E.O. Wilson on Biology as Politics, Culture, and Human Nature

One of the most illustrious living scientists, E.O. Wilson, is still active and writing great books well into his ninth decade. In this article I will review two of his most recent works, *The Social Conquest of Earth* (2012) and *The Meaning of Human Existence* (2014).

E. O. Wilson (1929-)

Wilson, a biologist considered to be the world's foremost expert on ants and sociobiology, is a gifted writer who explains difficult concepts for non-expert readers. My interests have always lain mostly within the humanities—history, literature, and philosophy above all—but reading these two books has opened my eyes in a couple ways. Firstly, that biology strongly determines many of the things often considered as separate and non-overlapping fields of study—history, politics, and the arts, for example. Secondly, that the fields of science and the humanities really would be best served by combining their forces and engaging in joint dialogue and research. I will attempt to explain these in greater detail.

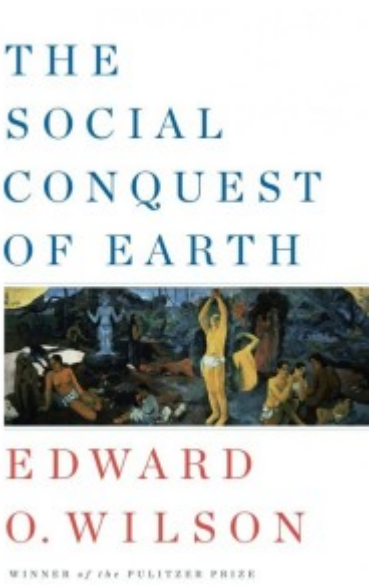
The Social Conquest of Earth is the story of how the most successful and dominant organisms in Earth's history are the ones that developed eusociality—namely, the social insects of

termites, bees, wasps, and especially ants on one hand, and human beings on the other. Eusociality is the term for the systematic cooperation between a large number of organisms in a given species for the benefit of the group over the benefit of individuals. Out of hundreds of millions of years of evolutionary history and the rise and fall of as many different species, this trait of social cooperation has only arisen 20 times as far as experts can tell (mostly species of the aforementioned insects, along with two varieties of shrimp, and two species of naked mole rats that are the only other eusocial mammals besides humans). Wilson spends the rest of the book explaining why it was so rare, why human beings in particular are so unique, and how this relates to the rest of the world's history.

"The origin of eusociality has been rare in the history of life because group selection must be exceptionally powerful to relax the grip of individual selection. Only then can it modify the conservative effect of individual selection and introduce highly cooperative behavior into the physiology and behavior of the group members." This is the key point of why social cooperation is so rare, leading to what Wilson calls the iron rule of genetic social evolution: **"It is that selfish individuals beat altruistic individuals, while groups of altruists beat groups of selfish individuals."** This is true for all the relevant species, but especially for humans as we will see.

So how did such a trait evolve in the first place? Wilson lists three reasons: "One solid principle drawn from this analysis of the hymenopterans [the ants], and other insects as well, is that all of the species that have attained eusociality, as I have stressed, live in fortified nest sites. A second principle, less well established but probably nonetheless universal, is that the protection is against enemies, namely predators, parasites, and competitors. A final principle is that, all other things being equal, even a little

society does better than a solitary individual belonging to closely related species both in longevity and in extracting resources from the area around a fixed nest of any kind."



A significant part of the book deals with detailed descriptions of ant (and termite and bee) colonies and how they developed socially, which is Wilson's particular specialty (at one point he mentions nonchalantly how he discovered and named 442 new species of ant). More interesting is how he compares and contrasts these social insects with humans, and describes the evolutionary process by which humans became a uniquely transcendent species. (For another interesting take on what happens when the planet's two most successful species go head to head, see the classic short story "Leiningen Versus the Ants", which I remember reading in high school English class).

Wilson describes the development of *Homo sapiens* as a maze, ultimately random, with each subsequent mutation bringing us closer to our modern form and capabilities. The first necessary adaptation was existence on the land so that fire could be harnessed (this is why highly intelligent dolphins and whales will never develop civilizations). The second necessary adaptation was large body size which allowed for bigger brains and advanced reasoning and culture (this excludes all eusocial insects). The third necessary adaption was the use of grasping hands with soft spatulate fingers that could hold and manipulate objects (this eliminates all large land animals besides the apes). The next necessary step was a dietary shift to a large amount of meat, a much more efficient source of protein that led to both larger brains and more social communities (this also excluded all other apes who are either vegetarian or, like chimpanzees, get only a small

fraction of their calories from meat [additional note: I have often written of my vegetarianism and how good it is for people, animals, and the environment; I do not see any disconnect, however, between our ancestors' adoption of meat into their diet for extra caloric and social development in a very limited world, and our current need to cut down grossly or eliminate meat consumption from our diets for the good of ourselves and life on our planet]). "About a million years ago the controlled use of fire followed, a unique homonid achievement." This was likely because early human ancestors found cooked meat from animals burned in forest fires, and began to bring the fire with them. "Cooking became a universal human trait. With the sharing of cooked meals came a universal means of social bonding…along with fireside campsites came division of labor." This maze seems very logical and easy to trace in hindsight, and from here it is relatively easy to trace the rest of human social development.

Wilson comes to some similar conclusions as another biologist Yuval Noah Harari, whose *Sapiens: A Brief History of Humankind* I reviewed here. For instance, he says "The origin of modern humanity was a stroke of luck—good for our species for a while, bad for most of the rest of life forever." He spends a lot of time describing how human culture developed to favor group cooperation over individual interests, and how this has affected our history, culture, and even psychology. "An unavoidable and perpetual war exists between honor, virtue, and duty, the products of group selection, on one side, and selfishness, cowardice, and hypocrisy, the products of individual selection, on the other side." In fact, he comments at length on the tribal instincts of our species which lead to the worst part of our nature, yet has been ingrained in our cultural development over thousands of generations of evolution. "The elementary drive to form and take deep pleasure from in-group membership easily translates at a higher level into tribalism. People are prone to ethnocentrism. It is an uncomfortable fact that even when

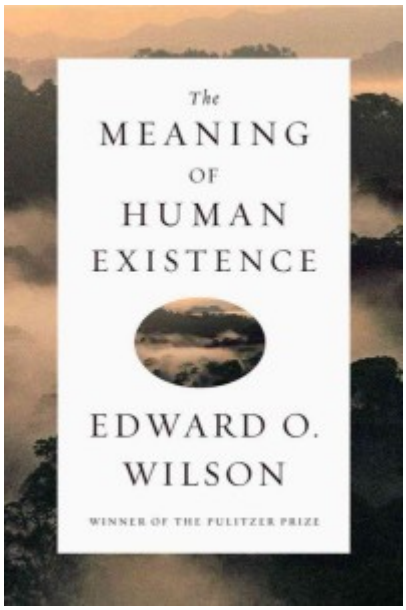
given a guilt-free choice, individuals prefer the company of others of the same race, nation, clan, and religion…Once a group has been split off and sufficiently dehumanized, any brutality can be justified, at any level, and at any size of the victimized group up to and including race and nation." What a history of human war and social conflict this sociobiological fact entails.

A portion of the book is spent on laying out the case for the theory of group selection versus the theory of kin selection, which had been the most popular one for four decades. The latter, discussed by Charles Darwin, formally theorized in 1964 by W.D. Hamilton, and popularized by Richard Dawkins in his 1976 *The Selfish Gene*, states that kinship is the dominant criteria for genetic reproduction. Wilson references a new mathematical model and a variety of examples to show why group selection is actually the more likely reality. Altruism, for example, never fit well in the kin selection model, but it is the basis for Wilson's theory. Dawkins, a renowned polemicist, did not take lightly to the dismissal of his preferred theory, and it led to quite the biological war of words in the press (here is a summary). I am not equipped to weigh in on what is still a controversial issue in evolutionary biology, but Wilson makes his case very convincingly.

Another fascinating aspect of the book that warrants mentioning is its discussion of how human cultural development differs from other animals. Somewhat surprisingly, Wilson says that we did not invent culture. Our common ancestor with chimpanzees did millions of years ago. "Most researchers agree that the concept of culture should be applied to animals and humans alike, in order to stress its continuity from one to the other and notwithstanding the immensely greater complexity of human behavior." Accordingly, he mentions how dolphins and whales have culture, shown by their imitative social interactions. He reminds us again, though, why such intelligent creatures did not progress as far as humans in

social evolution: “Unlike primates, they have no nests or campsites. They have flippers for forelimbs. And in their watery realm, controlled fire is forever denied.” Culture is especially dependent on long-term memory, a trait which humans possess far above all other animals. Our enlarged brains have made us into storytellers and planners, able to imagine past and future scenarios, invent fictions (a point also highlighted in Harari’s book *Sapiens*), and delay immediate desires in favor of delayed pleasures.

The Social Conquest of Earth explores a number of other engaging topics, but in the name of brevity I will conclude my synopsis here (in this New York Times “The Stone” article, Wilson also gives a nice summary of his ideas). I think one of the most important points of the book is the connection between biological development and what we usually think of as humanistic studies. I, for one, will be rethinking much of what I thought I knew about political and ethical philosophy. If we simply trust facts coming from scientific research, we will not need to construct theoretical hypotheses about how human societies developed and invented laws—those of Plato, Aristotle, Hobbes, and Rousseau, for example. Likewise with thorny questions of morality—if we consider that we are social animals who evolved successfully to work together, but that we still maintain the older individualistic impulses that go against the group, it helps to understand why humans behave the way the do. Perhaps Nietzsche was right, but not in the way he intended. We need not use the terms good and evil to characterize human actions—we can assess them as altruistic or selfish. Wilson comments: “Individual selection is responsible for much of what we call sin, while group selection is responsible for the greater part of virtue. Together they have created the conflict between the poorer and the better angels of our nature.”



The Meaning of Human Existence is a slimmer volume with a more multidisciplinary approach, but no less ambitious than its predecessor as the title implies. In it, Wilson rehashes some of the same information as before, such as another extended case for group selection theory over kin selection (prompted no doubt by the controversy it stirred up two years earlier). For the most part, though, Wilson attempts to give a brief but comprehensive version of human history and development, and how we can advance as a species by uniting scientific and humanistic studies, and overall being better stewards of our immense, godlike power over the planet.

Here are some interesting quotes in my opinion that give some flavor of what the book is about:

“The function of anthropocentricity—fascination about ourselves—is the sharpening of social intelligence, a skill in which human beings are the geniuses among all Earth’s species. It arose dramatically in concert with the evolution of the cerebral cortex during the origin of Homo sapiens from the African australopith prehumans. Gossip, celebrity worship, biographies, novels, war stories, and sports are the stuff of modern culture because a state of intense, even obsessive concentration on others has always enhanced survival of individuals and groups. We are devoted to stories because that is how the mind works—a never-ending wandering through past scenarios and through alternative scenarios of the future.”

“What we call human nature is the whole of our emotions and the preparedness in learning over which those emotions preside. Some writers have tried to deconstruct human nature into nonexistence. But it is real, tangible, and a process that exists in the structures of the brain. Decades of research have discovered that human nature is not the genes

that prescribe the emotions and learning preparedness. It is not the cultural universals, which are its ultimate product. Human nature is the ensemble of hereditary regularities in mental development that bias cultural evolution in one direction as opposed to others and thus connect genes to culture in the brain of every person."

"It is tribalism, not the moral tenets and humanitarian thought of pure religion, that makes good people do bad things."

Both books are highly recommended reading for anyone interested in life's big questions, which should be everyone. In *The Social Conquest of Earth*, Wilson opened with a discussion of Paul Gauguin's masterpiece, "Where Do We Come From? What Are We? Where Are We Going?", and what led the painter to create such a work. Gauguin lived an interesting life, giving up everything in a quest for truth and beauty (as portrayed in William Somerset Maugham's great roman à clef, *The Moon and Sixpence*). The painting reveals the questions which are still central to religion, philosophy, and science; these questions may perhaps never be solved, but Wilson overall gives as good a try as anyone at some likely answers. He ends on a positive, if quixotic, note that if humanity can harness its power for good, we can conquer our gods and demons: "So, now I will confess my own blind faith. Earth, by the twenty-second century, can be turned, if we so wish, into a permanent paradise for human beings, or at least the strong beginnings of one. We will do a lot more damage to ourselves and the rest of life along the way, but out of an ethic of simple decency to one another, the unrelenting application of reason, and acceptance of what we truly are, our dreams will finally come home to stay."

The Dangerous Rise and Impending Collapse of Homo Sapiens

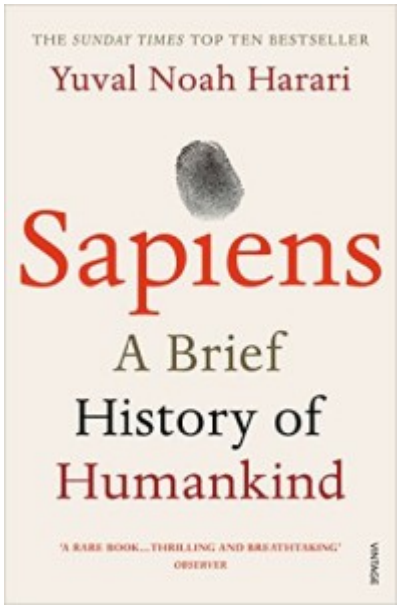
“If all the insects were to disappear from the earth, within 50 years all life on earth would end. If all human beings disappeared from the earth, within 50 years all forms of life would flourish.”

Attributed (probably falsely) to Jonas Salk

The good news is that most of the world has finally accepted that global warming is happening and is going to wreak havoc on our climate over the next 100 (or 100,000) years, and that something needs to be done collectively by world governments and industries to stop the worst of the changes from occurring. The bad news is that much of the climate change is already programmed in and will lead to large-scale disaster, and that the global human response, while increasingly encouraging, is still not nearly enough to make a dent in Mother Nature’s coming retribution. In this review, I will discuss two recent books that in different ways discuss how Homo sapiens have come to dominate the earth and its climate, and what this means for the future of our species and the planet. They are *Sapiens: A Brief History of Humankind* (2014) by Yuval Noah Harari, and *Countdown: Our Last, Best Hope for a Future on Earth?* (2013) by Alan Weisman.

In the first book, *Sapiens*, Harari offers some novel takes on how and why modern humans became and remain the kings of the terrestrial castle. Human beings have been around in some form for about 2.5 million years, and even 70,000 years ago anatomically modern humans were insignificant animals. “The most important thing to know about prehistoric humans is that they were unimportant. Their impact on the world was very

small, less than that of jellyfish, woodpeckers, or bumblebees…Today, however, humans control this planet. How did we reach from there to here? What was our secret of success, that turned us from insignificant apes minding their own business in a corner of Africa, into the rulers of the world?”



Harari spends the first chapter outlining a brief but lively summary of the biological evolution of the many various human species that we used to share the planet with. The key features, all with pros and cons, are our unusually big brains, our upright gait, and our social skills. He describes the consequences of our sudden leap to the top of the food chain 400,000 years ago: “Other animals at the top of the pyramid, such as lions and sharks, evolved into that position very gradually, over millions of years. This enabled the ecosystem to develop checks and balances that prevent lions and sharks from wreaking too much havoc. As lions became deadlier, so gazelles evolved to run faster, hyenas to cooperate better, and rhinoceroses to be more bad-tempered. In contrast, humankind ascended to the top so quickly that the ecosystem was not given time to adjust. Moreover, humans themselves failed to adjust. Most top predators of the planet are majestic creatures. Millions of years of dominion have filled them with self-confidence. Sapiens by contrast is more like a banana republic dictator. Having so recently been one of the underdogs of the savannah, we are full of fears and anxieties over our position, which makes us doubly cruel and dangerous. Many historical calamities, from deadly wars to ecological catastrophes, have resulted from this over-hasty jump.”

In this over 400-page book, Harari, a professor of biology in Jerusalem, continues to pour a wealth of information and

theory on the readers without ever losing their interest. In the third chapter, he speculates that interbreeding between various human species was rare, and that Homo sapiens basically wiped out other species, such as Neanderthals and Denisovans, whenever they came into contact, most likely due to intolerance. “In modern times, a small difference in skin color, dialect, or religion has been enough to prompt one group of Sapiens to set about exterminating another group. Would ancient Sapiens have been more tolerant towards an entirely different human species?” Whatever the cause, the result is that Sapiens are left as the only survivors of the genus Homo, and a rare animal without any close relatives. Interestingly, Harari speculates how history might have happened differently had we had to coexist with other humansspecies. “How, for example, would religious faiths have unfolded? Would the book of Genesis have declared that Neanderthals descend from Adam and Eve, would Jesus have died for the sins of the Denisovans, and would the Qur’an have reserved seats in heaven for all righteous humans, whatever their species? Would Neanderthals have been able to serve in the Roman legions, or in the sprawling bureaucracy of imperial China? Would the American Declaration of Independence hold as a self-evident truth that all members of the genus Homo are created equal? Would Karl Marx have urged workers of all species to unite?”

The reason Homo sapiens conquered the world, Harari claims, is above all its unique language. Around 70,000 years ago our ancestors left Africa for a second time and began to colonize the entire planet, a long march which only finished when the first humans reached New Zealand around 800 years ago. After leaving Africa, these Homo sapiens encountered and probably exterminated Neanderthals (and many other large animals), while at the same time developing a remarkable amount of new technologies over the next 400 centuries: boats, oil lamps, bows and arrows, needles, as well as art and the first evidence of religion, commerce, and social classes. This

Cognitive Revolution allowed for humans to think and communicate in new and sophisticated ways due to language use. The causes of this mental explosion are unclear, but Harari claims that it was most likely a genetic mutation that came from pure chance. (Compare the biologist E.O. Wilson here: "The origin of modern humanity was a stroke of luck—good for our species for a while, bad for most of the rest of life forever.") As for language itself, he says that while many animals, including our closest living relatives, the chimpanzees and bonobos, use types of communication mostly for signaling danger or food, human language developed mostly as a way of gossiping. Besides this, he says that a further development of the Cognitive Revolution is the human ability to think and talk about things that do not exist—entire kinds of entities that they have never seen, touched, or smelled. "This ability to speak about fictions is the most unique feature of Sapiens language." The consequences of this fact were obviously enormous and dominate the rest of the book.

Harari continues to discuss how language ability allowed our ancestors to form larger social groups. "Even if a particularly fertile valley could feed 500 archaic Sapiens, there was no way that so many strangers could live together…Sociological research has shown that the maximum 'natural' size of a group bonded by gossip is about 150 individuals. Most people can neither intimately know, nor gossip effectively about, more than 150 human beings." However, large numbers of strangers can cooperate successfully by believing in common myths, or fictions, which bind the group in ways that gossip cannot. This large-scale cooperation, derived from human language and imaginative thinking, is what led to the crucial cooperation of large numbers of people that gradually formed cities, empires, and conquered the planet. The consequences of this development lead us to the present-day and into the future. "As time went by, the imagined reality became ever more powerful, so that today the very survival of rivers, trees, and lions depends on

the grace of imagined entities such as gods, nations, and corporations."

The next main point in the book is the transition from the long-standing tradition of foraging bands of hunter-gatherers to mostly stable villages of farmers. This happened with the Agricultural Revolution of 12,000 years ago, and led to larger and more sophisticated societies. Harari spends a lot of time discussing the diversity of the ancient (and a few modern) forager bands and how dramatically their way of life differed from the agricultural one. Comparing the two groups, he claims interestingly that "The human collective knows far more today than did the ancient bands. But at the individual level, ancient foragers were the most knowledgeable and skillful people in history." He speculates that average human brain size has actually decreased since the beginning of the Agricultural Revolution, since survival no longer requires the superb memory and mental abilities from everyone as in the foraging groups. Furthermore, foragers had physical endurance and dexterity that few humans achieve today. He presents us with a plethora of evidence which leads to his most interesting claim in the book, in my opinion: that ancient foraging humans had a happier and healthier life than the subsequent agriculturally dependent ones. The diet was wholesome and varied, the working week was relatively short and free time was much greater, and infectious diseases were rare. Meanwhile, most agricultural societies until quite recently have had to endure constant uncertainty over their crops, little variety of food, much more work, and more unhygienic conditions. This is not a new argument—Jared Diamond wrote an essay with the same conclusions in a controversial 1987 essay "The Worst Mistake in the History of the Human Race"—but it is still surprising and counter-intuitive. How could ancient humans have possibly had better or happier lives than most of their post-Agricultural Revolution descendants? The idea is not so surprising if we consider Rousseau's idea of the Noble Savage, long thought to

be erroneous, or examples such as the paradisal Polynesian tribe described by Herman Melville in *Typee*, or the many noble societies of American Indians like the Iroquois or the Lakota Sioux.

Harari continues with several chapters detailing the relationship between humans and animals, which has become more and more unequal in favor of the humans since the Cognitive Revolution. Basically, wherever modern humans have lived, extinction of large animals and plants has followed soon thereafter. The First Wave Extinction accompanied the spread of foragers, the Second Wave Extinction, more due to slash and burn agriculture and habitat loss than hunting, accompanied the farmers, and we are currently in the midst of the Third Wave Extinction, caused by our own all-consuming industrial activity. Giving perspective on this tragic history, Harari comments: "Long before the Industrial Revolution, Homo sapiens held the record among all organisms for driving the most plant and animal species to their extinctions. We have the dubious distinction of being the deadliest species in the annals of biology." This is especially important because "if we knew how many species we've already eradicated, we might be more motivated to protect those that still survive." Besides the outright destruction of wild animal species by humans is the subjugation of domestic animals to the point of tragic absurdity: "It's hard to avoid the impression that for the vast majority of domesticated animals, the Agricultural Revolution was a terrible catastrophe. Their evolutionary 'success' is meaningless. A wild rhinoceros on the brink of extinction is probably more satisfied than a calf who spends its short life inside a tiny box, fattened to produce juicy steaks…The numerical success of the calf's species is little consolation for the suffering the individual endures." Later, Harari comments on the current state of industrial farming, in which hundreds of billions of animals are raised in horrific conditions for a short time to be slaughtered for human consumption, calling it "a regime of industrial exploitation

whose cruelty has no precedent in the annals of planet Earth…and might well be the greatest crime in history.”

Moving closer and closer to the present, Harari presents us with a long series of historical examples about how human societies have changed and gradually unified, leading to the last of the three revolutions that drive the human narrative—the Scientific Revolution. Around 1500, science led to new knowledge which created new technology and fundamentally changed humans’ relationship to their environment and each other. Harari presents a huge number of case studies in politics, industry, exploration, religion, economics, artistic culture, and science that offer his personal interpretations and opinions on all of these areas. The book overall is abundantly full of intriguing information and details about the long rise of Homo sapiens and what it means for our present and future existence.

For me, by far the most fascinating chapters are the early ones discussing how Sapiens arose biologically from among many other primate and human species, leading to the Cognitive and Agricultural Revolutions. This is the heart of the book taking us from the beginning of the world until around 12,000 years ago, and therefore the most theoretical, mysterious, and little-known even to people like me who have studied ancient history. As soon as Harari brings the narrative forward into the territory of recorded history, that is, since the first major Mesopotamian civilizations until the present, the book begins to become slightly more and more weighed down by the entropy of the overwhelming number of things discussed and the author’s increasingly over-arching and tendentious claims on all areas of human history and life. That is not to say that the book stops being interesting or that I even disagree with his ideas, but that the best part comes from Harari’s specialized knowledge of biology and the story of early human development. For a large part of the second half of the book, he is clearly less well-versed in the details of modern

history and arts, or less concerned with scientific rigor and more with his own opinions. He plays fast and loose with his examples of economics (the 400-year development of capitalism, for example), wars, or historical events and how they relate to his big-picture history of the species. There are few (if any) authors who could successfully pull off such an ambitious and wide-ranging history of our entire species in proper detail from origin to the present, and if Harari falls short on the more recent history of humans that is nothing to scoff at. The philosopher Galen Strawson reviewed the book critically calling it a swashbuckling account, and Bill Gates and Mark Zuckerberg, men with whom I otherwise have little in common, have both included it on their own lists of favorite books (probably more for the final chapters speculating on the future of our species, i.e. artificial intelligence and other things that I have not discussed here, for my own reasons). Overall, *Sapiens* is a highly worthy book for anyone interested in human life, and it presents so much engaging information in a readable way that this should be recommended reading for any student of the sciences and humanities.

In the second book, *Countdown: Our Last, Best Hope for a Future on Earth?*, Alan Weisman spends no time discussing the history of the human race except insofar as it relates to the increasing population growth of our species. I am a big fan of Weisman's previous book, *The World Without Us*, a long think-piece with a series of interesting case studies about what would happen to different ecosystems if humans suddenly disappeared. *Countdown* is the sequel, in which for over 500 pages Weisman follows the same pattern with a series of case studies of overpopulation in various countries and possible solutions that have been tried over the last century, and the consequences if we continue on this exponential trajectory.

The format of *Countdown* is to dive straight into the many local problems arising from an overpopulated world and beat us over the head, chapter after chapter, with the scope of the problem, without ever explicitly connecting the dots between all of the information. We are led to draw our own conclusions, but there is really only one proper inference to make after reading a few chapters of the book: human population growth is out of control and we need to do something about it before we destroy most of the planet's other inhabitants and resources.

Such a book obviously does not skirt around controversy but confronts it head-on. Thus, the first chapter brings us straight to Temple Mount in Jerusalem and the Israel-Palestine conflict. "Arafat's biology bomb" was the way locals referenced the demographic split of the divided territory. Palestinians have many more children than Israelis and so put more pressure on an already intractable political situation. Weisman discusses the recent history of walls, intifadas, agriculture, religion, and many other things relevant to the conflict, but the simple thesis comes down to the fact that too many humans are trying to live in a small area without enough resources, which is called carrying capacity, an updated version of the old Malthusian argument. This will become a repetitive theme throughout the book as Weisman visits at least 20 countries and interviews hundreds of scientists, politicians, families, and scholars. The book is basically extended reportage based around the author's own travels and interviews, and he gives few of his own overt opinions in favor of presenting us an overwhelming number of data that leads to the incontrovertible fact that there are too many humans.

Weisman constantly grapples with the question of how many people Earth can reasonably support versus how many people there will be due to the weight of current demographic trends. We are already well over 7 billion, and most estimates say that we will reach 10 billion by 2050, and could peak as high as 15 billion by the end of the century. Paul and Anne Ehrlich, famous for their 1968 book *The Population Bomb*, have calculated the ideal human population to be 1.5 billion. The Ehrlichs and their younger colleague named Gretchen Daily are the most recurring characters in the book, and it is clear that their decades of work on the population problem has made an great impact on the author.

The book is fairly bleak, but I cannot imagine it being any other way given the scope of the problem it treats with. Just a few of the many topics covered at a brisk pace are China's one-child policy, forced sterilizations, different kinds of contraception available in different countries, religious opposition to contraception, agricultural innovation and genetic modification, AIDS, and gorillas. Ultimately, after discussing every kind of recent example of population control on every continent in great detail, Weisman offers no specific solutions, but presents us with a choice: "I don't want to cull anyone alive today. I wish every human now on the planet a long, healthy life. But either we take control ourselves, and humanely bring our numbers down by recruiting fewer new members of the human race to take our places, or nature is going to hand out a pile of pink slips."

Countdown is similar to Harari's *Sapiens* in its enormous wealth of information across many fields (its impressive bibliography attests to its rigorous research), and its generally negative tone about the rise of humans and our ability to deal with the world we have created. Sometimes the truth hurts, and if it's necessary for us to realize that we are collectively responsible for the extinction of our closest living relatives and countless other species we cohabited the

planet with, and that our ever-growing numbers and unsustainable lifestyles are dooming even our own existence, then these two books should be required reading for every politician, business leader, teacher, and student. We are a problem-solving species and the undisputed rulers of the earth, but the countdown has indeed begun for Homo sapiens and there is no resetting the clock.