The Third Chimpanzee: the Evolution and Future of the Human Animal Study Guide

The Third Chimpanzee: the Evolution and Future of the Human Animal by Jared Diamond

BOOKRAGS

Contents

Plot Summary

This text, written with a personal and accessible scientific tone, first seeks to examine the evolutionary history of *Homo sapiens* in an effort to explain current behaviors and social structures. The text then tries to extrapolate likely future outcomes based on the investigation of the past. The text is divided into a logical set of topics, created such that subsequent topics build on previous topics. Because of this, the main theses develop somewhat slowly but the time taken in initial investigation pays off in later chapters as a strong framework is provided on which to present complex ideas. Overall, the text is interesting and compelling, and presents an internally consistent and convincing viewpoint. Most of the theory presented agrees with conventionally accepted biological and archaeological thought. Major differences to conventional thought are noted by the author, who usually notes his own bias and explains the rationale behind his departure from standard interpretation.

Part one investigates the evolutionary originals of primates and attempts to establish the most-likely evolutionary origin of modern humans. Additionally, our closest living biological relatives are considered. A variety of evidences are presented as support for the author's positions. Part one also considers the unique event or series of events, which the author terms "the great leap forward," which caused modern humans to diverge so notably from other closely-related primates.

Part two investigates several aspects of modern humans that are biologically peculiar - the topics included are particularly intriguing. The dominant theme of the section is, naturally, sex, and topics include the evolution of human sexuality, the science of adultery, the possible processes by which humans select reproductive partners, and an engaging overview of the theory of sexual selection. A variety of evidences from a wide range of fields of study are presented. The section concludes with a consideration of why organisms experience senescence.

Part three considers four areas of humanity that are generally considered unique to *H. sapiens*. The author presents human language, art, agriculture, and destructive drug use as behaviors that are typically considered uniquely human. However, examples of all of these behaviors are then noted within the animal kingdom, and the author concludes that humans are unique with these behaviors only in degree. The section concludes with an out-of-place consideration of the likelihood of finding extra-terrestrial intelligent life.

Part four considers the advent of human conquest of the globe. It begins with a particularly compelling review of "first contact" between explorers and previously isolated populations and then considers the aspects of some cultures which have enabled them to dominate other cultures in politics and warfare. The methodology utilized is credible and presents a feasible worldview stripped of most political ideologies. The section coalesces most of the principle theses of the text.

Part five concludes the text by considering the likely future of *H. sapiens*, including an analysis of our impact on the global ecology. The section includes a catalogue of genocides and a litany of environmental destruction and political conquests and is notably pessimistic about the immediate and long-term future. The epilogue presents a concise summation of the text and a continuation of the relatively negative view of the future developed in part five.

The text concludes with a very useful and lengthy section of further readings. The citations clearly indicate the sources from whence much of the text was derived. A perusal of the list allows a directed investigation into personally interesting areas and should be consulted throughout the reading of the text for possible sources of expanded and additional information.

Chapter 1, A Tale of Three Chimps

Chapter 1, A Tale of Three Chimps Summary and Analysis

In Chapter 1, the species *Homo sapiens* (humans) is compared and contrasted to *Pan troglodytes* (chimpanzees). The author rapidly presents several broad areas of research, which suggest that chimps are the closest living relative to humans. Both are mammals and share numerous physiologically similar traits. Recently, molecular data obtained from DNA hybridization suggests that humans, chimpanzees, and gorilla (*Gorilla gorilla*) are all very closely genetically related.

The chimp species (*Pan troglodytes*) shares 99.3 percent of its DNA in common with the pygmy chimp species (*Pan paniscus*). Both chimp species share 98.4 percent of their DNA in common with humans. Both chimps and humans share 97.7 percent of their DNA in common with the gorilla species. Worded another way, chimps vary from pygmy chimps by a mere .7 percent of their DNA; all chimps vary from humans by merely 1.6 percent of their DNA; and chimps and humans vary from gorillas by merely 2.3 percent of their DNA.

The author presents a phylogenetic clade of the hominids which shows chimps, humans, and gorillas breaking off from the remaining higher primates c. 15 millions of years ago; gorillas then separate c. 10 millions of years ago; humans separate c. 6 millions of years ago; and chimpanzees diverge from pygmy chimpanzees c. 2 millions of years ago. Put another way, the chimps' closest living relatives are humans, not gorillas.

The author then argues that humans and chimps should properly be considered to be two species within a single genus; as *Homo* precedes *Pan* in the nomenclature, the author suggests chimps be reclassified as *Homo troglodytes* and, presumably, *Homo paniscus*. The chapter concludes with an ethical discussion about the implications of classifying chimps as *Homo*.

The chapter attempts to establish that humans and chimps are biologically and genetically closely related. The evidence presented is heavily summarized and fairly simplified and the reader is directed to the text's "further reading" section for references to the scientific literature. Various methods are used, including physiology, traditional phylogenies, and newer cladistic analyses based on DNA hybridization studies. The chapter establishes that all of the higher primates are closely related genetically and that the genetic difference between humans and chimps is less than the difference between other pairs of organisms usually considered closely related, such as the red-eyed and white-eyed vireos. The author does not suggest that humans and chimps are qualitatively similar - indeed, he repeatedly points out that there is a vast gap between human behavior and chimp behavior - instead, he limits the investigation to molecular biology results.

The textual suggestion of chimp reclassification to *Homo troglodytes* is not fully justified by the evidence presented. Indeed, a fully mature biological literature and complete investigation spanning hundreds of years exists which conforms to the general consensus of *Pan* as appropriate for chimps. The subsequent textual utilization of an unqualified *Homo troglodytes* nomenclature is unfortunate and grasping and detracts from the chapter's otherwise consistent and developed thesis.

The conclusion of the chapter deals with the ethical implications of human and chimp relatedness. If chimps are indeed the closest living relatives to humans, should that not afford them some superior ethical consideration? They author asks if it is truly acceptable, for example, to use chimps in lethal medical experimentation and questions the human-centric division of humans from all other animals.

Chapter 2, The Great Leap Forward

Chapter 2, The Great Leap Forward Summary and Analysis

Chapter 2 presents a brief overview of human evolution. The author presents a greatly simplified view of the human evolutionary process where numerous uncertain elements are noted but dismissed. This allows a fairly straightforward presentation of human evolution in an intelligible and accessible format. The author states his bias and assumptions for most areas that are presented.

About four millions of years ago the first proto-human hominids began to walk upright; this is known from skeletal limb changes discovered in the fossil record. About three millions of years ago a great division in the human lineage occurred when two species, *Australopithecus africanus* and *A. robustus*, arose and survived contemporaneously for many tens of thousands of years. Eventually *A. robustus* became extinct and *A. africanus* gave rise to *Homo habilis*, the first commonly accepted *Homo* species. From three million to about 1.7 million years ago, the *A. africanus*-to-*H. habilis* evolutionary trend continued and eventually produced *H. erectus* (*H. erectus* was not the first upright hominid but bears the appellation because it was the first upright hominid discovered). Around 500,000 years ago, *H. erectus* appears to have given rise to the first modern *H. sapiens*.

About 200,000 years ago, *H. sapiens* appears to have diverged into two distinct lineages usually known as Neanderthals and "modern" man. The author again notes numerous uncertainties and unknowns in the fossil record and the evolution of early hominids, but notes that the general process described in the text is commonly accepted as factual and is not controversial within the scientific community.

The Neanderthals were a heavily built and physically powerful race with a very large brain case. Their society was nevertheless marked by a peculiar lack of innovation; that is, Neanderthal culture shows no variability over vast geological areas and enormous time spans. Neanderthals apparently mastered fire and used simple stone tools; the author disputes that Neanderthals were effective hunters and marshals evidence that they were predominantly plant-eating gatherers and opportunists.

Somewhat less than 100,000 years ago the Neanderthals vanished and were replaced by an advanced and fully modern form of *H. sapiens* usually referred to as Cro-Magnon man. Cro-Magnons were gracile and lightly built as contrasted to Neanderthals; they nevertheless dominated the landscape because of their advanced tools and innovative thinking and behavior. The author speculates about the demise of Neanderthals and concludes that they were probably displaced by Cro-Magnons who may have hunted them for food. About 60,000 years ago, fully modern man arrived and began a rapid proliferation of technology and culture that continues until the present. The author refers to the advent of modern creative man as "The Great Leap Forward" and speculates that

the defining characteristic of The Great Leap Forward was not upright posture, fire use, or tool use - but was rather engendered by the emergence of physical characteristics which allow for precise speech. Thus, spoken articulate language is the defining characteristic of the modern human's ascendancy.

The chapter recapitulates human evolutionary history from the earliest upright hominids to modern humans. The view presented is stripped of all controversial or poorly understood elements and is a conventional and widely accepted view of human evolution. Sufficient fossil remains have been found worldwide to ensure that the process presented is correct in broad outline and general timeline, though of course further refinement will continue.

When the author makes assertions that are not generally accepted, he notes his bias. For example, the author feels that Neanderthals were displaced by a technologically superior Cro-Magnon culture. He points to modern displacements of indigenous peoples by technologically superior aliens as evidence, and surmises that Neanderthal-Cro-Magnon interbreeding would have been unlikely. Interestingly, the author assumes that no Cro-Magnon male would find a Neanderthal female physically attractive but does not wonder what the females would have thought. In any event, the fossil record suggests that interbreeding - if it did occur - was not successful or significant.

The author introduces the biological species concept, proposed by Ernst Mayr as a teaching tool, as the *de facto* biological definition of species. This is a significant mistake in the text because as all evolutionary scientists are well aware, the biological species concept is extremely limited in application and is not particularly useful when discussing fossil or extinct species. It is therefore curious that the author refers to it in principle, if not name, and then confusingly concludes that Neanderthal-Cro-Magnon interbreeding did not occur within what he correctly characterizes as two forms of a single species. Nevertheless, the point is a minor one within a chapter that establishes a broad and correct outline for human evolution, and is used as the foundation for much of the remainder of the text.

Chapter 3, The Evolution of Human Sexuality

Chapter 3, The Evolution of Human Sexuality Summary and Analysis

Human sexuality is an unusually developed trait for primates as it is largely divorced from reproduction; most primates engage in sexual activity only to procreate. Additionally, our social structure is strange for a primate - most monogamous primates live as isolated pairs while most social primates engage in polygyny or are flagrantly promiscuous. Humans are unique among primates in being both social and monogamous. The pair bonding found among humans is probably due to the inordinately high burden of childcare found within human societies. Children mature slowly and demand an enormous amount of physical care and cultural education - these processes demand two parents. The author notes that humans are not distinct in any trait, but are only distinct by degree in some traits - that is, any human trait can be found among other animals but not to the degree exhibited by humans.

The study of testis and penis size among primates is interesting and instructive. Primates with large testes mate frequently while those with small testes mate infrequently. Chimpanzees have testes that average four ounces, humans average 1.5 ounces, orangutans and gorillas average less than 1.5 ounces - this corresponds nearly exactly with the frequency of sexual intercourse among the species and suggests that humans mate more frequently than gorillas but less frequently than chimpanzees. The issue of penis length is more complicated, however - the average chimpanzee penis measures 3" when erect, humans average an erect penis of 5", and the average gorilla penis measures 1.25" when erect; obviously penis size does not correspond to frequency of sexual intercourse. The author considers several theories regarding the relatively large human penis and concludes that the human penis is largely used for male-male display where a large penis is akin to a demonstration of masculinity and power directed toward other males.

The author considers the basic relationship between male-female body size discrepancy and mating habit. There is a strong correlation between sexual size dimorphism and polygamy such that in species in which the males are much larger than the females, polygamy is normal - while in monogamous species males and females are usually the same size. This indicates that humans should be largely monogamous with a slight tendency toward polygamy.

The author then considers the nearly uniquely human feature of hidden estrus. In nearly all other species, females signal their receptiveness by obvious physical displays. For example, in most primates, sexually receptive females - females currently capable of conception - exhibit brightly colored and swollen genitalia. On the other hand, human females rarely even know themselves when they are receptive. This means that sexual

intercourse in humans infrequently leads to conception; that is, human sex is designed to be relatively inefficient. The author considers numerous theories which purport to explain the reason behind hidden estrus and then presents a somewhat synthesized theory which argues that hidden estrus reinforces monogamy by ensuring a constant repetition of the sex act between dedicated reproductive partners which serves as a type of social cement.

The chapter considers several facets of human sexuality that vary from well-established norms in the primates. The chapter suffers from being unable to present any hard evidence based on scientific investigation; instead, nearly all of the theories provided rely heavily on either logical reasoning or on the results of studies conducted on animals suggested as substantively correct when also applied to humans. As the author notes, this is of course the only suitable method of investigation because human sex practices cannot be experimented upon with the same scientific rigor as animals' sex practices.

The sexuality of primates is first considered with a consideration of the relative penis and testis size of humans and great apes; the conclusion is that humans should, and do, engage in frequent sexual intercourse and that the relatively large human penis is used solely for male-male competitive displays. A theory of sexual dimorphism is presented and discussed; the conclusion is that humans should be relatively but not exclusively monogamous because human males are slightly larger in physical stature than females.

The nearly uniquely human trait of hidden estrus is then considered in significant detail. Hidden estrus ensures that the human sex act is not particularly effective - that is, most sexual intercourse within a monogamous pair does not result in pregnancy. The author theorizes that this ensures mated pairs remain relatively monogamous even though they live in social groups composed of numerous mating individuals. This synthesized theory also relies on the observed social structures of other primates where social groups are generally polygamous or promiscuous, and where monogamous primates usually live as solitary pairs. The unique situation of humans being monogamous and social has resulted in hidden estrus to maintain constant monogamous sexual unions that serve as a form of social cement. The hidden nature of estrus also presumably prevents advertising females from creating inter-group male-male rivalry between males competing for access to sexually receptive females.

Chapter 4, The Science of Adultery

Chapter 4, The Science of Adultery Summary and Analysis

Several scientifically rigorous genetic investigations of large populations conclusively demonstrate that roughly 10 percent of human children are not the genetic children of the male parent whom assumes genetic relatedness - in other words, about 10 percent of children are not genetically related to their putative "biological" father; thus, secretive extra-marital sexual unions are in fact exceptionally common among couples who self-identify as exclusively monogamous. Many of these scientific studies were never published because their conclusions were deemed too inflammatory.

For evolutionary reasons, extra-marital sex is approached differently by men than by women. Men can supposedly enjoy extra-marital sex with a minimum of consequences because an impregnated secondary sexual partner can simply be abandoned. On the other hand, women must be highly selective in extra-marital sexual partners to avoid compromise or disclosure. These differing goals are considered by using game theory where activities are abstracted into a stereotyped "game" and resulting scores are compared: if the game is a valid encapsulation of the real-world paradigm, the most successful game score should be the real-world strategy produced by evolutionary processes. In addition to game theory, the disparate goals in sexuality between sexes have been extensively investigated in animal species.

The author concludes that individual humans should adopt the sexual strategy that maximizes their individual reproductive success - this is completely consistent with the standard accepted theory of evolution by means of natural selection. The author once again considers the different reasons for engaging in extra-marital sex and the putative rationale explaining why men, more than women, enjoy less discriminating extra-marital sexual encounters. This purely biological viewpoint is complicated enormously by numerous asymmetrical social constructions; most notably, disparity between the legal consequences for men and women engaging in adulterous relationships. Culture therefore enormously complicates any relatively straightforward interpretation of the notion of biological fitness.

The chapter covers the biological and evolutionary underpinnings of modern theories of adultery. Of course, such an area of investigation is guaranteed to be controversial and often inflammatory. The author nevertheless presents his opinions in a concise and straightforward manner and attempts to back up the presented ideas with solid scientific evidence. However, directly manipulated scientific investigation of human extra-marital sexual practices is not only impossible but also illegal. The author must therefore rely upon a huge amount of deductive reasoning coupled with observed social phenomena and scientific studies of non-human organisms. This, unfortunately, weakens the proposed theories because they must remain simply untested hypotheses, but the

author's reasoning is clearly demonstrated and may be accepted, modified, or rejected, as the reader prefers.

The chapter is introduced with the factual but salacious statement that fully ten percent of children in the United States of America would be considered "illegitimate" if their true parenthood were to be established. This figure is derived from several scientific studies based on blood-type analysis or genetic-relatedness analysis coupled with subject interviews. The inescapable conclusion is that females engage in extra-marital affairs at a far higher rate than simply 10 percent; the author estimates perhaps three times this amount would be reasonable. Thus, roughly one-third of all self-identified monogamous women engage in secretive polyandrous sexual behavior and the implication derived from the chapter is that even more - perhaps one half - of all self-identified monogamous men engage in secretive polygynous sexual behavior. This conclusion correlates well with the various theories examined in Chapter 3 regarding the human life cycle.

The discussion of "game theory" is concise but intuitive and applies well to the subject being investigated. The author's strange-sounding various alternative possible strategies are insightful and serve well to illustrate standard human practices. The chapter concludes with the note that culture and society vastly complicate the idea of extra-marital sex; unfortunately, the author does not pursue this interesting and critical topic beyond the briefest mention, although he does provide additional external resources in the text's Further Readings section.

Chapter 5, How We Pick Our Mates and Sex Partners

Chapter 5, How We Pick Our Mates and Sex Partners Summary and Analysis

Chapter 5 begins by examining some primate methods of mate selection; gibbons - monogamous and solitary - are highly selective while chimpanzees - promiscuously polygamous and social - are non-selective. Humans are highly selective across an array of traits. Individuals find others sexual attractive to varying degrees and ideals of beauty vary enormously from culture to culture and even between individuals within the same culture, yet there are clearly ideals of beauty which are clearly established.

Various studies of sexual attractiveness in animals are briefly considered; human studies must rely on subjective interviews or careful examination of secondary effects. One of the most instructive avenues of investigation in human sexual attraction involves performing statistical analysis on observable measurements taken from large groups of mated humans. One of the most intriguing results of this analysis is the observation of correlation coefficients.

Some traits are extremely highly correlated to sexual attractiveness - these traits have a coefficient of correlation of approximately +0.9 and include religion, ethnic background, race, socioeconomic status, age, and political views. That is to say that, for example, given one individual's age, that individual's mate's age could be generally predicted with a very high degree of certainty.

Other traits are highly correlated to sexual attractiveness - these traits have a coefficient of correlation of approximately +0.4 and include measures of personality and measures of intelligence. Therefore, individuals strongly tend to find other individuals with a similar intellectual attractiveness.

A final set of traits is clearly correlated to sexual attractiveness - this set includes traits have a coefficient of correlation of approximately +0.2 and includes nearly all physical traits. That is to say, individuals tend to be attracted to physical traits that most closely approximate their own. For example, tall people tend to be attracted to tall people, while people with blue eyes tend to find blue eyes most attractive. This essentially indicates, "like marries like"; in other words, individuals are attracted to other people who look like themselves. Some seemingly bizarre physical traits have an astounding degree of correlation. For example, the length of the index finger has a startling correlation coefficient of +0.61 - yet "middle-finger length" would seldom, if ever, be cited as a principle physically desirable trait possessed by one's sexual partner.

The author reasons "like marries like" due to childhood imprinting. Various animal studies and collated evidence are presented to support the idea that humans derive

their ideals of sexual attractiveness by imprinting as infants. Thus, one's parents, siblings, and others associated with when one is an infant determine one's ideals of sexual attractiveness; beauty is in the eye of the beholder.

The chapter presents an interesting question - why are we attracted to certain physical types that are not universally "sexy"? The author presents the risible so-called "buxom redhead" theory: while many American men find buxom redheads sexy, there are relatively few buxom redheaded women - shouldn't physical beauty closely match social ideals of beauty? The text then presents a large amount of raw data along with studies conducted on non-human animals, principally birds, to arrive at a synthesized theory of human imprinting. In short, the text proposes that as infants grow up and are socialized they derive their ideals of beauty from the humans that surround them - principally their oppositely gendered parent and siblings. Thus imprinted, our ideals of beauty are not particularly based on physiologically useful traits but on locally common traits.

Since most individuals tend to grow up within demographically distinct populations, most individuals also tend to marry within their demographically distinct population. This accounts for the very tightly correlated facets of attractiveness such as religion, political views, and race. Additionally, individuals tend to marry others with roughly equivalent intelligence and personality. Finally, individuals usually seek out mates who are generally physically similar. An exact fit in all of these details is clearly not possible, however, so sexual attractiveness involves a complex evaluation of many disparate facts that explains why some obese people marry very thin people, etc., or why a woman with a short index finger may find herself in a long-term relationship with a man with a particularly long index finger. The author notes that mate selection is not a simple selection of finding one's ideally attractive mate and claiming him or her. Instead, a complex negotiation ensues and, generally, both individuals must find each other roughly equally attractive. In cultures where marriages are arranged these correlations may not apply - yet in these cultures the selection of extra-marital lovers does, indeed, follow the same general rules as elsewhere. The chapter also includes a note regarding the nearly universal social taboo of incest; thus, the most attractive individual is a close physical duplicate but not "too close".

The theory provided suffers from several notable problems. First, ideals of physical attractiveness greatly change over time. Most 14-16 year olds consider oppositely gendered 14-16 year olds incredibly sexually attractive but only a vanishing small percentage of 34-36 year olds find oppositely gendered 14-16 year olds sexually attractive (and those few who do are usually considered mentally deranged by society at large). If traits of attractiveness are truly imprinted, they should not vary so significantly due to experience and age. Similarly, fads and trends of sexuality and sexually alluring display vary considerably every several years, and an imprinted suite of ideals would not suggest that such fluctuation should occur. Second, as an infant, one is most likely surrounded by oppositely gendered siblings who are also infants. Thus, if one's ideals of physical attractiveness were imprinted primarily by one's siblings, then relatively few women should find facial hair or bulky muscles attractive in males and relatively few men should find long legs and large breasts attractive in females - such is manifestly not the case.

Chapter 6, Sexual Selection, and the Origin of Human Races

Chapter 6, Sexual Selection, and the Origin of Human Races Summary and Analysis

It is evident that the human race is often strongly associated with geographic dispersion. Race is a fundamental aspect of humanity and in general is easy to determine even by non-experts. Some racial traits appear to be loosely correlated with environment and offer some survival benefit, but most racial traits do not appear to have any meaningful influence on environmental fitness.

Charles Darwin realized that many organisms possessed traits that do not appear to give any survival benefit; in fact, many traits are apparently adverse to survival. Clearly, natural selection could not explain these traits. Darwin offered the theory of sexual selection to explain these traits. In brief, if mating individuals of one sex show a strong predilection for a particular trait in members of the opposite sex, that trait will enable the bearer to reproduce more often and thus will increase in frequency throughout the generations. The typical example of the results of sexual selection is the colorful but not -particularly useful tail of the male peacock. Males with enormous brightly colored tails would seem to be at a survival disadvantage. Yet, female peacocks find the male's tails sexually appealing and usually mate with the males with the largest and brightest display. Thus, a male peacock with a large, bright tail will often pass along his genes for a large, bright tail, even though the large, bright tail may not be useful for survival. Meanwhile, a male peacock with a small, dull tail may survive well but will not often breed.

Race appears to have many of the hallmarks of traits derived primarily through sexual selection, and there is strong evidence suggesting that race is a very old characteristic of modern humans. Referring to the Chapter 5 analysis of the formulation of sexual attractiveness standards through imprinting, the author suggests that race results from infant imprinting on a suite of racially distinct physical traits that, in later life, strongly reinforce the individual's preference to mate with racially distinct partners. Since members of a given race tend to mate within their race (as pointed out in Chapter 4, the correlation coefficient of same-race mating is a staggeringly high +0.9), races tend to remain established and distinct - due to sexual selection. Several examples of race-preference in mating are given for individuals who grew up surrounded by members of a race different from their genetic race. For example, Japanese girls who grew up with Caucasian families tend to find Caucasian men attractive, while Japanese girls who grew up with Japanese families find Japanese men attractive. Thus, race is proposed to be a self-sustaining mating preference where racial traits are favored by racial bias, and the two components of preference and trait are constantly reinforced.

Any investigation of racial genetics is bound to be controversial and inflammatory, as the author distinctly states in the introductory paragraphs of this chapter. The text is presented in a largely racially independent manner, however, such that no race is indicated as being superior. Instead, race is defined as a characteristic suite of observable phenotypic variation that is distinct only as compared to another race's characteristic suite of the same observable phenotypic character. The chapter is only intelligible when based on a reading of Chapter 5; the author's theory of sexual attractiveness coupled with the biological theory of sexual selection is indeed sufficient to explain the observable phenomenon of geographically correlated distribution of race. Since the vast majority of all mated pairs of humans select a member of their own race with which to reproduce, the distinctive traits of that race are perpetuated. The reason most individuals choose to mate with members of their own race is suggested to be due to imprinting at an early age. Although once again no rigorous scientific analysis of the issue is available, the author does present anecdotal evidence that one's preferred mating partner is not of one's own genetic race, but rather mating partners of the race of the individuals with whom an infant grew up - usually the infant's own race, of course.

Chapter 7, Why Do We Grow Old and Die?

Chapter 7, Why Do We Grow Old and Die? Summary and Analysis

All animals age and eventually die. All humans age and die as an inevitable and inescapable process of life. Numerous scientific approaches to aging have been proposed and numerous theories have been suggested, but they all fall short of providing a suitable holistic answer to the problem. Instead, the author argues that the life span of humans should be viewed as the result of a series of trade-offs whereby an optimal organism is designed given many constraints. The author derives clues from observing how much energy several species invest in self-repair and concludes that longer-lived species put more energy into self-repair and less energy into reproduction over a given time period, thus optimizing their long-term survival probability.

It is easy to imagine how a human could be maximized in a few particular traits - that is, the fastest person, or the most reproductive person. However, such a maximized set of traits would not result in an optimal overall organism. An optimal organism is balanced because a few maximized parts do not create an optimal organism. Thus, some organisms can regenerate severed limbs but humans cannot. The author suggests this is because humans are simply not likely to experience survival after having a limb severed and thus the expense of maintaining limb-regeneration capability would rob energy and resources from other, more significant, capabilities that are more likely to be needed.

Human females are nearly unique among animals in menopause - nearly every other animal, including all other primates, dies shortly after ceasing reproduction. Indeed, there appears to be little selective advantage to surviving beyond reproductive ability. Humans, however, are unique because child rearing is such an unusually lengthy process, typically spanning many years. Every reproductive event for a human female is fraught with danger, and as a given individual ages, the process of childbirth becomes progressively more dangerous. If a woman continued to deliver children as frequently as possible until death, her death would nearly positively result from childbirth and many of her most-recent children would be unable to survive without her parenting. It is therefore a superior strategy - for women - to cease reproductive activity once several children are born. She thereby avoids the risk of death in childbirth and greatly increases her chances of continued survival to provide child-rearing services to her existing children. Since reproduction is not dangerous, *per se*, for men there is no parallel process in men. Instead, man typically remain reproductive through old age and death, showing only gradual reduction in reproductive ability which is demonstrated by virtually all other animals.

The author concludes with a synthesis of the theories presented and argues that aging does not have a single cause; instead, all systems within a given organism are designed to wear out at essentially the same time - this is optimal design based on trade-offs imposed by various constraints.

Theories of ageing are common and generally focus on a single cause. Many researchers apparently feel that ageing can be solved like a disease and that one day a single monolithic "cure" for ageing will be discovered. The author argues that ageing is more appropriately understood as a confluence of numerous effects resulting from design decisions made during the evolution of animals. All organisms must survive with a very limited number of resources and these finite resources must be used not only to survive but also to reproduce. Thus, some organisms, such as mice, are designed to reproduce frequently and copiously but live briefly, while other organisms, such as humans, are designed to survive for prolonged periods but reproduce in rather limited numbers. For example, during a human's generational time perhaps sixty or more mouse generations will pass. This does not suggest that one design is inherently superior to another design - only that all designs that persist must be optimal designs and, in fact, are optimal designs by very definition.

The discussion of menopause is interesting but, of course, ultimately remains as simply theory as it cannot be tested. The argument presented is that a woman who has children until she dies will be less optimally designed than a woman who lives for a prolonged period beyond the birth of her ultimate child. This, presumably, is because a woman's children would not survive without her and thus upon the mother's death any non-adult infants would be wasted reproductive effort. The requirement of maternal care is not unique among humans but is found in an extreme degree in humans - for example, most other primates are essentially self-sustaining adults as soon as they are weaned; human children remain highly dependent for many years beyond weaning. Thus, evolution favors menopause in women because it assures they will stop reproducing yet will probably live long enough to care for their existing children. This theory requires, of course, that childbirth be particularly dangerous for women - and such is indeed historically the case. Death of the mother in childbirth is exceptionally rare in all non-human primates but is an unfortunately common occurrence in humans.

Chapter 8, Bridges to Human Language

Chapter 8, Bridges to Human Language Summary and Analysis

Language is considered by most scientists to be uniquely human - humans use language, animals do not. The author considers this common bias from an evolutionary perspective and largely rejects the premise that language is unique to humans. Many animals and most mammals use vocalizations; clearly, they convey some sense of meaning. Vervet monkeys have been studied in detail and have been found to have a rudimentary suite of vocalizations that can be classified as a type of grammar-less word; ten individual words have been identified. A few captive gorillas and chimpanzees have been taught to use various non-vocal systems to communicate with sign or symbol languages. Thus, the author argues that language is not unique to humans, though humans clearly employ it to a degree that is unique.

Human language is incredibly complex, with numerous rules and subtleties that are easily mastered by infants. The complexity of language predates any known writing system; the first writing systems recorded a fully matured language. Some linguists have convincingly argued that the complexity of language demands a biologically pre-determined capability for language. In other words, human infants learn language because they possess biological linguistic adaptations. No animal communication system approached human language, but the gap between animal vocalizations and human language is not as great as is commonly believed.

Many animals utilize complex vocalizations that confer established meaning; many vocalizations among groups of the same species vary significantly from group to group, indicating that they are a learned suite of sounds. Several researchers have focused on the vocalizations of wild vervet monkeys and have demonstrated that vervets use at least ten distinct sounds to convey specific meanings. In other laboratory experiments, gorillas and chimpanzees have been taught artificial or symbolic languages containing hundreds of words.

The most rudimentary human languages are termed pidgins or creoles. Whenever two groups with disparate developed languages come into occasional contact that, for social reasons, precludes the use of one or the other languages, a new rudimentary communication system usually arises. These rudimentary languages are known as "pidgin" languages. If pidgin languages persist and become more widely adopted they usually continue to evolve into a basic but grammatical language known as a "creole." Linguists have noted that most creoles possess very similar grammatical rules even though they were developed by disparate cultures throughout history.

The author considers the mal-named "pidgin English" of New Guinea - actually a creole and more appropriately known as Neo-Melanesian. It originally arose from the need for European traders to communicate with natives who spoke an enormous number of local

languages. Today, Neo-Melanesian is widely used and can express nearly any idea. The study of Neo-Melanesian, other creoles, and pidgins has allowed linguists to speculate on the rudimentary human origins of modern languages.

Linguistic theory suggests that the first step toward a language is the use of a single word to represent a concrete real-world item. Then two words are used to convey a more complex meaning about real-world items. Then multiple words are used without specific order to express meanings that are even more complex. Animals have been demonstrated to be capable of single, double, and multiple-word communications. The next step in the development of language involves the development of basic patterns of multi-word construction - that is, rudimentary rules about word order. This step is what distinguishes pidgins from non-languages. Next, the ability to refer to external referents, which are not real-world items, is added. That is, abstract ideas can be discussed and various words that are solely linguistic in meaning are created. This step distinguishes creoles from pidgins. Finally, a complex and rules-based grammar evolves and this final step separates fully realized language from creoles.

The chapter suggests that languages - commonly considered uniquely human - are not unique within humans except to the degree in which they have been developed. Numerous animal studies are summarized which demonstrate that some animals, in fact, do use complex vocalizations to convey concrete and specific meaning. For example, the vervet monkey uses a singularly distinctive call to warn about the presence of a predatory feline and another distinctive call to warn about the presence of a predatory bird. A second topic investigated in the chapter is that of rudimentary human languages such as pidgins and creoles. The author demonstrates that the gap separating animal vocalizations and human languages is not as great as is commonly believed. The author then suggests that the evolutionary event that made possible the so-called Great Leap Forward in human evolution was the appearance of the ability of humans to establish basic patterns of speech, utilize external referents, and thereby develop complex grammars. Since the earliest known writings record languages that are fully modern, the ability to speak complex languages clearly significantly predates written languages.

Chapter 9, Animal Origins of Art

Chapter 9, Animal Origins of Art Summary and Analysis

Art is generally considered uniquely human, but the very definition of art is somewhat vague. To qualify an object as art, the author suggests that it must fulfill three qualities - it must be non-utilitarian (that is, serve no survival function); it must be used primarily for aesthetic pleasure; and it must be transmitted by learning and not genetics. With this definition, does art remain uniquely human?

The artistic endeavors of several chimpanzees and an elephant are presented and considered. The art produced was determined by professional artists to be of high artistic value, and the animal art has sold consistently - yet it is completely non-utilitarian. Thus, the first criterion is not uniquely human.

Bower birds are a group of smallish birds in New Guinea that build bowers - fairly large houses - and decorate them with various artistic flourishes. The bowers are built by males and allow them to attract females for mating, and they can be quite large - up to several feet in diameter. Although the bowers are utilitarian displays of genetic fitness, their design is not under genetic control. Adolescent bower bird males watch older males build bowers and learn construction methods and decorative processes from the prior generation. Because of this, bowers vary considerable over the geographic range of a given species. Thus, the third criterion is not uniquely human.

The author dismisses the second criterion as being unanswerable and therefore not applicable to the debate. Thus, various animals satisfy the demands of art - simply not within a given species. The author concludes that although art does indeed appear to be uniquely human in advanced form, the roots of artistic endeavor are not distinctly human.

The chapter considers whether art can be considered a uniquely human endeavor. The chapter has a somewhat peculiar construction; the author presents three hallmarks of art but subsequently dismisses one of them as unanswerable leaving only two criteria for the definition of art. The author then provides several examples of animals that satisfy one of the criterion and several examples of animals that satisfy the other criterion - but the fusion of the two is stated to remain an essentially human condition.

The chapter includes several anecdotes regarding well-respected art critics' evaluations of animal-produced pieces of art without knowing that the artist was in fact non-human. In many cases, the critics deemed the art to be of superior quality. The process is repeated with psychologists who deem the artists to suffer from several neuroses. It is interesting that in all cases the professionals always correctly determined the biological sex of the animal artists.

Chapter 10, Agriculture's Mixed Blessings

Chapter 10, Agriculture's Mixed Blessings Summary and Analysis

Agriculture is nearly unique human but is a very recent innovation, being practiced first only 10,000 years ago. Several dozens of species of ants also practice agriculture by growing fungus gardens or herding aphids; the behavior of these ant species is incredible but does not approach human agriculture in diversity. No non-human primates demonstrate any predilection to agricultural practices.

The conventional wisdom suggests that pre-agricultural hunter-gatherer societies were crude organizations where individuals lived short, brutish, and violent lives. An analysis of today's few remaining hunter-gatherer societies does not suggest that the conventional wisdom is correct. Indeed, paleopathology investigations demonstrate conclusively that the health of the average pre-agricultural hunter-gatherer human was superior in nearly all respects to the health of an average early agricultural human. Various physical illnesses and social disease arise only with the advent of agriculture and rising population densities. Additionally, agriculture gave rise to class divisions with their unequal distribution of wealth as well as military organizations and warfare.

The author concludes that agriculture is a mixed blessing practiced by humans. Although there are undoubted benefits, they come with notable drawbacks. Even though today's societies will never revert to the hunter-gatherer lifestyle, agriculture is not the apparently golden solution for human survival.

The chapter suggests that agriculture, like other uniquely human traits, is unique to humans only by the degree to which it is practiced and not by its existence. The author spends a considerable amount of time detailing the agricultural pursuits of various ant species who conclusively demonstrate miniaturized agricultural lifestyles. The chapter then concludes with a rather lengthy critique of the agricultural lifestyle changes through the ages and argues that a hunter-gatherer lifestyle is in fact far healthier than an agricultural lifestyle.

Chapter 11, Why Do We Smoke, Drink, and Use Dangerous Drugs?

Chapter 11, Why Do We Smoke, Drink, and Use Dangerous Drugs? Summary and Analysis

Humans routinely use tobacco, drink alcohol, and become addicted to dangerous drugs. Drug abuse crosses all social and cultural boundaries and laws circumscribing alcohol consumption are among the oldest known legal declarations. Thus, smoking, drinking, and drug use are universal human traits - traits that are not shared by any other animal in such a flagrantly destructive manner.

However, many animals exhibit behaviors that seem dangerous. For example, when a gazelle discovers it is being stalked by a lion it does not immediately run away; instead, it engages in stotting, and only if the lion continues to stalk will the gazelle run away. The stotting behavior expends precious time and, at least theoretically, is dangerous. Biologists theorize that stotting is a behavior that allows the gazelle to communicate to the lion that it is aware of the lion and that it can easily escape capture. Thus, the lion does not bother to pursue the gazelle and the gazelle does not have to flee the lion. Such signals are rather common in the animal kingdom - but what prevents a slow or lame gazelle from "cheating" and stotting when it could not escape? Stotting is energetically expensive and not always effective - sometimes lions pursue stotting gazelles. If a gazelle were to "cheat," it would rapidly be caught and killed. Thus, stotting is generally immune from cheating. Most animals need rapid cheat-proof methods of determining a mate's genetic fitness.

In 1975, Amotz Zahavi proposed the handicap principle, which seeks to explain why some animals, such as peacocks, have physical features that so clearly appear to be counter-productive to survival. Zahavi theorized that a male peacock with a huge tail is demonstrating that even with such an obvious handicap it can survive and, therefore, has superior genetics. Female peacocks see the male peacock's tail as a cheat-proof signal that the male is evolutionarily fit. The author then applies Zahavi's theory to human tobacco, alcohol, and dangerous drug use, and suggests that the clearly deleterious and often dangerous behavior of drug use is engaged in as a form of deliberate handicap display. In other words, a man might take up smoking to demonstrate that even when smoking he possesses superior health.

The theory presented in this chapter seeks to explain human tobacco, alcohol, and drug abuse as a form of deliberate handicap. The author suggests that humans deliberately damage themselves to demonstrate their superior health and genetic fitness to potential mates. The argument is not convincing and seems fairly absurd, particularly since numerous other theories for tobacco, alcohol, and drug abuse exists which are manifestly more logical. For example, the text proposes that a man may consume large amounts of alcohol as a display of sexual prowess - even when intoxicated he claims to

be sexually adequate. It stretches credulity that females seeking mates would deliberately select a male who drinks heavily to be sexy. The author does admit that such a theory is not particularly convincing and suggests that perhaps drug abuse is an artifact of earlier human evolutionary trends - but this idea is not particularly developed. The author also suggests that animals do not engage in drug use although this is not accurate - several studies have demonstrated that some animals do indeed demonstrate an affinity for intoxication.

Chapter 12, Alone in a Crowded Universe

Chapter 12, Alone in a Crowded Universe Summary and Analysis

Exobiology is a theoretical pursuit that ponders the likely nature and possible existence of extra-terrestrial life and intelligence. So-called exobiologists have proposed the Green Bank formula, a mathematical process that putatively determines the number of intelligent species in the universe. The formula includes numerous factors, all of which are estimated. Not surprisingly, the Green Bank formula can predict that humans are the only intelligence in the universe or that there are billions of intelligent species in the universe depending upon the estimates used in the various factors; most Green Bank estimates indicate that extra-terrestrial life and intelligence should be plentiful.

The author offers a rather lengthy investigation of the woodpecker group of species, noting that all woodpecker traits are found plentifully in other bird species and yet all of the traits necessary to be a woodpecker have come together only once during evolution - all woodpecker species are descended from a common ancestral species. This is surprising because the woodpecker lifestyle is very advantageous; furthermore, vast areas of the world do not have indigenous woodpeckers. Thus, evolutionary convergence may not be as common as typically believed.

The author concludes the rather strange chapter by informally applying the woodpecker-derived estimates to the Green Bank formula to demonstrate that extra-terrestrial intelligence is probably highly unlikely - which coincides exactly with our attempts to observe any signs of extra-terrestrial life. The author suggests this is lucky, as human history indicates that technologically superior extra-terrestrial intelligences would probably be violent and oppressive.

This chapter deals with the rather strange and out-of-place topic of extra-terrestrial life and intelligence. Several questions and theories are proposed which are scientifically uninteresting, because manifestly, no testing can be performed and thus the scientific method cannot be applied. Instead, the chapter relies on presumably logical reasoning to determine that extra-terrestrial intelligence probably does not exist: if it does exist, it is probably very ephemeral, if it does persist it will never locate us, and if it does locate us it will probably be hostile and violent. Within the context of the scientifically grounded book this brief chapter is unconvincing and somewhat ridiculous.

Chapter 13, The Last First Contacts

Chapter 13, The Last First Contacts Summary and Analysis

First contacts involve the initial encounter between previously isolated native peoples with previously unknown external peoples who are nearly always more technologically advanced. First contacts usually involve the inability to communicate effectively due to language and cultural barriers and are frequently characterized by violence and misunderstanding. In nearly every historic case, the native people suffered dramatically following first contact.

One of the last major first contacts involved Richard Archbold's third expedition to New Guinea. In August 1938, the expedition finally reached the Grand Valley of New Guinea and discovered thousands of people known as the Dani. Until that day the Dani had considered themselves the only humans on the planet even though many native New Guinean tribes lived within just a few miles of the Dani. The inaccessible terrain and topography of New Guinea effectively isolated tiny groups for prolonged periods.

Like the Dani, most primitive humans evolved in isolated groups. Local languages and cultures arose with great degrees of variability and distinction. Only within modern time have large political states emerged which, usually forcibly, exported their language and culture to surrounding areas. Thus, even as agriculture has allowed more people to live it has notably decreased the number of languages spoken and caused a general decline in cultural variability.

Most of this chapter examines the peoples, languages, and cultures of New Guinea. Until very recently, most New Guinea peoples existed with so-called stone-age technology and in complete isolation from the remainder of the world. The author examines their enormous linguistic and cultural variability and proposes that most humans developed in very similar circumstances until the advent of widespread agriculture. Several notations of - to a modern reader - peculiar New Guinean cultural practices and sexual activities are included but not particularly detailed. Additional notes detailing the difficulties in exploring New Guinea make interesting reading. Given that New Guinea linguistic and culture variation is so great it is surprising that European variation is, by comparison, nearly insignificant.

Chapter 14, Accidental Conquerors

Chapter 14, Accidental Conquerors Summary and Analysis

Around 10,000 BCE the world's human population was approximately 10 million; today the human population easily exceeds five billion - a five-hundred-fold increase. This population explosion was enabled by agriculture and resulted in massive emigrations and displacements of native peoples. A huge amount of this expansion was conducted by European peoples, who displaced, for example, Native American and Native Australian populations. Europeans were enabled to pursue their conquests because they carried social diseases, had better technology, used advanced writing, and featured large-scale political organizations. These features arose in Europe for several geographical reasons and are not considered evidence of superiority in intelligence or capability.

European animals included numerous species of large-bodied herding animals, which were domesticated. Asia features several similar animal species. These animals performed work and revolutionized warfare. Similar domesticated animals did not occur in the Americas, Australia, or Southern Africa and in those areas, humans performed all manual labor.

Europe and Asia featured several plant species that were relatively easily converted into crop breeds, including cereals and grains. By contrast, the Americas featured only a rudimentary corn species, which was more difficult to farm and which resisted facile domestication. Thus, agriculture in the New World was significantly more rudimentary than agriculture in the Old World due to the crops available.

Finally, the principle geographic axis of the Old World is east-to-west while that of the Americas is north-to-south. Thus, the Old World features wide areas of similar climate and terrain over which early humans and agriculture could easily spread; in the New World, every significant migration involved a change in climate with resultant difficulties in agriculture.

The author concludes that European military dominance arose through a confluence of three fortunate external facts: superior animals for domestication, superior crops for agriculture, and superior biogeography for monolithic culture.

This chapter poses interesting questions - why did Europeans conquer the Americas? Why didn't Native Americans conquer Europe? The author answers by examining the factors that allowed the rise of the large political state in Europe and Asia, with its corresponding military organization. The conclusion is that Europeans were accidental conquerors, enabled to expand and displace other peoples not because of any inherent superiority but simply because of a unique confluence of fortunate biogeography. European and Asian agriculture was enabled by a large variety of wild plant species that

were relatively easily converted into reliable crops, and by a variety of large-bodied animals that were relatively easily domesticated. Thus, agriculture was enabled and powered by large animal strength. Conversely, in the Americas, agriculture yielded limited results and was powered by human strength, and in Australia, agriculture never gained a foothold.

Once agriculture was established it allowed the development of specialized artisans and craftsmen who developed technology and advanced writing systems. Agriculture also caused higher population densities with a resultant increase in contagious diseases. All of these developments traveled along the primary geographical axis of Eurasia along similar latitudes and terrains - allowing for rapid sharing of technology without adaptation to widely differing climates. Relatively few of these developments occurred in the Americas because of the limiting factors of corn-based agriculture and the lack of animal power.

Chapter 15, Horses, Hittites, and History

Chapter 15, Horses, Hittites, and History Summary and Analysis

Indo-European derived languages dominate the world. England, Spain, Portugal, France, and Russia all have actively spread their languages over the world. English, Spanish, Portuguese, French, and Russian are all derived from a common root language, which is generally referred to as Proto-Indo-European, or "PIE". The text presents a map of European linguistic dispersion and several tables listing comparative vocabularies from sample languages.

PIE has been somewhat reconstructed by linguists from glottochronology and an analysis of the oldest existing texts known. This reconstruction uses numerous data sources to corroborate the basic evidence and has resulted in several thousand "words" which are considered likely to be very similar to the original language. Various analyses put the initial use of PIE c. 4000 to 2000 BCE. PIE probably originated on the steppes slightly to the north of the land mass between the Black Sea and the Caspian Sea. The original PIE speakers swept outward in a wave of colonization enabled by newly discovered superior metallurgical technology and an increased use of large-bodied domesticated animals.

The chapter derives its somewhat unusual alliterative title by suggesting that horses were the principle animal, prevalent on the steppes, which allowed PIE speakers to rapidly colonize new areas of Europe and Asia. Hittites are noted as a great culture that spoke an early version of PIE - they are named in the Bible as a fearsome people; within recent times, the Hittite culture has been archaeologically confirmed. Finally, the chapter considers the sweep of history throughout Europe and Asia.

The bulk of the somewhat lengthy chapter is devoted to an analysis of PIE from a primarily linguistic point of view. The various methods of reconstructing PIE words are considered in summary, and a few PIE words - sheep and fart - are used as illustrative examples of how PIE words are thought to have spread with gradual modification. The chapter also considers a few languages that are known only from accidentally preserved written documents. The chapter's principle theme is the rather strange situation of having many major world languages derived from an ancient and originally very small and isolated area - and the various methods used in glottochronological investigations make interesting reading.

Chapter 16, In Black and White

Chapter 16, In Black and White Summary and Analysis

When European settlers first arrived in Tasmania, they found it inhabited by an estimated 5,000 black native inhabitants. Those inhabitants were entirely eliminated over several years by the process of genocide. Alarmingly, the Tasmanian genocide was looked upon as a successful process by many European inhabitants of Australia, some of whom argued that a similar genocide should be carried out upon the black native inhabitants of Australia.

Genocide is rather loosely defined as the mass killing of an identifiable demographic of people simply because of their demographic association. The text then provides three world maps that indicate the locations and times of various documented genocidal events occurring from 1492 through 1900, 1900 through 1950, and 1950 through 1990. Not all genocidal events are included in the maps and tables.

Genocide is thus established as an unfortunately common occurrence in human history. The text proposes four main motivating rationales which cause genocide: the desire of a technologically superior people to occupy and dominate the lands of a weaker people; a power struggle reaching a critical stage in a pluralistic society; scapegoat killings motivated by political means; or racial or religious persecutions.

As with many other seemingly uniquely human traits, genocide is uniquely human only in degree. Many, perhaps most, primate species engage in occasional murder, and murders have also been observed in several non-primate animal species. The text examines in considerable detail a documented series of events where one chimpanzee band engaged in the slow but systematic murder of all of the members of a neighboring chimpanzee band - the chimpanzee equivalent of genocide. Thus, genocide appears to be a firmly established component of our genetic heritage; we are apparently hard-wired with the "us" versus "them" ideology.

The chapter concludes with a historical analysis of the genocide of American Indians and how white Americans typically remember that genocidal event today. Various quotes from American presidents about American Indians are included. The author suggests that the risk of future genocidal events is extremely high but offers the hopeful realization that technology and media continue to eliminate the perceived boundaries between "us" and "them."

This chapter analyzes genocide: the targeted killing of individuals because of their association with an identifiable demographic. The text states that many experts consider genocide to involve the complicity of an official state bureaucracy but convincingly dismisses this requirement. The recounted genocidal events of Tasmania and the Americas serve as depressing examples of genocide and literally scores of other events are noted. A well-documented case of what might be termed "chimpanzee genocide" is

provided in considerable detail. The prolonged and repetitive effort, ultimately successful, of one band of chimpanzees to eliminate a neighboring band is chilling and can easily be anthropomorphized into human genocide.

The definition of genocide is considered at some length. Whether some events are considered genocide largely depends, of course, upon the definition selected. The text offers a typical definition but then convincingly disagrees with several particulars of that definition; unfortunately, the text does not offer its own internally consistent definitive definition; thus, when the use of atomic weapons upon Hiroshima is repeatedly referred to as genocide, the attribution does not appear convincing, and the bombing of Dresden is even less so. The process whereby history is re-written for convenience or matters of conscience makes particularly interesting reading and gives rise to many issues worthy of further consideration. The maps presented are likewise instructive.

Chapter 17, The Golden Age That Never Was

Chapter 17, The Golden Age That Never Was Summary and Analysis

A prevalent habit among modern peoples of all time is to look toward the distant past and imagine it as a sort of golden age where contemporaneous problems did not exist. Many suggest that today's societal ills could be eliminated by a return to a fondly remembered era of peace and environmental purity. Many imagine that humans living during these golden ages were somehow more in tune with nature and behaved with high moral and ethical standards as a sort of "noble savage." The archaeological and historic records suggest that these views are entirely incorrect.

A thorough archaeological investigation of New Zealand indicates that the first human settlers hunted local large fauna to extinction within a few dozen years. Numerous large endemic New Zealand species went extinct at the same time the area was initially colonized. Other species went extinct as they were out-competed by rats that accompanied the first human settlers. Other similar patterns of ecological disturbances are easily found in archaeological studies of Hawaii, Henderson Island, and Madagascar. Massive environmental destruction, including total deforestation, is relatively easily demonstrated on Easter Island, Chaco Canyon, and at Petra, an archaeological site in the Middle East.

Packrats and other small rodents build underground dens called middens. After the rodents die, the middens are often sealed and thus preserved for thousands of years. Middens are often packed with plant debris. Archaeologists can excavate middens and analyze their contents. Coupled with radiocarbon dating, this analysis allows for detailed and robust reconstructions of ancient environments.

Usually, new colonizers or rapid human migrations result in massive ecological damage. Some few, long-term, stationary cultures have developed ecologically responsible habits but the trend is not universal. As modern humans learn about the past, and use technology to predict the future, we should be making better decisions instead of continuing to destroy our environment.

This chapter presents a rather thorough case study of mass extinction of large-bodied animals occurring on New Zealand several thousand years ago. Although the issue is somewhat disputed, the author presents substantive and convincing evidence that the extinction was caused by the over-exploitation of their environment by humans. Several other examples are given in less detail, including analyses of Chaco Canyon, Petra, and Easter Island. The author also comments on current trends in New Guinea and the Solomon Islands.

The conclusions drawn are not comforting. Throughout human evolution, the arrival of *Homo sapiens* has generally heralded environmental over-exploitation through hunting and harvesting of resources at a rate far beyond which they could possibly be expected to be renewable. After a brief surge in population, the newly arrived humans completed their environmental degradation and suffered the consequences. For example, the Chaco Canyon civilization apparently deforested their local area, which proceeded to become xeric and untenable. Thus, a vast and greatly advanced civilization simply vanished. The text concludes that modern humans are well on our way to irrevocably poiling our environment: a bleak future is postulated.

Chapter 18, Blitzkrieg and Thanksgiving in the New World

Chapter 18, Blitzkrieg and Thanksgiving in the New World Summary and Analysis

About 11,000 years ago, humans first crossed the Bering Straights into Alaska and then spread south into North America. These peoples, referred to as the Clovis culture, used similar tools and their archaeological remains are widely distributed. Within about 1,000 years, they had colonized North and South America entirely in the single greatest range expansion of *Homo sapiens* ever to occur. In addition, roughly 11,000 years ago, 73 percent of North American and 80 percent of South American large animals went extinct. Then, very rapidly, the Clovis culture was quickly replaced by the Folsom culture, which specialized on hunting smaller animals and buffalo - the sole remaining abundant large mammal.

Although the reasons for the mass extinctions are somewhat debated, the most likely explanation is that they were hunted to extinction by the Clovis peoples in an event described as an environmental blitzkrieg. Several supporting theories are advanced: given easily achievable rates of reproduction and travel, the Clovis people could indeed have expanded from a few hundred to about ten million and spread from Alaska to the end of South America within 1,000 years. Their hunting styles, animal consumption rates, and hunting ability all demonstrate that they would easily be capable of wiping out existing large animals.

This chapter presents one of the more recent human-caused mass extinction events which have occurred on a large, continental, scale; that of the extinction of large-bodied North and South American animals due to over-hunting by the Clovis peoples. The author presents an overwhelming amount of evidence drawn from numerous disciplines that suggest humans were the cause of the extinction event. When added to the various smaller-scale events detailed in Chapter 17, it is evident that humans do not need advanced technology to cause enormous and deleterious changes in the global environment. In brief, the author theorizes that Clovis hunters specialized in ambushing and killing large animals in a local area until the animals became locally extinct. The hunters would then fan out into the surrounding area and continue their lifestyle. The depopulated areas would never recover, and within about 1,000 years, no large animals remained in the New World and the Clovis culture was rather abruptly replaced by the Folsom culture, one composed of peoples specializing in taking smaller game and looking forward to an agricultural existence.

Chapter 19, The Second Cloud

Chapter 19, The Second Cloud Summary and Analysis

Humanity faces two imminent risks to survival - nuclear holocaust and environmental holocaust. Nearly everyone realizes the risk of planetary destruction posed by massive nuclear stockpiles but the greater and more certain risk posed by environmental holocaust is argued and all-too-frequently dismissed.

The author suggests that perhaps 30 million species currently exist on earth, though only about 2 million have been scientifically enumerated. Extinction rates are alarming though exact numbers are probably impossible to calculate in most cases. It is relatively certain that 1 percent of North American birds have become extinct since 1600; archaeological evidence suggests that pre-historic humans were directly responsible for 80 percent of large-mammal extinctions in North and South America. Thus, human-caused extinction rates vary tremendously and can be exceptionally high.

Extinction is caused by four primary things: over-hunting and over-utilization; damage caused by human-introduced foreign species; habitat destruction; and ripple effects of the three previous causes. The author estimates that fully 50 percent of all species will be extinct or endangered by 2050. The text concludes by noting that we are in the midst of an environmental holocaust that will continue for decades and result in deteriorating quality of life and, possibly, an untenable environment.

This chapter concludes the text with a dire assessment of our future prospects. The author examines three main areas of species extinction. First considered are extinctions from 1600 to the present, next considered are pre-1600 human-caused extinctions. These initial two categories are not well-documented and the author does not present notable evidence to support his later dire predictions, beyond noting that at least 1 percent of bird species have been documented as going extinct since 1600 and offering some generalized and still-disputed archaeological evidence of prior extinctions. The third area of species extinction is offered as the author's prediction for the future where fully 50 percent of species are predicted to be extinct by 2050. Although this number roughly agrees with many predictions from other sources, it is unfortunate that the chapter does not substantiate the number with evidence beyond North American birds. The text is thus quite pessimistic about humanity's chances of long-term survival and about humans' effects on the environment and other species.

Epilogue: Nothing Learned, and Everything Forgotten?

Epilogue: Nothing Learned, and Everything Forgotten? Summary and Analysis

In the concise epilogue, the author recapitulates the major themes of the text and reiterates the major events of human evolution and cultural development. He concludes by noting that nuclear holocaust is possible and that environmental holocaust is not onlyprobable, but already underway. Several examples of positive change are noted, but the outlook for continued human survival is notably bleak.

The epilogue is very brief and consists almost entirely of a very brief recounting of the major themes and events described in the text - it reads almost as would an abstract of the book. The final paragraphs note a few somewhat encouraging examples of environmental preservation and attempts to slow or even reverse ecological destruction. Overall, the epilogue remains bleak in outlook and does not offer a particularly hopeful look toward the future.

Characters

Jared Diamond

Charles Darwin

Charles Sibley and Jon Ahlquist

Robert Seyfarth and Dorothy Cheney

Noam Chomsky

Amotz Zahavi

Richard Archbold

Atahualpa

Derek Bickerton

Julio Betencourt and Thomas Van Devender

Paul Martin

Objects/Places

The Great Leap Forward

The evolution of modern humans was characterized by a continuous and gradual change in physical adaptations to the environment including upright posture, opposable thumbs, and enlarged braincase. However all of these traits emerged before the qualities that make modern human essentially distinct: art, culture, language, and society. The author uses the term "The Great Leap Forward" to refer to the relatively short unknown event or series of events that changed pre-modern *Homo sapiens* to fully modern *H. sapiens*, and suggests that the physical refinement leading to the capacity for fully developed vocalizations and language is the most likely candidate. The Great Leap Forward happened 40,000 years ago and left its first unmistakable archeological evidence in Europe.

Correlation Coefficient

The correlation coefficient is a statistical measure of the interdependence of two variables. The coefficient ranges in value from -1 to +1; a value of -1 indicates a perfect negative correlation, a value of +1 indicates a perfect positive correlation, and a value of zero indicates an absence of correlation. Also called the coefficient of correlation, the statistic is used within the text to discuss various traits that appear to be related to sexual attraction between humans.

Natural Selection

Natural selection is the process by which individual organisms with favorable traits survive and reproduce more successfully than those with less favorable traits. Natural selection is able to function only upon entire organisms where only the heritable portion of a given trait will be passed along to offspring. Thus, favorable traits will tend to increase in frequency throughout successive generations. With sufficient time for numerous generations, this process results in adaptation and, eventually, speciation.

Sexual Selection

Sexual selection is the process by which individual organisms exhibit preference for mating partners with specific traits. This allows individuals of the opposite sex possessing certain traits to reproduce more successfully and frequently than those who do not have desirable traits. Many traits without obvious survival benefits are thought to be the result of sexual selection.

Handicap Principle

The handicap principle was first suggested in 1975 by Amotz Zahavi. The theory seeks to explain behaviors and physical characteristics that appear to reduce an organism's environmental fitness by suggesting that these behaviors or characteristics result from sexual selection and are used as a signal to demonstrate superior fitness; that is, if an organism can survive and thrive with such an obvious handicap it must be a superior organism. The male peacock's large and bright tail is often used as a demonstration of the handicap principle. In the text, the author rather unconvincingly argues that tobacco, alcohol, and dangerous drug use by humans can be understood as demonstrations of the handicap principle.

Green Bank Formula

The Green Bank formula is a mathematical process that putatively determines the number of intelligent species in the universe. The formula includes numerous factors, all of which are estimated. Not surprisingly, the Green Bank formula can either predict that humans are the only intelligence in the universe or that there are billions of intelligent species in the universe depending upon the estimates used in the various factors. Most Green Bank estimates indicate that extra-terrestrial life and intelligence should be plentiful.

Neo-Melanesian

A creole language used in New Guinea and often erroneously referred to as "pidgin English." The language is rudimentary in development but widely distributed in New Guinea. Most Neo-Melanesian vocabulary is borrowed from English but the implementation and structure vary considerably from English. Neo-Melanesian is presented as an example of creole and its development is discussed in the text. A paragraph of Neo-Melanesian is presented along with an English-language translation in Chapter 8.

Proto-Indo-European (PIE)

Proto-Indo-European, or "PIE", is the name given to the theoretical linguistic source of most modern European languages. The text proposes that an ancient PIE language was spoken by steppe inhabitants whose homeland lay somewhat to the north of the region between the Black Sea and the Caspian Sea. PIE speakers moved outward in a sweep of colonization enabled by improved metallurgy and expanded use of large domesticated animals.

First Contact

First contact is the term used in the text to describe the initial encounter between isolated native peoples living in essentially tribal societies with previously unknown outsiders. In the vast majority of cases throughout history, first contact has developed into a series of encounters that have proved disastrous for the less technologically developed people; many have been entirely eliminated and over time the surviving peoples nearly always suffer an enormous loss of native culture and frequently lose their native language.

Genocide

Genocide is the term to describe the mass killing of a group of people for collective reasons - usually because they belong to an identifiable demographic group. Throughout human history, the result of the somewhat common practice of genocide has resulted in hundreds of millions of deaths. The text focuses on several genocidal events including the European colonization of Tasmania, Australia, and the Americas. Genocides can be categorized as a desire to occupy new lands, a power struggle in a pluralistic society, scapegoat seeking,; or racial and religious persecutions.

Themes

What Makes Us Human

The dominant theme of the text is the repeated investigation of what makes humans uniquely human. Dozens of traits are examined in considerable detail, from language and art to genocide and drug use. The author nearly always concludes that these traits that are generally considered to be uniquely human are uniquely human only in degree - that is, for every uniquely human trait there are numerous animals that exhibit the trait to a lesser degree. For example, human speech has numerous precursors within the animal kingdom, from singing birds through vocalizing vervet monkeys. Many animals use vocalized communications, yet only humans use language.

The author proposed a concept early in the text, which is thereafter referred to as The Great Leap Forward. The Great Leap Forward is the event or series of events which occurred at some point in the past that allowed modern humans to become finally, fully modern. It was not upright posture, opposable thumbs, or enlarged braincases - all of those traits pre-existed The Great Leap Forward by hundreds of thousands of years. Nevertheless, some event did occur that allowed humans to develop language, arts, and technology to a unique degree. The author suggests that a relatively minor physical change in the voice box is a rational explanation for the causative event of The Great Leap Forward. The proposed minor change would allow for articulated speech beyond simple vocalization and - putatively - lead to the rapid development of language and thereafter art, civilization, and technology.

Where'd We Come From

In examining the unique nature of humans, the text presents an overwhelming amount of information on the origins of humans and human traits. The evolutionary origins of humans are considered in detail, along with a simplified phylogeny of well-established human precursors such as *Australopithecus africanus* and *Homo erectus*. In fact, modern *Homo sapiens* is compared and contrasted to other modern primates such as *Gorilla gorilla* and *Pan troglodytes*; the author even suggests that *Pan* be deprecated in favor of a more holistic interpretation of *Homo* leaving chimpanzees, pygmy chimpanzees, and humans in a single genus.

Beyond our evolutionary roots, the text also considers the origins of many human traits such as language, art, agriculture, drug use, and genocide. Each of these traits, and others, are in turn examined from the perspective of their origins, development, and distribution. For example, global languages are considered from a dispersion angle and the author notes that most major American and European languages are derived from a common root language that is seemingly incongruently disbursed geographically. Various linguistic reconstructions demonstrate that these languages are all derived from the so-called Proto-Indo-European language that arose in a relatively obscure location

and spread due to reasons of biogeography much more than utility. All of these investigations seek to establish the origins of humanity and human traits and answer the age-old question of "from whence did we come?"

What's Next

The author's dedicatory stated purpose in presenting the text is to place possible human destiny in context of our evolution and origins. The text seeks to answer what the future likely holds for the human species and even the planet on which we live; the author's view is not particularly encouraging. Drawing upon the fundamentally sound theory that what humans have done for tens of thousands of years they are likely to continue doing in the foreseeable future, the author suggests that we can look forward to increasing populations, decreasing resources, and increasing pollution and ecological destruction.

The text is not entirely pessimistic, however, and makes many suggestions on how a bleak future could potentially be avoided. Needless to say, implementing many of these suggestions would be costly and controversial but manifestly necessary. Several examples of societal catastrophe are presented and analyzed. For example, the populations of Easter Island, Henderson Island, and Chaco Canyon all went through a period of relative prosperity and affluence followed by general environmental degradation that ultimately caused societal collapse. Other examples of societies that persisted with only limited resources are also noted. The success stories are contrasted with the catastrophes and the author derives a concise list of lessons that could be learned would we only take the time to examine our global historic origins.

Style

Perspective

Jared Diamond, the author, is a professor of physiology at the UCLA Medical School. He has authored several books that have similar themes, and is widely regarded as fair and thorough in his treatment of difficult social subjects. The author has conducted field science in New Guinea and has first-hand experience with many of the topics considered in the text. The author's dedicatory paragraph indicates that the book was written for his two sons "to help them understand where we came from and where we may be heading" (p. v); clearly, with the publication of the text the author contemplates sharing his theories with a far larger audience.

The writing style, generally simple and largely free of technical jargon, indicates the author does not intend the text to be limited to experts and instead has targeted a general audience with, perhaps, a college-level ability to read and conceptualize the scientific process. The author's political bias is fairly evident in the text; this is balanced by the author's general tendency to state bluntly his bias. For example, he strongly objects to medical research being conducted on chimpanzees and suggests that is may not be appropriate on other classes of animals; he argues that languages and cultures are inherently valuable and should actively be preserved; and he argues that nearly all environmental damage is counter-productive and nonsensical. While some or all of these views are probably shared by many readers, they are nevertheless political opinions that often are presented somewhat disingenuously as rationally unavoidable conclusions of scientific investigation.

Tone

The text is presented in a somewhat subjective tone. Many sections present fact and theory objectively but the text features rather frequent authorial intrusion and acknowledged bias during sections of discussion or summarization. For example, the author discusses language theory by stating "I'd argue that . . ." (p. 166) and drug use theory by stating "I'll generalize my theory further by . . ." (p. 201); such textual constructions are common. The text is presented using generally easy language structures and is notably free of jargon. The author does not assume that readers are familiar with biological theories - indeed even the basic concepts of natural selection are explained.

The book contains numerous examinations of well-established scientific thought, including experimental results that offer supportive evidence of presented theories. Strangely, the text also fairly often divagates into unscientific or less established areas of investigation, such as the search for extra-terrestrial life or the proposing of a new theory of drug abuse. The amalgam thus achieved is somewhat peculiar and detracts from the generally objective and scientific nature of the text. Even so, the objective

presentation of most topics, accompanied by generally stated personal bias, allows an engaging, instructive, and stimulating presentation of the complex theories examined.

Structure

The 407-page book is divided into five numbered and named parts. Each part is further divided into between two and five numbered and named chapters. Chapters are often further divided into segments separated by ellipses or space breaks. The five major parts feature a brief introduction that describes the overall contents of the division; in general, each section remains dedicated to the sectional topic while each chapter examines a particular area of interest within the topic. In addition, a Prologue is offered prior to Part One, which summarizes the basic structure of the text and sets forth some major points which will be further explored in the body of the work. The text concludes with a section of acknowledgements, a lengthy bibliography of further related readings, and a comprehensive index. The text features several illustrations and maps which materially assist in understanding difficult or complex textual passages.

The straightforward presentation of topics allows the text to remain accessible while simultaneously presenting a large volume of often complex and sometimes subtle theories. The arrangement of the text allows later theories to be based upon prior theories and thus their complexity is examined piece by piece, which aids understanding.

Quotes

"What remains unclear is the outcome of the interbreeding experiment posed in science-fiction novels. Did some invading Cro-Magnon men mate with some Neanderthal women? No skeletons that could reasonably be considered Neanderthal-Cro-Magnon hybrids are known. If Neanderthal behavior was as relatively rudimentary, and Neanderthal anatomy as distinctive as I suspect, few Cro-Magnons may have wanted to mate with Neanderthals. Similarly, although humans and chimps continue to coexist today, I'm not aware of any matings. While Cro-Magnons and Neanderthals weren't nearly as different, the differences may still have been a mutual turnoff. And if Neanderthal women were geared for a twelve-month pregnancy, a hybrid fetus might not have survived. My inclination is to take the negative evidence at face value, to accept that hybridization occurred rarely if ever, and to doubt that living people of European descent carry any Neanderthal genes." (Chap. 2, p. 53)

"Breakdown of murders caused by sexual jealousy in the U.S. city of Detroit in 1972

"Total: 58 murders

"47 murders precipitated by jealous man:

"16 cases: jealous man killed the unfaithful woman

"17 cases: jealous man killed the rival man

"9 cases: jealous man was killed by the accused woman

"2 cases: jealous man was killed by the accused woman's relatives

"2 cases: jealous man killed unfaithful homosexual male lover

"1 case: jealous man killed innocent bystander accidentally

"11 murders precipitated by jealous woman:

"6 cases: jealous woman killed the unfaithful man

"3 cases: jealous woman killed the rival woman

"2 cases: jealous woman was killed by the accused man" (Chap. 4, p. 97)

"Simply by looking at a person, even laymen can often tell what part of the world that person comes from, and trained anthropologists may be able to 'place' him or her to the right part of the right country. For example, given one person each from Sweden, Nigeria, and Japan, none of us would have any trouble deciding at a glance which person was from which country. The most visibly variable features in clothed people are of course skin color, the color and form of the eyes and hair, body shape, and (in men)

the amount of facial hair. If the people to be identified were undressed, we might also notice differences in amount of body hair, the size and shape and color of a woman's breasts and nipples, the form of her labia and buttocks, and the size and angle of a man's penis. All those variable features contribute to what we know as human racial variation." (Chap. 5, pp. 110-111)

"To those of you who share my fascination with naval warfare, British battle cruisers are a good example. Before and during World War I, the British navy launched thirteen warships called battle cruisers, designed to be as large and with as many big guns as battleships but much faster. By maximizing speed and firepower, the battle cruisers immediately caught the public imagination and became a propaganda sensation. However, if you take a 28,000-ton battleship, keep the weight of the big guns nearly constant, and greatly increase the weight of the engines while still maintaining total weight around 28,000 tons, you have to skimp on the weight of some other parts. The battle cruisers skimped especially on weight of armor, but also on weight of small guns, internal compartments, and antiaircraft defense.

"The results of this suboptimal overall design were inevitable. In 1916 H.M.S. *Indefatigable*, *Queen Mary*, and *Invincible* all blew up almost as soon as they were hit by German shells at the Battle of Jutland. H.M.S. *Hood* blew up in 1941, a mere eight minutes after entering battle with the German battleship *Bismarck*. H.M.S. *Repulse* was sunk by Japanese bombers a few days after the Japanese attack on Pearl Harbor, thereby gaining the dubious distinction of being the first large warship to be destroyed from the air while in combat at sea. Faced with this stark evidence that some spectacularly maximal parts don't make an optimal whole, the British navy let its program of building battle cruisers go extinct." (Chap. 7, pp. 128-129)

"NEO-MELANESIAN, IN ONE EASY LESSON

"Try to understand this Neo-Melanesian advertisement for a department store:

"Kam insait long stua bilong mipela - stua bilong salim olgeta samting - mipela i-ken helpim yu long kisim wanem samting yu liakim bikpela na liklik long gutpela prais. I-gat gutpela kain kago long baiim na i-gat stap long helpim yu na lukautim yu long taim yuk am insait long dispela stua.

"If some of the words look strangely familiar but don't quite make sense, read the ad aloud to yourself, concentrate on the sounds, and ignore the strange spelling. As the next step, here is the same ad rewritten with English spelling:

"Come inside long store belong me-fellow - store belong sellim altogether something - me-fellow can helpim you long catchim what-name something you likim, big-fellow na liklik, long good-fellow price. He-got good-fellow kind cargo long buyim, na he-got staff long helpem you na lookoutim you long time you come inside long this-fellow store.

"A few explanations should help you make sense of the remaining strangeness. Almost all the words in this sample of Neo-Melanesian are derived from English, except for the work 'liklik' for 'little,' derived from a New Guinea language (Tolai). Neo-Melanesian has

only two pure prepositions: 'bilong,' meaning 'of' or 'in order to,' and 'long,' meaning almost any other English preposition. The English consonant *f* becomes *p* in New-Melanesian, as in 'stap' for 'staff,' and 'pela' for 'fellow.' The suffix '-pela' is added to monosyllabic adjectives (hence 'gutpela' for 'good,' 'bikpela' for 'big'), and also makes the singular pronouns 'me' and 'you' into plural ones (for 'we' and 'you' plural). 'Na' means 'and.' Hence the ad means:

"Come into our store - a store for selling everything - we can help you get whatever you want, big and small, at a good price. There are good types of goods for sale, and staff to help you and look after you when you visit the store." (Chap. 8, pp. 166-167)

"We've already discovered two species that are very intelligent but technically less advanced than we are - the common chimpanzee and the pygmy chimpanzee. Has our response been to sit down and try to communicate with them? Of course not. Instead we shoot them, dissectthem, cut off their hands for trophies, put them on exhibit in cages, inject them with AIDS virus as a medical experiment, and destroy or take over their habitats. That response was predictable, because human explorers who discovered technically less advanced humans also regularly responded by shooting them, decimating their populations with new diseases, and destroying or taking over their habitats." (Chap. 12, p. 214)

"Compounding those terrain problems is the impossibility of living off the land, because of New Guinea's lack of big game animals. In lowland jungle the staple food plant of New Guineans is a tree called the sago palm, whose pith yields a substance with the consistency of rubber and the flavor of vomit. However, not even New Guineans can find enough wild foods to survive in the mountains. This problem was illustrated by a horrible sight on which the British explorer Alexander Wollaston stumbled while descending a New Guinea jungle trail: the bodies of thirty recently dead New Guineans and two dying children, who had starved while trying to return from the lowlands to their mountain gardens without carrying enough provisions." (Chap. 13, pp. 225-226)

"A Proto-Indo-European Fable

"Owis Ekwoosque

"Gwrreei owis, quesyo wlhnaa ne eest, ekwoons espeket, oinom ghe gwrrum woghom weghontm, oinomque megam bhorom, oinomque ghmmenm ooku bherontm.

"Owis nu ekwomos ewewquet: 'Keer aghnutoi moi ekwoons agontm nerm widntei.'

"Ekwoos tu ewewquont: 'Kludhi, owei, keer ghe aghnutoi nsmei widntmos: neer, potis, owioom r wlhnaam sebhi gwhermom westrom qurnneuti. Neghi owioom wlhnaa esti.'

"Tod kekluwoos owis agrom ebhuget." (Chap. 15, p. 274)

"Finally, our ethical codes regard animals and humans differently. Thus, modern genocidists routinely compare their victims to animals in order to justify the killings. Nazis considered Jews to be subhuman lice; the French settlers of Algeria referred to

local Moslems as *ratons* (rats); 'civilized' Paraguayans described the Achy hunter-gatherers as rabid rats; Boers called Africans *bobbejaan* (baboons); and educated northern Nigerians viewed Ibos as subhuman vermin. The English language is rich with animal names used as pejoratives: you pig (ape, bitch, cur, dog, ox, rat, swine)." (Chap. 16, p. 300)

"It's still true that small, long-established, egalitarian societies tend to evolve conservationist practices, because they've had plenty of time to get to know their local environment and to perceive their own self-interest. Instead, damage is likely to occur when people suddenly colonize an unfamiliar environment (like the first Maoris and Easter Islanders); or when people advance along a new frontier (like the first Indians to reach America), so that they can just move beyond the frontier when they've damaged the region behind; or when people acquire a new technology whose destructive power they haven't had time to appreciate (like modern New Guineans, now devastating pigeon populations with shotguns). Damage is also likely in centralized states that concentrate wealth in the hands of rulers, who are out of touch with their environment. And some species and habitats are more susceptible to damage than others - such as flightless birds that never had seen humans (like moas and elephant birds), or the dry, fragile, unforgiving environments in which both Mediterranean civilization and Anasazi civilization arose." (Chap. 17, pp. 335-336)

"From this point of view it's beyond understanding to see modern societies repeating the past's suicidal ecological mismanagement, with much more powerful tools of destruction in the hands of far more people. It's as if we hadn't already run that particular film many times before in human history, and as if we didn't know the inevitable outcome. Shelley's sonnet 'Ozymandias' evokes Persepolis, Tikal, and Easter Island equally well; perhaps it will someday evoke to others the ruins of our own civilization..." (Chap. 17, p. 337)

Topics for Discussion

The fossil and archaeological records provide overwhelming evidence that humans and chimpanzees evolved from a common ancestor. Recent genetic evidence strongly supports this theory. Even so, many Americans continue to believe that humans resulted from an event of special divine creation. Why has the idea of human evolution encountered such strong opposition?

Are you attracted to individuals of the opposite sex or the same sex? What physical traits do you find sexually appealing? Why do you think you find these particular traits attractive? Would you consider having children with someone who had a particularly long middle finger?

Would you rather have children and die of old age or skip being a parent and live for hundreds of years? Why do you think you don't "get" to make that decision?

What languages do you speak? Does anyone you know speak languages you do not speak? Why do you think you speak the language you usually speak?

Do you think that the study of ancient and so-called "dead" languages has any worth? Do you think that the modern languages that are rapidly vanishing should be preserved so far as is possible? What would be the benefit if everyone in the world spoke the same language? Which language do you think is the most commonly used language in the world? Which do you think is the "best" language in the world?

Would you rather live in a sedentary settlement and live off the products of agriculture or wander a large area searching for naturally occurring food and hunting for game animals? Why would you prefer the method you selected?

Have you ever used alcohol to become intoxicated? Have you ever used tobacco and felt its effects? Have you ever used illegal or harmful drugs? If not, why not? If so, what prompted you to use the substance? Do you plan on using the substance again?

What color is your skin? What is your race? What do you think this says about your abilities as an individual?

What is your biological sex? What do you think this says about your abilities as an individual?

Think of how you interact with other people. Does their biological sex or race influence the way that you treat them? Would you rather go to a school where most of the instructors and students are the same race as you, or would you prefer a racially mixed school? Would you rather go to an "all-boys" or "all-girls" school or a co-educational school? Why?

The author suggests that the definition of genocide be broadened substantially to include various forms of mass killings. Do you think that re-defining genocide to be more inclusive might diminish the perceived negative opinion of genocides?

What do you think the world will be like when your children are adults? Will we live in a radioactively poisoned atmosphere on a super-hot planet? Will there still be forests and relatively natural areas? Will the world be better or worse than it is now?

The author did not consider every possible solution to the world's current ecological problems. What additional topics do you think should have been considered in Part Five? Do you think that humans will be able to solve perceived future problems such as global warming, overpopulation, starvation, and warfare?