a designer, are the source of meaning. There is no advance design, but instead overlapping networks of physical cause and effect. The unfolding of history is obedient only to the general laws of the Universe. Each event is random yet alters the probability of later events. During organic evolution, for example, the origin of one adaptation by natural selection makes the origin of certain other adaptations more likely. This concept of meaning, insofar as it illuminates humanity and the rest of life, is the worldview of science.

Whether in the cosmos or in the human condition, the second, more inclusive meaning exists in the evolution of present-day reality amid countless other possible realities. As more complex biological entities and processes arose in past ages, organisms drew closer in their behavior to include the use of intentional meaning: at first there were the sensory and nervous systems of the earliest multicellular organisms, then an organizing brain, and finally behavior that fulfills intention. A spider spinning its web intends, whether conscious of the outcome or not, to catch a fly. That is the meaning of the web. The human brain evolved under the same regimen as the spider's web. Every decision made by a human being has meaning in the first, intentional sense. But the capacity to decide, and how and why the capacity came into being, and the consequences that followed, are the broader, science-based meaning of human existence.

Premier among the consequences is the capacity to imagine possible futures, and to plan and choose among them. How wisely we use this uniquely human ability depends on the accuracy of our self-understanding. The question of greatest relevant interest is how and why we are the way we are and, from that, the meaning of our many competing visions of the future.

The advances of science and technology will bring us to the greatest moral dilemma since God stayed the hand of Abraham: how much to retrofit the human genotype. Shall it be a lot, a little bit, or none at all? The choice will be forced on us because our species has begun to cross what is the most important yet still least examined threshold in the technoscientific era. We are about to abandon natural

selection, the process that created us, in order to direct our own evolution by volitional selection—the process of redesigning our biology and human nature as we wish them to be. No longer will the prevalence of some genes (more precisely alleles, variations in codes of the same gene) over others be the result of environmental forces, most of which are beyond human control or even understanding. The genes and their prescribed traits can be what we choose. So—how about longer lives, enlarged memory, better vision, less aggressive behavior, superior athletic ability, pleasing body odor? The shopping list is endless.

In biology, how-and-why explanations are routine and expressed as "proximate" and "ultimate" causation of living processes. An example of the proximate is this: we have two hands and ten fingers, with which we do thus and so. The ultimate explanation is *why* we have two hands and ten fingers to start with, and why are we prone with them to do thus and so and not something else. The proximate explanation recognizes that anatomy and emotions are hardwired to engage in certain activities. The ultimate explanation answers the question, why this particular hardwiring and not some other? To explain the human condition, thereby to give meaning to the human existence, requires both levels of explanation.

In the essays to follow, I've addressed the second, broader meaning of our species. Humanity, I argue, arose entirely on its own through an accumulated series of events during evolution. We are not predestined to reach any goal, nor are we answerable to any power but our own. Only wisdom based on self-understanding, not piety, will save us. There will be no

redemption or second chance vouchsafed to us from above. We have only this one planet to inhabit and this one meaning to unfold. To take this step in our journey, to get hold of the human condition, we need next a much broader definition of history than is conventionally used.

2

Solving the Riddle of the Human Species

To grasp the present human condition it is necessary to add the biological evolution of a species and the circumstances that led to its prehistory. This task of understanding humanity is too important and too daunting to leave exclusively to the humanities. Their many branches, from philosophy to law to history and the creative arts, have described the particularities of human nature back and forth in endless permutations, albeit laced with genius and in exquisite detail. But they have not explained why we possess our special nature and not some other, out of a vast number of conceivable natures. In that sense, the humanities have not achieved nor will they ever achieve a full understanding of the meaning of our species' existence.

So, as best we can answer, just what are we? The key to the great riddle lies in the circumstance and process that created our species. The human condition is a product of history—not just the six millennia of civilization but very much further back, across hundreds of millennia. The whole of it, biological and cultural evolution, must be explored in

seamless unity for a complete answer to the mystery. When viewed across its entire traverse, the history of humanity also becomes the key to learning how and why our species arose and survived.

A majority of people prefer to interpret history as the unfolding of a supernatural design, to whose author we owe obeisance. But that comforting interpretation has grown less supportable as knowledge of the real world has expanded. Scientific knowledge in particular, measured by numbers of scientists and scientific journals, has been doubling every ten to twenty years for over a century. In traditional explanations of the past, religious creation stories have been blended with the humanities to attribute meaning to our species' existence. The time has come to consider what science might give to the humanities and the humanities to science in a common search for a more solidly grounded answer than before to the great riddle of our existence.

To begin, biologists have found that the biological origin of advanced social behavior in humans was similar to that occurring elsewhere in the animal kingdom. Using comparative studies of thousands of animal species, from insects to mammals, we've concluded that the most complex societies have arisen through eusociality—meaning, roughly, the "true" social condition. By definition, the members of a eusocial group cooperatively rear the young across multiple generations. They also divide labor through the surrender by some members of at least part of their personal reproduction in a way that increases the "reproductive success" (lifetime reproduction) of other members.

Eusociality stands out as an oddity in a couple of ways.

One is its extreme rarity. Out of hundreds of thousands of evolving lines of animals on the land during the past four hundred million years, the condition, so far as we can determine, has arisen only nineteen times, scattered across insects, marine crustaceans, and subterranean rodents. The number is twenty, if we include human beings. This is likely to be an underestimate, perhaps a gross one, due to sampling error. Nevertheless, we can be certain that the number of originations of eusociality was relatively very small.

Furthermore, the known eusocial species arose very late in the history of life. It appears to have occurred not at all during the great Paleozoic diversification of insects, 350 to 250 million years before the present, during which the variety of insects approached that of today. Nor is there as yet any evidence of eusocial species alive during the Mesozoic Era until the appearance of the earliest termites and ants between 200 and 150 million years ago. Humans at the Homo level appeared only very recently, following tens of millions of years of evolution among the Old World primates.

Once attained, advanced social behavior at the eusocial grade found a major ecological success. Of the nineteen known independent lines among animals, just two within the insects—ants and termites—globally dominate invertebrates on the land. Although they are represented by fewer than twenty thousand of the million known living insect species, ants and termites compose more than half of the world's insect body weight.

The history of eusociality raises a question: Given the enormous advantage it confers, why has this advanced form of social behavior been so rare and long in coming? The

answer appears to be the special sequence of preliminary evolutionary changes that must occur before the final step to eusociality can be taken. In all of the eusocial species analyzed to date, the final step before eusociality is the construction of a protected nest, from which foraging trips are launched and within which the young are raised to maturity. The original nest builders can be a lone female, a mated pair, or a small and weakly organized group. When this final preliminary step is attained, all that is needed to create a eusocial colony is for the parents and offspring to stay at the nest and cooperate in raising additional generations of young. Such primitive assemblages then divide easily into risk-prone foragers and risk-averse parents and nurses.

What brought a single primate line to the rare level of eusociality? Paleontologists have found that the circumstances were humble. In Africa roughly two million years ago, one species of the primarily vegetarian australopithecines evidently began to shift its diet to include a much higher reliance on meat. For a group to harvest such a high-energy, widely dispersed source of food, it did not pay to roam about as a loosely organized pack of adults and young in the manner of present-day chimpanzees and bonobos. It was more efficient to occupy a campsite (thus, the nest) and send out hunters who could bring home meat, both killed or scavenged, to share with others. In exchange, the hunters received protection of the campsite and their own young offspring kept there.

From studies of modern humans, including hunter-gatherers, whose lives tell us so much about human origins, social psychologists have deduced the mental growth that

began with hunting and campsites. A premium was placed on personal relationships geared to both competition and cooperation among the members. The process was ceaselessly dynamic and demanding. It far exceeded in intensity anything similar experienced by the wide-roaming, loosely organized bands of most animal societies. It required a memory good enough to assess the intentions of fellow members, as well as to predict their responses from one moment to the next, and, of decisive importance, it required the ability to invent and inwardly rehearse competing scenarios of future interactions.

The social intelligence of the campsite-anchored prehumans evolved as a kind of nonstop game of chess. Today, at the terminus of this evolutionary process, our immense memory banks are smoothly activated to join past, present, and future. They allow us to evaluate the prospects and consequences of alliances, bonding, sexual contact, rivalries, domination, deception, loyalty, and betrayal. We instinctively delight in the telling of countless stories about others, cast as players upon our own inner stage. The best of it is expressed in the creative arts, political theory, and other higher-level activities we have come to call the humanities.

The definitive part of the long creation story evidently began with the primitive *Homo habilis* (or a species closely related to it) two million years ago. Prior to the habilines the prehumans had been animals. Largely vegetarians, they had humanlike bodies, but their cranial capacity remained chimpanzee-sized, at or below 600 cubic centimeters (cc). Starting with the habiline period the capacity grew precipitously, to 680cc in *Homo habilis*, 900cc in *Homo erectus*,

and about 1,400cc in *Homo sapiens*. The expansion of the human brain was one of the most rapid episodes of complex tissue evolution in the history of life.

Yet to recognize the rare coming together of cooperating primates is not enough to account for the full potential of modern humans provided by a large brain capacity. Evolutionary biologists have also searched for the grand master of advanced social evolution, the combination of forces and environmental circumstances that bestowed greater longevity and more successful reproduction upon the possessors of high social intelligence. Two competing theories of the principal force have been in contention. The first envisions kin selection: individuals favor collateral kin (relatives other than offspring), making it easier for altruism to evolve among members of the same group. Complex social behavior can evolve when group members individually reap greater benefits in numbers of genes passed to the next generation than losses from their altruism, averaged through their behavior toward all members of the group. The combined effect on the survival and reproduction of the individual is called inclusive fitness, and the explanation of evolution by it is called the theory of inclusive fitness.

In the second, more recently argued theory (full disclosure: I am one of the modern version's authors), the grand master is multilevel selection. This formulation recognizes two levels at which natural selection operates: individual selection based on competition and cooperation among members of the same group, and group selection, which arises from competition and cooperation between groups. Group selection can occur through violent conflict or

by competition between groups in the finding and harvesting of new resources. Multilevel selection is gaining in favor among evolutionary biologists because of recent mathematical proofs that kin selection can operate only under special conditions that rarely if ever exist. Also, multilevel selection is easily fitted to all of the known real animal cases of eusocial evolution, whereas kin selection, even when hypothetically plausible, can be fitted less well or not at all. (I'll treat this important subject in detail later, in Chapter 6.)

The roles of both individual and group selection are clear in the details of human social behavior. People are intensely interested in the minutiae of behavior of those around them. Gossip is a prevailing subject of conversation, everywhere from hunter-gatherer campsites to royal courts. The mind is a kaleidoscopically shifting map of others inside the group and a few outside, each of whom is evaluated emotionally in shades of trust, love, hatred, suspicion, admiration, envy, and sociability. We are compulsively driven to belong to groups or to create them as needed, which are variously nested, or overlapping, or separate, and in addition ranging from very large to very small. Almost all groups compete with those of similar kind in some manner or other. However gently expressed and generous in the tone of our discourse, we tend to think of our own group as superior, and we define our personal identities as members within them. The existence of competition, including military conflict, has been a hallmark of societies as far back in prehistory as archaeological evidence can be brought to bear.

The major features of the biological origins of *Homo*

sapiens are coming into focus, and this clarification raises the potential of a more fruitful contact between science and the humanities. The convergence between these two great branches of learning will matter hugely when enough people have thought its potential through. On the science side, genetics as well as the brain sciences, evolutionary biology, and paleontology will each be seen in a different light. Students will be taught prehistory as well as conventional history, and the whole properly presented as the living world's greatest epic.

Pride and humility in better balance, we'll also take a more serious look at our place in nature. Exalted we are, risen to be the mind of the biosphere without a doubt, our spirits uniquely capable of awe and ever more breathtaking leaps of imagination. But we are still part of Earth's fauna and flora, bound to it by emotion, physiology, and, not least, deep history. It is folly to think of this planet as a way station to a better world. Equally, Earth would be unsustainable if converted into a literal, human-engineered spaceship.

Human existence may be simpler than we thought. There is no predestination, no unfathomed mystery of life. Demons and gods do not vie for our allegiance. Instead, we are self-made, independent, alone, and fragile, a biological species adapted to live in a biological world. What counts for long-term survival is intelligent self-understanding, based upon a greater independence of thought than that tolerated today even in our most advanced democratic societies.

3

Evolution and Our Inner Conflict

Are human beings intrinsically good but corruptible by the forces of evil, or the reverse, innately sinful yet redeemable by the forces of good? Are we built to pledge our lives to a group, even to the risk of death, or the opposite, built to place ourselves and our families above all else? Scientific evidence, a good part of it accumulated during the past twenty years, suggests that we are both of these things simultaneously. Each of us is inherently conflicted. Team player or whistle-blower? Charitable donation or personal certificates of deposit? Admitted traffic violation or denial? I don't believe I can let this subject pass by leaving my own conflicted emotions unconfessed. When Carl Sagan won the Pulitzer Prize for nonfiction in 1978, I dismissed it as a minor achievement for a scientist, scarcely worth listing. When I won the same prize the following year, it wondrously became a major literary award of which scientists should take special note.

We are all genetic chimeras, at once saints and sinners, champions of the truth and hypocrites—not because humanity has failed to reach some foreordained religious or ideological ideal, but because of the way our species

originated across millions of years of biological evolution.

Don't get me wrong. I am not implying that we are driven by instinct in the manner of animals. Yet in order to understand the human condition, it is necessary to accept that we do have instincts, and it will be wise to take into account our very distant ancestors—as far back and in as fine a detail as possible. History alone cannot reach this level of understanding. It stops at the dawn of literacy, where it turns the rest of the story over to the detective work of archaeology. In still deeper time the quest becomes paleontology. For the real human story, history must comprise both the biological and cultural.

Within biology itself, the key to the mystery is the force that lifted prehuman social behavior to the human level. The leading candidate is multilevel selection, by which hereditary social behavior improves the competitive ability not just of individuals within groups but among groups as a whole.

Bear in mind that during organic evolution the unit of natural selection is not the individual organism or the group, as some popular writers have misconstrued it. It is the gene (more precisely the alleles, or multiple forms of the same gene). The target of natural selection is the trait prescribed by the gene. The trait can be individual in nature and selected in competition among individuals inside or outside the group. Or the trait can be socially interactive in nature with other members of the group (as in communication and cooperation) and selected by competition among groups. A group of uncooperative, poorly communicating individuals will lose to its better organized competitors. The genes of the losers will decline across generations. Among animals, the consequences

of group selection can be most plainly seen in the exquisitely programmed caste systems of ants, termites, and other social insects, but is also manifest in human societies. The idea of between-group selection as a force operating simultaneously in addition to between-individual selection is not new. Charles Darwin correctly deduced its role, first in the insects and then in human beings, respectively in *On the Origin of Species* and *The Descent of Man*.

I am convinced after years of research on the subject that multilevel selection, with a powerful role of group-to-group competition, has been a major force in the forging of advanced social behavior—including that of humans. In fact, it seems clear that so deeply ingrained are the evolutionary products of group-selected behaviors, so completely a part of the contemporary human condition are they, that we are prone to regard them as fixtures of nature, like air and water. They are instead idiosyncratic traits of our species. Among them is the intense, even obsessive interest of people in other people, which begins in the first days of life as infants learn particular scents and sounds of the adults around them. Research psychologists have found that all normal humans are geniuses at reading the intentions of others, whereby they evaluate, proselytize, bond, cooperate, gossip, and control. Each person, working his way back and forth through his social network, almost continuously reviews past experiences while imagining the consequences of future scenarios. Social intelligence of this kind occurs in many social animals, and reaches its highest level in chimpanzees and bonobos, our closest evolutionary cousins.

A second diagnostic hereditary trait of human behavior is

the overpowering instinctual urge to belong to groups in the first place, shared with most kinds of social animals. To be kept forcibly in solitude is to be kept in pain, and put on the road to madness. A person's membership in his group—his tribe—is a large part of his identity. It also confers upon him to some degree or other a sense of superiority. When psychologists selected teams at random from a population of volunteers to compete in simple games, members of each team soon came to think of members of other teams as less able and trustworthy, even when the participants knew they had been selected at random.

All things being equal (fortunately things are seldom equal, not exactly), people prefer to be with others who look like them, speak the same dialect, and hold the same beliefs. An amplification of this evidently inborn predisposition leads with frightening ease to racism and religious bigotry. Then, also with frightening ease, good people do bad things. I know this truth from experience, having grown up in the Deep South during the 1930s and 1940s.

It might be supposed that the human condition is so distinctive and came so late in the history of life on Earth as to suggest the hand of a divine creator. Yet, as I've stressed, in a critical sense the human achievement was not unique at all. Biologists have identified at the time of this writing twenty evolutionary lines in the modern-world fauna that attained advanced social life based on some degree of altruistic division of labor. Most arose in the insects. Several were independent origins in marine shrimp, and three appeared among the mammals—that is, in two African mole rats, and us. All reached this level through the same narrow

First published as a Liveright paperback 2015

Book design by Chris Welch Design
Production manager: Devon Zahn

The Library of Congress has cataloged the printed edition as follows:

Wilson, Edward O., author.
The meaning of human existence / Edward O. Wilson. — First edition.
pages cm
ISBN 978-0-87140-100-7 (hardcover)
1. Philosophical anthropology. I. Title.
BD450.W5225 2014
128—dc23

2014016707

ISBN 978-0-87140-480-0 (e-book)

ISBN 978-1-63149-114-6 (pbk.)

Liveright Publishing Corporation
500 Fifth Avenue, New York, N.Y. 10110
www.wwnorton.com

W. W. Norton & Company Ltd.
Castle House, 75/76 Wells Street,
London W1T 3QT