



Evolution and the Big Questions

Sex, Race, Religion, and Other Matters

David N. Stamos

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Introduction

There is a debate raging in virtually every college and university in the Western world, and also widely among the public. It is whether evolutionary explanations—Darwinian explanations—can be legitimately extended to the big questions that vitally concern us all, questions that fall outside of biology as normally circumscribed. The big questions concern matters between the sexes, racial issues, religion, and so much more. The debate as a whole is the interdisciplinary question *par excellence*, involving not only biology but philosophy, psychology, anthropology, sociology, feminism, theology, and virtually every other discipline in one way or another. This unique and timely book is devoted entirely to that debate, as a critical introduction. Both its content and its style were written for two main audiences, one the general public, the other students in college and undergraduate university courses in a variety of disciplines. I have also not refrained from developing my own views in every chapter, not only to provoke thought on the part of the reader but to challenge the heavyweights in the various fields. This book operates, then, on a number of levels. But more on all of this below, including chapter summaries.

What this book is *not* devoted to is a defense of the science of evolutionary biology *per se*. That debate is dead among scientists and the intellectual world as a whole. Beginning with Charles Darwin's *On the Origin of Species*, first published in 1859, the evidence for evolution has grown exponentially, such that evolutionary biology long ago became the core and foundation of professional biology. To be sure, there are theories and debates about various aspects of evolution by professional biologists and philosophers of biology (biology would not be a healthy science were it otherwise). But the debates are not about evolution *per se*. Instead, all the debates occur within the framework of evolution as a fact, much the same way debates in modern astronomy occur within the framework of a dynamic rather than a static universe.

The fact is, all professional biological research around the world, in every country that has institutions of professional science—whether that research is on animal behavior, ecology, agriculture, medicine, genetics, or the fossil record—is conducted from an evolutionary point of view. The explanatory power of evolutionary principles is enormous, and that is putting it much too mildly. Evolutionary principles not only

sufficiently explain what we find in the biological world, but they alone allow us to predict new findings and to understand the mysteries of life in their manifold diversity. Indeed every new finding by biologists, every new discovery, fits perfectly within the evolutionary framework begun by Darwin. From the changes and transitional forms studied in the fossil record, the geographical distribution of plants and animals, their anatomical relationships, the study of DNA and related mechanisms, to the study of the mutation and evolution of viruses and the evolutionary resistance of bacteria to antibiotics, “Nothing in biology makes sense except in the light of evolution.” This is what the renowned geneticist Theodosius Dobzhansky, one of the principal architects of the Modern Synthesis, once wrote in defense of the teaching of evolution in public school science classes (Dobzhansky 1973, 125).¹ At the center of it all is natural selection, Darwin’s main mechanism of evolutionary change and his only proposed explanation for the existence of biological adaptations such as beaks and eyes. This mechanism has now been studied and confirmed over and over again in the lab and in the wild, and it remains the core causal explanation of biological adaptation, of complexity and design in organisms.

In short, evolutionary science is one of the greatest and most solid of human achievements, possibly even the greatest of all time. As such, it should be denied to no one. But what is worse, to deny evolution is to deny the very nature and value of evidence itself. Reasoning that is not based on evidence, that ignores it or even fights against it, is reasoning that invites moral condemnation. We would hold a judge or jury in contempt were they to decide court cases on emotions and ideologies rather than on evidence. The offense becomes only worse for the big questions in life. As W. K. Clifford (1879) argued over a century ago, we have both a personal and a social duty to avoid belief unsupported by or opposed to evidence, just as we have both a personal and a social duty to avoid the spread of disease. Disrespect for evidence translates psychologically and socially into a culture of lies and power politics, not a culture that values truth and justice.

The public perception of the status of evolutionary biology, unfortunately, is in many parts of the world quite the opposite of what it should be. One often used to hear of *creation science*, especially of court cases in which special interest groups challenged the scientific status of evolutionary biology or attempted to have creation science taught in public schools as a rival to evolutionary biology. Recently it has reemerged under a new guise known as *intelligent design theory*. Is not evolutionary biology just a competing theory after all? The answer is clearly *no*, for reasons already given and further elucidated in a number of places in this book. Nor is intelligent design theory genuine science. This theory, along with its previous incarnation as creation science, is essentially mythological thinking masquerading in a lab coat. It is the attempt to take a way of thinking common to frightened and ignorant peoples living in pre-scientific societies, a way of thinking possibly rooted deeply in human nature, and to make it intellectually respectable. But no matter how it is dressed, its explanations are not real explanations, it makes no testable predictions (because

1 Key terms that are not defined in the text, or that are defined but occur more than once, will find a discussion in the Glossary at the back. It might be a good idea for those not familiar with key terms in biology and philosophy to read the Glossary first, before reading the chapters.

one cannot test the will of an invisible creator or designer), and it opens up no fruitful lines of research. In short, the public has been bamboozled by an enormous propaganda machine driven by the religious right wing. Debate over intelligent design theory does not exist within science itself, and for very good reasons. In all of this the public has been seriously misled. For more on this topic there is the Appendix, which includes plenty of references as well as a discussion on the main misconceptions about evolution. This is needed for removing obstacles in the minds of many readers and thus preparing them for the real debates, the debates that are alive and well and are being fought within one college and university after another.²

To return to the purpose of this book, then, it is to accomplish something far more interesting than to argue for the truth of evolution. That is something that has been done over and over again and need not be repeated here. Instead, the purpose of this book is to question whether and to what extent evolutionary biology shines light on the big questions debated in the humanities and social sciences, questions that concern us all. Adding evolution to those questions has the effect of making them controversial in the extreme. The philosopher Daniel Dennett (1995), for example, has argued that Darwinian evolution is what he, approvingly, calls a “universal acid” (63), corroding its way through our cherished beliefs in virtually all areas of life, such as ethics, politics, romance, and religion. Certainly one can choose one’s metaphor here, Dobzhansky’s light or Dennett’s acid or whatever else. Whatever one’s metaphor, it remains an extremely interesting question just how far evolutionary explanations can legitimately go.

The main theme that runs throughout the chapters is the debate between evolutionary explanations and what has come to be known as the *Standard Social Science Model* (SSSM). The SSSM is a way of looking at human nature that is commonly found in sociology, behaviorism in psychology, cultural anthropology, Marxism, women’s studies, and gay studies. There is a danger in presenting this debate as a dichotomy, since in recent years some of these fields (particularly anthropology and psychology) have in some of their quarters been warming up to evolutionary explanations, while evolutionists on human nature have been paying more attention to the role of the environment. And yet the debate has not changed so much that the distinction between the two competing models no longer holds. Each model is alive and well and competing for allegiance, the social sciences and the humanities still have much of the SSSM in them, and the debates with evolutionists are as hot as ever. While I can only paint in broad strokes in this introduction, we shall see what I mean when we get to the details in the chapters. It will be useful at this point, then, to set the nature of the debate as an opposition between evolutionary models and the SSSM. Understanding each in its pure form will help to recognize and evaluate them when they are mixed.

2 There is a simple two-part test that I like to apply to anyone who thinks evolution is just a theory: (i) ask them what books by evolutionary biologists they have read, and (ii) ask them where they think species came from if not from evolution. Invariably the answers are lame. Of course, everyone is entitled to their own opinion, but this must not be confused with the fact that uninformed opinions are a dime a dozen (and that is putting too high of a price on it). The same is true of opinions that are informed to some degree but are motivated primarily by an agenda other than logic and evidence.

One might say the debate between the two models is between an emphasis on evolutionary history and an emphasis on cultural history, but this is not entirely accurate. The debate is *not* nature versus nurture, but rather nature-nurture versus nurture. Biologists routinely argue that a full explanation for a given trait (whether physical or behavioral) requires a genetic and ultimately evolutionary explanation (nature) *and* an environmental explanation (nurture). Take, for example, the height of a particular plant. Reference to the genetics of the plant and the evolutionary history of its species is not enough for a full explanation of its height. For that, reference is also needed to the environmental conditions to which the plant has been exposed, such as the amount of sunshine and water. The same plant, with its genetics and evolutionary history, could have had a different height had it been exposed to different environmental conditions. This is easily seen in the case of clones.

The SSSM, on the other hand, tries its best to play down the role of biology and play up the role of the environment, namely, culture and conditioning. Ultimately it views human nature as enormously *plastic* (moldable), or, to vary the metaphor (following the 17th-century philosopher John Locke), as a *tabula rasa*, a blank slate. For example, Marxists argue that humans are not innately greedy, contrary to the view made popular by the 17th-century philosopher Thomas Hobbes, who thought humans were innately selfish but rational enough to form a social contract. Instead, for Marxists, it is a capitalist system that makes people greedy. Raised in a truly communist system, a system without class distinctions and private property, people would be unselfish and cooperative. Similarly, many feminists and social scientists argue that it is not because of their biology that men are so aggressive and violent toward women. Instead, they claim, it is a patriarchal system that makes men that way. Raised in a truly egalitarian system, men and women, behaviorally, would be basically the same. In gay studies it is similarly claimed that heterosexuality is not the biological norm for humans. Raised in a sexually permissive society, without stereotypes and prejudice, human sexual preferences would be either all the same or an even continuum. Common to each of these three examples, to Marxism, women's studies, and gay studies—indeed it is part of the common denominator of SSSM thought—is the further claim that hierarchy is not innate to the human species but the product of cultural history, in other words a *social construction* (this is the current fashionable phrase). Humans in this view are perfectly capable, in spite of their biology, to live in non-hierarchical social arrangements. It is the environment, past and present, that makes the hierarchies in humans, not genes, so also it is the environment that must be changed to fix the problem.

In the previous century one of the most powerful exponents of SSSM thinking was behaviorism in psychology. For behaviorists, what was true of serial killers and rapists was true of philanthropists and gifted musicians. In each and every case, it was not the person, or their genes, that was responsible, but rather it was the environment that had made them. John Watson, the first great of behaviorism, proclaimed,

Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and yes,

even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors.

(Watson 1924, 104)

Similarly for the last of the great behaviorists, B. F. Skinner, although he recognized the role of genes via instincts more than earlier behaviorists, the due he gave them was superficial. For Skinner as for many others, human nature is still so plastic that he envisioned a utopia in which human society, engineered using behaviorist principles, enjoys previously unknown bliss, a world where “behavior likely to be punished seldom or never occurs,” “people live together without quarreling,” and people “bear no more children than can be raised decently” (Skinner 1972, 66, 214). (Utopia thinking, indeed, tends to be common among SSSM thinkers.)

What went hand in hand with behaviorism, both ideologically and temporally, was cultural relativism in anthropology. Not only were fashion and art found to be tremendously variable and entirely culturally relative, but so too, as the anthropologist Ruth Benedict (1934) argued, were “mannerisms like the ways of showing anger, or joy, or grief . . . or in major human drives like those of sex . . . in fields such as that of religion or formal marriage arrangements” (59). What is considered normal in one society, she pointed out, might easily be considered abnormal in another. On such a view no culture is right and no culture is wrong, and morality, far from having any innate norm, “differs in every society, and is a convenient term for socially approved habits” (73).

Although genuinely evolutionary explanations of human nature have been around since Darwin, they had difficulty being taken seriously in academic disciplines outside of professional biology until the power and pervasiveness of the SSSM received a number of serious blows. One serious blow (some would say the fatal blow) was delivered by the linguist Noam Chomsky. Beginning in the 1950s, Chomsky argued that language acquisition, contrary to behaviorism, is not simply a matter of basic intelligence and stimulus-response conditioning; indeed, that such a model could not possibly work. He argued, instead, that we humans enter the world with what he called a *universal grammar* hard-wired into our brains, meaning that it is coded for in our DNA (more on this in Chapter 3). Chomsky accomplished a veritable revolution in the science of linguistics, one that is still ongoing but is now widely accepted in its broad outlines. His greater importance, however, lies in the effect his revolution had on the SSSM with its blank slate view of human nature. Not only did Chomsky’s revolution open the door to the computer model of the mind-brain (cognitive science), but it also opened the door to evolutionary models of human behavior, namely, sociobiology and evolutionary psychology. *Sociobiology* is the application of evolutionary principles to help explain social behavior in humans and other animals,³ while *evolutionary psychology* is the application of evolutionary principles to help explain psychological phenomena.⁴ These two burgeoning fields have much in common and a lot of overlap.

3 Wilson (1975) is the classic text, Alcock (2001) a recent and able defense.

4 Barkow *et al.* (1992) and Crawford and Krebs (1998) are the main anthologies, Badcock (2000) a recent introductory text.

Another serious blow to the SSSM came from anthropology. In 1928, around the time behaviorism was becoming popular in professional psychology, Margaret Mead's *Coming of Age in Samoa*, the *locus classicus* of cultural anthropology, was first published. Mead claimed that in Samoan culture men were not dominant, rape and violence virtually did not exist, nor rivalry and competition, and sexual mores were completely free. A university textbook for many decades, *Coming of Age in Samoa* subsequently proved to be as shoddy as can be, with Samoans turning out to be basically no different than the rest of humanity. Mead, it turned out, got her information not from a careful study of the Samoans but from interviews with 25 teenage Samoan girls in one of the villages, girls who had fun in making up stories. Mead ultimately believed what she wanted to believe, taking most of anthropology with her (Freeman 1983, 1989; see Alcock 2001, 131–134). Although anthropology long remained in denial (Freeman's study of Samoans and of Mead was done in the 1940s and 1960s), many anthropologists in recent decades have increasingly distanced themselves from anthropology's SSSM past, taking seriously evolutionary biology and the search for cultural universals underlying cultural diversity (Brown 1991; Ghiglieri 2000).

The main problem with the SSSM is not that it is completely wrong. Indeed, it is obviously right about many things. For example, it is today plainly clear that the historically widespread view that men have a greater share of reason than women (e.g., Aristotle *Politics* I.12) was a socially constructed myth, as was the view that women are mainly to blame for the woes of humanity (the myth of Eve for the ancient Jews, Pandora for the ancient Greeks). And the SSSM might well turn out to be right about many other matters, for example that human rights are not natural or innate but are merely a social construction.

What is wrong with the SSSM, instead, is that as a way of thinking it produces resistance, even phobia or denial, to the fact that humans are a biological species. We can resist the fact as much as we want, but it remains the fundamental fact of our existence. Our species, *Homo sapiens*, did not pop into existence out of nothing, but instead evolved ever so gradually from an earlier species, which in turn evolved ever so gradually from a yet earlier species, and so on back through evolutionary time. Granted, very few, if any, professional academics who subscribe to the SSSM would wish to deny this (the evidence for evolution is just too great). But what they do wish to deny, instead, are the many *implications* of this fact. And that is where the problems arise. Quite simply, *Homo sapiens* is not just an evolved species but a social species, one that evolved in small hunting-gathering groups. As such, it would be utterly remarkable if this animal species did not evolve special instincts while all the others have. SSSM thinkers, interestingly, have no problem admitting rabbit nature, or wolf nature, or gorilla nature, but when it comes to humans they just do not want to admit that there is such a thing as human nature.

There are many reasons for this resistance, and they are interconnected. One reason simply involves the history of the term “human nature.” Deeply rooted in pre-evolutionary doctrines such as those of Plato, Aristotle, and St Augustine, talk of human nature immediately suggests to many today something essentialistic, something that is fixed and eternal, not something that gradually evolves. It also has

normative connotations, suggesting not only what is but what ought to be. Indeed, so theory-laden is the term “human nature” that I recently had a prominent evolutionary biologist get angry with me at the very mention of the term. Such anger, however, is misplaced. As our knowledge grows, the meaning of terms naturally change. We still believe in the existence of humans, of course, and that, following Linnaeus in the 18th century, humans are a species. But ever since Darwin we also now recognize that, like other species, we are a constantly evolving species. Moreover, following Darwin but especially following our recent ability to read DNA, we know that variation is the norm for every population or species at the genetic level. But more than that, we also now know that there are *statistical norms* for populations and species at any one slice of time. Given this knowledge, then, there is no reason to abandon the concept of human nature altogether. Instead, our evolved knowledge suggests an evolved meaning, which in biology and related sciences is and should only be that of the *genetically influenced statistical behavioral norm* of the species taken at any one *time slice* in its evolutionary history. There is no essentialism here. There is also nothing in this meaning that need involve evaluative connotations such as that statistical deviations are “deviants,” nor need it involve normative connotations such as that the statistical norm is “good” or “best.” Instead, the only legitimate meaning of “human nature” in science today is *purely descriptive*. When legitimized as such, hopefully the fear that its folk and pre-Darwinian past evokes in so many will eventually subside and cease to be a barrier to understanding.

Related to this is the fear that talk of genes and human nature invariably involves *biological determinism*. The fear is that once it is granted that genes *influence* human behavior then it must also be granted that they *determine* human behavior, so that the status quo with all its injustice is justified and any hope of progressive change is lost. This fear is understandable, given that there is a history of injustice supported by biological theories, the Nazi doctrines of racial supremacy and inferiority being a striking example among many. Indeed, the fear of what evolutionary biology might mean for human nature has prevented many from taking the time to learn the basic principles of evolutionary biology and genetics. What should become apparent as we go through the coming chapters, however, is that “biological determinism” is a bogey term, one that does not have scientific respectability. To be sure, there are legitimate fears that are involved with the self-knowledge that comes from studying evolutionary biology, but the fear of biological determinism is not one of them.

Finally, there are political reasons for why many find the SSSM appealing and are immediately suspicious of, or will not even listen to, those who provide evolutionary perspectives on human nature.⁵ At the core of it all is political correctness, with its goal of a sensitive and fair society, especially with regard to groups that have

5 Jumonville (2003) provides a nice discussion on how the debate between the SSSM and evolutionary models relates to politics, in particular the multicultural values of the rising New Left (which embraces group identity values, whether based on race, ethnicity, or gender, and opposes hierarchy) versus the universal values of the Enlightenment. For a sustained critical discussion on how the SSSM embraces the *tabula rasa* model and in effect denies the existence of human nature, see Tooby and Cosmides (1992), Gross and Levitt (1998), Alcock (2001, ch. 7), and Pinker (2002).

suffered and continue to suffer discrimination and oppression. While among the general public there is a lot of division over the value of political correctness, with many thinking it has gone too far (just listen to call-in radio talk shows), in colleges and universities, especially in the humanities and social sciences, it has become quite a dominant force, even to the point of censorship (in many colleges and universities in the United States, for example, racial theorizing is not allowed). While the basic reasons for political correctness are just and laudable, much politically correct thinking is arguably unrealistic and a form of denial. Nowhere is this plainer than in the big questions where biology should be clearly relevant. Indeed, politically correct thinkers routinely give the impression that they could not care less about being *biologically correct*. If there is a conflict between political correctness and biology, then too bad for biology. What we shall see in coming chapters is that political correctness, when it shuts itself off from empirical evidence and argument or flies too easily to the SSSM, easily becomes its own worse enemy. To give a quick example, it can now be argued that the communist experiment failed, in country after country around the world, just as every commune experiment of hippies in the 1960s failed, not necessarily because evil or stupid people were behind the experiments, but because they had the wrong theory of human nature. How many other grand visions of human happiness are destined to fail because they have an erroneous concept of human nature?

The truly interdisciplinary challenge, then, as I see it, and it is the real debate, is to try to figure out as best one can just where the SSSM is right and where it is wrong and to be fearless about it, even if that means throwing political correctness to the wind at times. Biology in general and evolutionary biology in particular need to be taken seriously, both if we want to truly understand the human condition and if we believe knowledge is power and we want to support the most effective ways of bettering the world. Granting that we should take biology seriously, however, is one thing, saying exactly where we should do so and to what degree is another. Indeed it is the hard part, but it is also the most interesting.

As mentioned briefly at the beginning, this book was written for three main audiences and I want to say more about them here. One of the main audiences is the general public, more specifically fairly well-educated people with at least some basic background in high school science. We all know that there is enormous interest out there over evolution versus religion, over whether evolution is true and whether it undermines religion and *vice versa*. But I suspect that there is also enormous interest out there about the wider implications of evolution should it be true. For example, virtually everyone has wondered about whether there is a genetic component to homosexuality or to behavioral differences between men and women. Well if genes are involved then so is evolution. It is that simple. Many also wonder if evolution and religion are not really antipodes but can be combined, and yet few will be aware of the fact (including Catholics) that in 1996 the late Pope John Paul II officially accepted evolution (combining it, of course, with theology) and that this is the official position of the Vatican. Indeed many scholars and intellectuals have combined evolution with theology, including some famous evolutionary biologists such as Theodosius Dobzhansky and Francisco Ayala. But can they do so legitimately? These and many

other interesting questions are explored in this book, such that I cannot imagine the general public giving it a cool reception.

An equally important audience is college and undergraduate university students. What they shall learn in this book are not only the basic principles of evolution, but the real debates that are hotly engaging their own professors in department after department and from discipline to discipline. Indeed this book is a brief education in the nature and value of interdisciplinary studies. Whenever I have taught these topics (in the form of a course kit anthology which also contained my critical commentaries), twice in a university and twice in a community college, students became engaged in a way and to a degree that I have never seen elsewhere. This is because most if not all of their exposure in college and university is to SSSM thinking, so they are naturally surprised to find that there is a powerful alternative. It was in fact this situation that ultimately brought me to write this book, all combined with the discovery that there does not seem to be anything out there in the book market that is at all comparable.

Not only are evolutionary perspectives on the big questions normally not studied by undergraduate students in colleges and universities, but students who try to express evolutionary explanations in courses in the humanities and social sciences often find themselves in quite a tempest (as a number of my students have attested when they took courses after my Mind and Nature course). Undoubtedly much of the heat generated—and it is typically heat, not light—comes not from the topics themselves, or from the interdisciplinary approach as a whole, but first and foremost from the professors, from their territoriality which compels them to defend and protect their individual disciplines or subdisciplines from outside explanatory encroachment, and from their egos, which compel them to look down upon outside disciplines with a condescending smile or frown. Indeed there is enormous arrogance in academia, with in-group and out-group mentality. Unfortunately, not only is this egotism and arrogance misplaced, such that these professors do their respective fields a great disservice, but they also infect their students with the air of their high-minded insularity and thereby perpetuate *a priori* a barrier within those students to an increase in knowledge and understanding. In other words, they indoctrinate students into a specialization. Hence, students with an interdisciplinary mindset who attempt to introduce evolutionary explanations in classes outside of biology or philosophy of biology typically experience two walls of resistance: one from the professor, and the other, often before the professor even speaks, from other students in the class, especially those who share the disciplinary perspective of the professor.

Specialization, of course, is extremely important for progress within any field. Nevertheless, if one truly wants to know how the world works, whether the human world or the world of nature as a whole, in other words if one is genuinely imbued with a spirit of inquiry and a thirst for knowledge, then one has little choice but to welcome interdisciplinary studies with open arms. And the reason is simple. Not only is there ultimately only one reality, but examples abound of insights that were gained only by the cooperative efforts of workers in different fields. A prime example is the emerging explanatory paradigm of mass extinction #5 (which included the dinosaurs), a paradigm that involves the fields of geology, paleontology, evolutionary

biology, chemistry, geophysics, astronomy, and astrophysics (Glen 1994). Another example (though far less one of cooperation) is the species problem, the problem of determining the nature of biological species, a problem that has enjoyed an enormous amount of input and benefit not only from biologists but also from historians and philosophers (Stamos 2003, 2007). The present book, it is hoped, will awaken students to many other possibilities.

Although the expository level of this book is designed primarily for the general public with at least a high school education as well as college students and lower-level university undergraduates, it would be more greatly enjoyed by upper-level undergraduates, students with some background in disciplines such as philosophy, biology, anthropology, psychology, sociology, women's studies, gay studies, or theology. With students from a variety of backgrounds and the present book, both the course director and the students should experience (as I and my students have) a course they shall never forget!

As for specific courses, one obvious choice is philosophy of biology. However, it should be kept in mind that this book does not focus on some of the traditional topics in philosophy of biology (such as the species problem, the levels of selection problem, the problem of reductionism, or the problem of whether there are laws in biology). Instead, it casts a much wider net, a net that not only makes it more attractive than the standard philosophy of biology fare but that makes it attractive to many courses in the humanities and social sciences, especially courses that focus in one way or another on the topic of human nature.

The final audience for this book is professional scholars. While much of the content of this book is devoted to the clearest possible exposition of various views, concepts, and theories involved (again, it must be as clear as possible for students and the general public), I often critique the views of others and argue my own position on the various questions. In this way I hope to engage professional scholars and present a serious challenge to their views. This book, then, operates at more than one level and fluctuates between them, the one being clarity of exposition for students and the general public, the other being critical arguments designed for student research and professional scholars.

What this further means is that the style in each of the following chapters is not linear but mainly dialectical, in that each chapter moves forward typically by working through opposing views. This style is not only more engaging for the reader, I find, but it also provides the materials and perspectives necessary for responsible and informed conclusions on the various questions. For this purpose there are plenty of references to guide further research.

In all of this, whatever conclusions one comes to on evolution and the big questions after reading this book, they should always be tentative, and one need not even go that far. Instead, one may simply choose to suspend judgment on the various questions, pending further research and reflection. In either case, one cannot help but come away with a much more informed perspective on whether, where, and to what degree evolutionary explanations legitimately extend beyond biology as traditionally circumscribed. It is an exploration, indeed, that should not only enrich one's life but that should continue for the rest of one's days.

I should also say that my primary concern is to do justice to each of the big questions and to not hold back on what I think and why I think it. While an approach is needed that is sensitive to people's feelings, since many of the questions and arguments in this book have the potential to disturb and even offend, my primary concern is to stimulate thought and to be sensitive to logic and evidence, which involves the value of being biologically correct. Throughout it all my attitude is that, to paraphrase the Christian existentialist Søren Kierkegaard, there is no thought I am afraid to think whole. Nor do I think should you be afraid.

Now on to the chapter summaries.

Chapter 1 deals with epistemology, the study of knowledge, and we shall examine two questions that involve evolution. First, centering around the evolutionary epistemology of Karl Popper, we shall examine arguments pro and con on whether evolution evolved in us an ability to find truth, or whether that ability is a byproduct of other abilities that evolution evolved in us. We shall then examine a more narrow question, but nonetheless epistemological, namely, whether the science of evolutionary biology is capable of giving us any knowledge about human nature. After a brief discussion on postmodernism, the focus shall then be on the views of three critics, namely, the biologists Stephen Jay Gould and Richard Lewontin, and the anthropologist Marvin Harris. Much of this discussion paves the way for what is to come in the rest of the book.

Chapter 2 is devoted to evolution and consciousness. The problem of consciousness is arguably the central problem in philosophy of mind. The problem is whether this remarkable thing called consciousness, which seems so utterly different than matter, can receive an adequate explanation from evolutionary principles, or whether one needs to go outside of them. For some, such as Richard Swinburne, the existence of consciousness is literally a miracle, while for others, such as John Searle, Horace Barlow, and Gerald Edelman, it is perfectly natural.

Chapter 3 is devoted to evolution and language, a problem closely related to that of the previous chapter since many theorists connect consciousness irrevocably with language use, in the full-bodied sense of sentence formation (on this view, dogs and human babies, for example, are not conscious). The focus in this chapter is on Noam Chomsky's claim that humans are born with what he calls a universal grammar (UG), a language organ distinctly human (animals do not have it),⁶ hard-wired into our DNA, in a sense the common denominator underlying natural languages such as English and Chinese (which for Chomsky are superficial surface phenomena, humans really have only one language). We shall examine the basic ideas in Chomsky's theory of the UG as well as problems raised against the UG from an evolutionary perspective. Accepting the UG (in some form), we shall then examine Chomsky's argument for why he thinks the UG is not the product of evolution by natural selection, as well as two very different attempts to fit Chomsky's UG into the evolutionary picture, attempts by the evolutionary linguists Steven Pinker and Derek Bickerton.

⁶ Although from a biological point of view humans *are* animals, throughout this book I shall follow linguistic convention and use the word "animal" to refer only to non-human animals. This is much more convenient than repeatedly using the phrase "non-human animals," which quickly becomes tiring.

In Chapter 4 we turn to matters of sex. Four questions shall be examined here. First, we shall look at the argument by the evolutionary psychologist David Buss that evolution evolved different mating strategies in men and women. Second, we shall focus on the question of why men rape, specifically the argument by the anthropologist Michael Ghiglieri for the evolution of a rape instinct in men, which makes rape at bottom a matter of sex and reproduction, as well as critical arguments that place the cause solely in culture, as a matter of male dominance and hatred toward women. Third, we shall look at the question of homosexuality, examining two very different evolutionary theories that attempt to explain why there is homosexuality, the kin selection theory of the sociobiologist E. O. Wilson and the X chromosome theory of the behavior geneticist Dean Hamer. We shall also examine some critical arguments, one of which is that heterosexuality, homosexuality, and bisexuality are not natural human kinds but social constructions. Fourth and finally, we shall look at the incest taboo, which is universal or near universal in human culture, specifically the argument by E. O. Wilson for the evolution of an instinct for incest avoidance and the argument by Marvin Harris that it is totally based on culture.

In Chapter 5 we deal with questions raised by feminism. One question is why women's studies courses are characterized by what has been termed *biophobia*. Another question is whether sexual selection theory in biology legitimately applies to humans. Related to this is the question of gender roles. Feminists often argue that gender roles are social constructions. Certainly at least some are, but we shall examine arguments for whether on the whole they have an evolutionary basis. We shall also examine an argument, by the well-known feminist biologist Anne Fausto-Sterling, that not only gender roles but the very dichotomy of male-female is not biologically justified but is another social construction, so that what we really have is a continuum or single sex. Finally, we shall take a look at the question of whether the science of evolutionary biology is sexist and if so whether scientific knowledge must always be biased.

In Chapter 6 we deal with questions concerning human races. We shall begin by looking at some popular misconceptions about race that are undermined by a basic understanding of evolutionary biology. That will take us to the interesting debate over whether human races really exist. On the one hand we shall examine the now standard arguments for why many biologists say we should not name human races, focusing on a paper by Stephen Jay Gould. We shall then examine a number of arguments, much more recent, that attempt to reintroduce the concept of race, one using ecology, the other using cladistic taxonomy. We shall then examine the question of race and IQ, assuming that there are human races for the sake of argument. Finally, we shall examine the question of whether racism, which is a human universal, is acquired by culture and environment or has a deeper cause, one rooted in our evolutionary past.

In Chapter 7 we examine many of the questions that evolutionary biology raises for ethics. We shall begin with an examination of Social Darwinism, the older kind of evolutionary ethics which holds that we should apply the principle of natural selection to the human species. This will be followed by a discussion on the distinction