CHAPTER 1

A GRAY EVOLUTIONARY LENS

Old age ain't no place for sissies.

—Bette Davis

I vaguely remember my father having black hair. Being the youngest of four and born to older parents, I recall my most vivid memories to be of him having silver hair and mustache. He was sort of a mix between Clark Gable and Cesar Romero. Lucky Mom. However, as he got older, it wasn't difficult to see changes in the way he looked, spoke, moved, and acted. Except for mild diabetes and minor back issues resulting from a tumble off a ladder, he sported relatively good health for most of his life. By the time I started attending UCLA as an undergraduate, I noticed that some of his tastes and habits had begun to change. Instead of having a beer or two with my uncles, he opted for coffee. He passed on the late-night movie, went to bed a bit earlier, and napped more often. Although he was a modest smoker in his younger years, I don't remember him picking up a cigarette after the age of forty or so. In his later years, he spent much of his time working with my older brother in their workshop. As he occupied himself with one craft project or another, I saw that he was starting to hunch slightly while he worked, as if he was in a slow but constant struggle against gravity. In his sixties, he was much thinner compared to his earlier cinematic appearances in family home movies. I suspect much of his weight control was the result of my mother's close attention to his diet because of his diabetes. However, I am certain he was simply declining as a result of aging.

Charles Darwin and my father both lived to the age of seventy-three. Both married, fathered children, had their share of health issues, and were outlived by their wives. While my father did not write any books, venture to the Galápagos, or have the fame of Darwin, both ultimately succumbed to the effects of aging and died of heart failure. Though my father's passing was sudden, his death was not shocking. He was a great husband, father, and grandfather. As he aged, his life changed and he adjusted with dignity and a wry sense of humor that was often capped by a rolling of the eyes and a smile. Though he was not a biologist and not very familiar with physiology, hormones, or the biological bits and bobs of aging, I am certain that during his later years he understood that he was not the man he had been when he was twenty. Seventy-three trips around the sun is an accomplishment for most men around the world. As with Darwin, Pop lived a long, rich life and was loved by many. By any measure, evolutionary or otherwise, my father was a success.

Thousands of miles away in South America, other men in the forests of eastern Paraguay were living parallel lives. Cuategi is a bit younger than my father but not by much. As a man from the Ache people, who until the 1960s and 1970s were full-time nomadic foragers with very limited contact with the outside developed world, he spent most of his time searching for food, keeping his family safe, and coping with the daily microdramas that are commonplace in all small communities. He made and stoked fires from damp wood, drank wild yerba mate from the *Ilex paraguariensis* bush (now widely available in the organic food section of your local supermarket), fashioned archery bows from palm wood using a modified land snail shell as a hand planer, and devoted many days to the pursuit of capuchin monkeys (*Cebus capucinus*), white-lipped peccary (*Tayassu pecari*), and paca (*Cuniculus paca*), to name just a few of the items on the Ache menu.

Cuategi fathered several children, became a grandfather, and experienced significant life changes, not the least of which was making first peaceful contact with the outside world when he was well into adulthood. Up until his twenties, he and his band lived solely within the confines of the Paraguayan forest, away from modern settlements, actively avoiding loggers, farmers, and poachers who sometimes ventured into the jungle—although from time to time he and his band were not above the occasional incursion into a farmer's manioc field when hunger made it a necessity. As he got older, his beard turned gray, he contracted and survived leishmaniasis

resulting in the destruction of his upper palate, and lost more than a few teeth. Eventually he and other members of his small community decided to leave the forest to make first peaceful contact with a family of Norwegian missionaries, eventually settling into semipermanent housing on their land near the Ñacunday River in eastern Paraguay close to the Brazilian border. Today their life is taken up by the daily chores of farming, some modest foraging, and spending time with family and friends. In his seventh decade of life, Cuategi and his band now cope with the daily challenges of adjusting to a world full of cell phones, the Internet, bills, and diabetes. The rapidity and intensity of their transition from forest-dwelling, full-time foragers to blue-jeans-wearing surfers of the Web is dizzying and unprecedented in human evolution. Most are now on Facebook.

On the other side of the world in eastern Africa, a male chimpanzee makes his way through the Ugandan forest. He is large, robust, and emboldened by the life experience that comes from surviving four decades in the wild, avoiding poachers' snares and other potential threats. Although in relatively good health for his age, he is clearly more feeble compared to other males in their teens and twenties. The fur on his chin is white. He knows the importance of alliances and staying clear of neighboring chimpanzee groups that would readily beat him to death if he were foolish enough to be caught alone. During his twenties, he managed to hold the alpha position in his group and fathered several offspring but never devoted any time to caring for them. His life was preoccupied with staying out of the crosshairs of rival males and nurturing coalitions with other males who allowed him to outlive his rivals. As he becomes old and weak, he will disappear into the forest, never to be seen again. A primatologist may find his bones.

The lives of my father, Cuategi, and the chimpanzee could not be more different. Yet beyond their particular life conditions and environmental circumstances, the biological and social forces that shaped their journey of aging are similar. Three important factors unite them and how they aged. First, they are males. Belonging to sexually reproducing species, their lives were significantly influenced since conception by the union of their parents' X and Y chromosomes as well as the subsequent cascade of hormonal and other developmental changes that come with being a male. This is not to say that their genes determined their destinies or daily life decisions, but their sex chromosomes and male phenotype certainly had significant

roles in their lifetime development. Second, the biology of their aging was shaped by evolution by natural selection. As a product of evolution, their aging processes share important similarities as a result of their common ancestry. Yet humans and chimpanzees are different because of the environmental and social challenges that face each species. As a species, human males also face common and distinct environmental and social challenges that shape their behavioral and reproductive strategies as they age. Finally, male aging is unique compared to that of women because of the different constraints that emerge from our reproductive and metabolic biology.

In this book, based on those three premises, I will argue that an evolutionary lens is vital for understanding the biology of male aging. Moreover, I will contend that evolution has shaped male health, influenced human evolution as a whole, and will guide where we are heading as a species. In essence, Darwinian fingerprints are on every aspect of male aging. But why should one care? There are numerous books on health and well-being as well as evolutionary biology. But understanding the evolution of male aging goes beyond health and well-being. There are other important reasons to understand male aging from a Darwinian perspective.

Besides putting some modest polish on our scientific literacy, there are other ways in which understanding male aging can be informative and more than a bit interesting. If you bought this book, it is probably because you have some interest in the topic. You're an older man, the partner of an older man, or someone who has a general interest in the evolution of the human condition. Perhaps as an aging man, you are looking for some insights into why and how your body is changing. That's a perfectly reasonable motivation. If your partner or other loved one is an aging man, you may be wondering why he is spending more time in his favorite chair, snoozing, or otherwise changing from when he was younger. An entire chapter is devoted to changes in muscle mass, the dreaded love handles, and the hormones that are responsible. You may also be interested in more serious aspects of health like prostate disease, erectile dysfunction, or male pattern baldness. Is testosterone supplementation safe? What does it mean to have low testosterone levels? What are "normal" testosterone levels for older men? These are all rational incentives to read this book.

But to gain a *deeper* understanding of health and illness, one needs evolutionary theory. The reason is that natural selection does not create perfect

organisms, and imperfect organisms tend to have a nasty habit of accumulating defects, aging, and eventually dying. Men and women are also subject to different selection pressures that contribute to sex differences in aging and life span. That is, during our evolutionary past and arguably up to the present, men and women have faced challenges that are unique to their sex. Drawing on examples from reproduction, for women, these include childbirth and lactation. For men, it has been competition with other males and evolving ways to be attractive mates. Evolving optimal traits that can cope with the effects of aging is in itself a major challenge.

Virtually every physical trait is a compromise in response to the development and needs of other traits. Sometimes traits complement each other and actually promote the effectiveness of the function of other traits. Often the investment or expression of one trait will compromise the function of another. These compromises or "trade-offs" lead to imperfections that result in physical degradation, illness, and eventually death. Trade-offs are a primary driver of aging. Men and women contend with different trade-offs and therefore exhibit different patterns of aging and death. A male body needs to make crucial decisions about how to allocate calories and other resources to promote reproductive success. In Darwinian evolutionary theory, surviving is not enough. Survivorship is only time in service of trying to produce offspring and push one's genes through to the next generation. As we will see, men pay a significant tax in the form of shortened life spans in order to include their genes in subsequent generations. What is interesting about men, however, is that they may have developed unique solutions to maintain the ability to father offspring at older ages and address the challenge of somatic degradation and aging. More on that later.

Besides questions of health, well-being, and how evolutionary theory can shed light on these important issues, I would offer that there are other deeper and compelling reasons for taking an interest in aging males. If you are reading this, it is safe to assume that, like the author, you are human. Therefore, how evolution shaped our ancestors into the beings that they were and how that resulted in you reading these words is, in my humble opinion, bloody interesting. How did we emerge as the dominant species on the planet? Yes, there are far more beetles on the earth than people, but one cannot ignore how we have diverged from our other ape cousins and evolved traits that are unexpected for a large-bodied great ape. Simply by sheer numbers and our ability to shape our environment, for better or

worse, we are pretty successful as a species. I will argue that to get to this point in our evolutionary history, traits associated with male aging may have been leveraged to facilitate the evolution of human-specific traits in all individuals, both men and women. These traits were vital to our success as a species.

Fast-forward to the present, and we can readily agree that the world is clearly run and controlled by men. I am certainly not condoning this reality; I am simply making a statement based on fact. Most of those men are also older, say, over the age of fifty. With very few exceptions, virtually all heads of state, chief executive officers, and individuals who wield socioeconomic and political power are older men. Clearly men have leveraged economic, social, and political power in their favor. How did this come to pass, what makes them tick, and how did they evolve? The acquisition of this power and influence is through competition with other males and active and passive subjugation of women's political and socioeconomic power. For anyone who is interested in gender equity or motivated to pursue it, I would suggest that understanding the evolution of older men and how they arrived at this point in history would be at best strategic and at least somewhat useful. But before we delve into these complex and nuanced questions, we will have to define what we are assessing in men.

WHAT IS AGING?

Understanding the specifics of aging in men requires that we get a handle on what we are putting under the evolutionary microscope. Aging is more than simply the passage of time or the number of candles on a birthday cake. Aging is a physical process that affects individual men and is guided by a number of factors including physics, genes, disease, and other environmental challenges. From a genetic perspective, the process of aging shares similarities with the biology of height. Both have a high degree of heritability, which means that the genetic complement of your parents has a significant predictive effect on your own height, or in this case how you age. The association is certainly not perfect, but the relationships are pretty strong with genetic variation accounting for 20–25 percent of the chance one will live past the age of eighty.[1] However, despite this high degree of heritability, no single gene or suite of genes accounts for this relationship, at least none of which we are aware. Genes are an important aspect

of aging, but their expression often depends on environmental cues and the action of other genes. In addition, genes are carried around within individuals, populations, and species that interact with each other in crucial ways. We need a more holistic approach to understand the whole evolutionary picture.

Zooming out from the individual, we can also observe aging from a higher perspective, one that examines male life span and mortality both within and between populations and species. Men have longer life spans compared to male chimpanzees, for example; the probability of dying at various ages is remarkably similar. Comparative analysis of the demography between us and our closest primate relative reveals that there are deep evolutionary roots that guide male mortality, aging, and life span. In addition to our similarities to other primates and mammals, humans are also unique in ways that are clearly evident, such as how we walk, our lack of body hair compared to other primates and mammals, our large brains, and language, just to name a few spiffy characteristics. While these are all qualities that would make any self-respecting primate proud, there are other traits that allow scientists to assess human uniqueness on a more fundamental level. These characteristics are called "life history traits," which emerge from a branch of evolutionary theory called, not surprisingly, life history theory. In essence, this theory is an extension of evolutionary thought that provides scientists with a way of studying the evolution of different species by comparing basic traits that all organisms have in common. Of particular interest for the purposes of this book is the process of aging. All organisms deteriorate to some degree with time and are faced with the constraints created by this degeneration. While the entire body ages at once, different parts can age at different paces and in different ways. With life history theory we can ask: Are certain characteristics of aging in men unique to humans or are they common to other organisms? How has aging affected other life history traits in humans such as reproductive effort in both males and females? Addressing these questions also allows researchers to determine whether a trait is the result of some biological constraint in males or if it recently emerged in humans, perhaps as a result of changes in environment. These are deep, juicy questions.

Viewing aging as a life history trait is fairly straightforward. However, what gets lost in the shuffle is what one might consider an adaptation. In basic terms, an adaptation is a trait that is the result of natural selection. In

humans, a large brain is all but certainly an adaptation since the advantages must outweigh hefty metabolic costs associated with having so much neural biomass between your ears. Another trait is our ability to walk habitually on two legs. Bipedalism is a unique and fancy way of getting around if you are a great ape. However, other organisms such as birds are bipedal, which kind of throws a wrench into the uniqueness of bipedalism. This raises a challenging issue that revolves around how we compare humans with other organisms. After all, we cannot say that humans are unique at anything if we do not compare a particular trait with that of other animals. What we need is a common currency of natural selection that can be compared between species regardless of evolutionary heritage, environment, or genetic complement. This is where life history theory provides a tremendously useful and powerful way of deploying comparative analyses of traits that are common to all life. The following life history traits are a common evolutionary currency that can be applied to virtually any comparative investigation. Besides aging and life span, they include distinct events and traits that are shared by all organisms. These include:

- Size at birth (or hatching)
- Rate and pattern of growth
- Age at reproductive maturation
- Adult body size
- Size and number of offspring
- Rate of reproduction
- Sex ratio of offspring (for sexually reproducing organisms)[2]

The power of life history has only recently been deployed in the service of understanding human evolution. However, since that time, tremendous strides have been made in addressing the evolution of these traits using observational, biological, and demographic assessments of various populations. Another core idea underlying life history theory is that all organisms, including humans, are faced with universal challenges that constrain and influence the evolution of life history traits. The central challenges are the availability and allocation of time and energy. As men age, time and energy availability becomes ever more constrained and challenging to manage. The idea of energy availability being a constraint emerges directly from one of the basic laws of thermodynamics; that is, energy spent

in service of one purpose is made unavailable for other purposes. Time and energy seem to be in chronically short supply even today, although the emergence and spread of obesity is definitely a condition that has emerged from our ability to sequester too much energy in environments that are awash in quick, abundant, and easily accessed calories.

Understanding the harvesting and allocation of these resources within the physiology of an individual is what drives much of life history research. It is assumed that organisms are often limited in the availability of time and energy and must therefore make allocation decisions that directly or indirectly affect their fitness, through influences on either survivorship or reproduction. Life history traits, such as those related to aging, do not operate in a vacuum. Traits related to growth and reproduction often vary in response to each other as well as with the processes associated with aging. For example, the time and energy devoted to reproduction are hugely important. In life history parlance this is known as reproductive effort. As we will see, reproductive effort will have a tremendous say in how males age. Unfortunately sex does come with a price, not only for men but for all reproducing organisms.

Constraints on time are best illustrated by trying to be in two places at once. Try it. Doesn't work. Unless you are Dr. Who, you will fail miserably. Also try and do two things at once. Sometimes we succeed, although our distribution of attention often has mixed results. Most of the time we fail in spectacular fashion. It is almost impossible to whip up a batch of marinara sauce and simultaneously edit a manuscript, or take aim at a juicy monkey with your bow and arrow while conducting a debate on tribal politics. Doing two things at once requires skill, planning, and choosing the appropriate tasks to tackle together. Yet we are faced with these challenges every day. How we manage these decisions and live with the outcomes is important to our evolution.

In terms of energy, even if one is obese and literally swimming in coagulated calories in the form of fat, you cannot burn the same calorie for two different purposes. The same calorie cannot be metabolized to heal a wound while at the same time be used to replace a worn-out kidney cell. If you are fortunate, you may have enough energy to deploy two different calories to deal with these challenges. With finite and constrained resources of time and energy, every organism faces trade-offs. If you invest time or energy in one purpose, chances are you have made that time/energy

resource unavailable for anything else. These trade-offs eventually manifest themselves in larger physiological negotiations that affect a greater proportion of the organism often in the form of aging. Selection favors organisms that reproduce effectively at higher rates. But to do so, you need time and energy. Those that allocate time and energy most effectively and efficiently will most likely have an advantage over other organisms and be favored by natural selection.

Life history theory can also provide useful perspectives on the various health issues men face as they get older such as prostate cancer, loss of muscle mass, and difficulties with weight management. The deployment of life history theory and evolutionary biology in general to gain a greater understanding of health and disease is known as evolutionary medicine. While this field has been instrumental in developing a greater understanding of various diseases, very little attention has focused on male aging. For example, in a later chapter we will discuss how reproductive biology early in life may influence the risk of acquiring age-related illnesses such as prostate cancer. Finally, we will turn the tables and explore how the evolution of traits in older men has affected the evolution of our entire species and how this may continue going forward as we continue to evolve.

HUMAN DIVERSITY

We need to appreciate the importance of human diversity. Most biomedical research focuses on urban populations who live more or less Westernized lifestyles, which usually means people who ingest lots of calories, are relatively sedentary compared to many other populations around the world, and live in high-density areas. Harvard evolutionary psychologist Joseph Henrich has dubbed these people Western, Educated, Industrialized, Rich, and Democratic, or WEIRD.[3] Information from populations who are not WEIRD and have different lifestyles is becoming more available, but the vast majority of our information on human biology comes from American and Western European populations. This research has been invaluable, but what has become apparent over the past few years is the broad range of physiological variation that is a hallmark of our species. My father and Cuategi led very different lives, yet if one were to compare the demographic patterns of aging and mortality of their respective communities, one would find striking similarities and important differences that

influenced their aging. For example, as my father got older, he developed diabetes. Cuategi did not. Was it due to genetic differences? Perhaps, but their different lifestyles, activities, and diets likely had a greater impact on their risk of acquiring metabolic disease with age. To understand human evolutionary biology, including male aging, an anthropologist's perspective that looks at older men from across a broad range of the human condition is the only way to appreciate the adaptability of humans as well as the commonalities that bind us as a species.

In my present administrative position at Yale as deputy provost, I am responsible for helping schools and departments find excellent faculty in segments of society that historically have been underrepresented at Yale and in academia in general. Our goal as a university is to promote greater diversity since homogeneity of thought, perspective, or background is seldom conducive to scholarly growth and excellence. Diversity matters and is important. From a biological perspective, this is equally true. To understand male aging from an evolutionary perspective, we need to look at a very broad biological and ecological landscape. We need to look beyond our own shores and closely examine the evolutionary biology of older men across the spectrum of human existence. Anthropologists like me are particularly interested in hunter-gatherer communities and others who do not live as sedentary, well-fed individuals since their lifestyles are more indicative of the challenges humans have faced throughout our evolution.[4] This is not to say that hunter-gatherers are perfect models of the conditions during human evolution. Hunter-gatherer populations themselves exhibit a broad range of lifestyle and ecological variability from the Hadza, who live in dry scrub areas of Tanzania, to the Shuar, who inhabit the Amazonian region of southeastern Ecuador. Nonetheless, they do provide a useful lens through which we can get a glimpse of the conditions that were important during human evolution.

It is also vital to understand that biology responds to environmental variation. Compared to other great apes, humans are extremely diverse and adaptable organisms. We maintain an extraordinary ability to adjust our physiology, behavioral strategies, and social arrangements to accommodate environmental change. One only needs to note that humans have colonized most corners of the globe since leaving Africa about two hundred thousand years ago. In the case of earlier species of Homo, this wanderlust occurred even earlier. In contrast, our other great ape relatives have

remained in fairly specialized environments. The potential for adaptability to the constraints of aging is no exception.

EVOLVING OPTIONS AND MALE AGING

So far we have used the word "trait" several times. Within evolutionary biology, traits that are relevant to male aging often refer to things like amount of muscle, amount of fat, and visual acuity—pretty much anything that you notice changing as one gets older. Strictly speaking we restrict our definition of a trait to characteristics that have the potential to evolve over time as a result of natural selection. Other important traits that are unique to older men that may have contributed to the evolution of our species include paternal investment, devaluing the importance of physical strength in men, and leveraging experience. Compared to other primates and great apes, these are traits that are unique to older men. As a consequence, older men are able to contribute to reproduction beyond the ability of fertilizing an ova. I will argue that devaluing the importance of physical strength allowed for longer life spans, inhibited the aging process, and decreased mortality resulting from environmental risks. As the importance of physical strength declined, knowledge and experience took on more central roles in the daily lives of older men. This will be an important topic in this book, one that we will revisit later on.

The contributions of older males to the evolution of human life history traits that define us as a species are also very noteworthy. Humans are strange creatures who failed to get the memo outlining the characteristics that are expected from any respectable creature who would call itself a great ape.[5] Using diagnostic traits such as body mass, food sources, and environmental hazards, an evolutionary biologist can wield some predictive power about what sorts of characteristics should evolve in a particular species. For example, orangutans are large bodied compared to many other mammals and primates. They also live in an environment where food resources are often unreliable and characterized by dramatic swings in availability. Consequently orangutans reproduce very slowly and have much slower metabolisms than one would expect given their body size.[6] When the food supply is unreliable and there are very few hazards in the form of predators, it makes sense to slow down and take it easy. And when there are few predators, as in the case of orangutans, a species can grow

for a longer period of time and achieve a larger body size, which has many benefits.[7] In contrast, despite our large body size, humans have evolved very different life history traits.

Consider that there are over seven billion humans on the planet and fewer than a million other great apes. As a species, we are very efficient at reproducing and have done pretty well compared to other great apes. In addition, the human life span is much longer than one would predict. Life span is usually correlated with female reproductive life span; that is, when females cease reproducing, it is usually a signpost that mortality is imminent. However, in humans about a third of female life is post-reproductive. This is unique and begs the question: How did this evolve and have older men been part of this evolutionary development? I would argue that the answer is "yes."

There has been a common assumption that men tend to stop reproducing around the same time as women. This emerges from a somewhat ethnocentric perspective that is based on demographic data from Westernized populations such as the United States and Europe, one that fails to incorporate human cultural diversity. However, we will see that the American and European pattern of male fertility is not universal. Men maintain the capacity to reproduce long after similar-aged women have gone through menopause. Male ability to reproduce at older ages allows natural selection to operate and shape human evolution in ways that are unique compared to how other primates evolved. The question then is, if aging causes men to physically deteriorate, and physical condition is often important to reproductive success in many mammalian and primate males, how did men evolve the ability to reproduce at older ages? In fact, how did the human life span evolve to become longer than the reproductive life span? What are the implications to human evolution? This is a big deal.

LIMITATIONS OF EVOLUTIONARY THEORY

Before we get too excited we should tap the brakes a bit. Evolutionary theory and life history theory are tremendously useful, but there are limits. It is certainly not uncommon to have different schools of thought in any academic field. Try being in an elevator with an applied and theoretical physicist. Making it gracefully to the fifth floor is doable. Getting to the twelfth without a disagreement is an accomplishment.[8] The rift between

scholars who deploy evolutionary biology to human research questions and those who critique this perspective is also quite animated and I believe based on a fundamental misunderstanding. This unfortunate division lies between the more subjective realm of academia and those scholars who are more scientific or biological. On more than one occasion I have been faced with a critic who takes exception to attempts to deploy evolutionary theory to understanding human behavior. Curiously there is very little pushback when it is used for non-human primates or to grapple with the fossil record. However, if there is any mention of evolutionary biology to understand contemporary humans today, more than a few eyebrows are raised and one is thankful to be nowhere near an elevator.

The unfortunate misunderstanding stems from the belief that evolutionary biologists are out to prove that everything is in our genes and that biology will explain everything. If we know the level of hormone x, we can explain complex behaviors like aggression, love, and our affinity for cats on YouTube. This is simply misguided. Contemporary evolutionary biology is firmly grounded in gene-environment interactions, and unless a change over time in a trait can be traced back to the necessary conditions of natural selection, there is not much room for evolutionary theory in the conversation. Genes, and therefore our biology, are often inextricably influenced by environmental factors such as diet, activity, social interaction, care, attentiveness, and any number of things we can think of that shape our lives every day, including culture. As I used to state in my undergraduate courses every year, when it comes to nature or nurture, the answer is "yes." On the flip side, believing that our brain, genes, or the various glands that secrete hormones do not influence our behavior is similar to believing our choice of clothing is not influenced by the weather. I may ponder whether to don my gray coat or my brown one, but I will surely put on a coat if it is a cold Connecticut winter day. We are products of the environment our ancestors experienced in the past as well as the conditions we face today. Those who take issue with evolutionary approaches to behavior are often led to these perspectives by the publicity of poor science. We won't do that here.

Evolutionary perspectives cannot address individual behavior and should certainly not be used as an excuse for bad behavior. This is particularly worrisome when the discussion revolves around men. One cannot point to the actions of an individual and say, "Oh, Darwin made him do it." Everyday

life is just too complicated to make overly simplistic assertions. As someone who has spent a good portion of his career studying the evolutionary biology of men, few statements prompt me to duck into my local pub out of frustration quicker than "Boys will be boys" or "Oh, that's just testosterone poisoning." Evolutionary descriptions of human behavior and biology are not justifications. They are attempts to explain and understand. Indeed it is sad that Darwinian theory has been corrupted and twisted for political, sexist, and racist gain over the past century. Charles would not approve.[9]

As with most, if not all, scientific fields, biological anthropology has historically been a male-dominated discipline that has had a checkered history when it comes to research that is tainted or motivated by racism, classism, or sexism. An overabundance of caution is therefore merited when evoking an evolutionary perspective to understand men.[10] It does not mean it cannot be done; it just has to be done right. In this book, assertions to evolutionary biology will be made carefully and conservatively. Fortunately, the trait that we will be discussing, aging, is central to the evolution of all organisms since the biology that governs how we age has been at the core of natural selection. However, I will take some chances in the hope that the reader can make informed conclusions based on scientific evidence and critical thought. I am certain that some of my ideas will ultimately prove to be wrong. But I will assert that all merit consideration.

Obviously the biological aspects of human male aging are significant. But this does not mean that other aspects of the human condition have nothing to do with male aging. Humans are cultural beings. Some have argued that other organisms such as chimpanzees exhibit social behaviors that are similar to those found in human culture.[11] This may be true, and the arguments for comparative cultures are beyond the scope of this book. However, it is certainly true that no other organism exhibits the level of cultural complexity that is seen in humans. Humans interact with each other, develop unique and often illogical social practices, and do things that seem to contradict the premises laid out by Darwin and later evolutionary biologists. It may be tempting to dismiss cultural practices as simply noise that needs to be discarded in order to get at the real facts underlying male aging or any other aspect of human evolutionary biology. However, this would be a mistake. Culture and social behaviors are extensions of our phenotype, and while the connections with genes and

phenotypic expression are complex and sometimes unwieldly, they are part and parcel of who we are as a species.

As we delve into the science of male aging and mortality, it is important to note that there are shades that exist outside the intellectual visibility spectrum laid out by evolutionary biology. The cultural and anthropological subtleties of male death inform our understanding of male aging and likely influence how men age and die. Clearly humans are more complex compared to most organisms, but the roots of hesitation to bring humans into the conversation about future evolution run deeper than ordinary scholarly banter. Reluctance to apply evolutionary theory to questions of human biology stems from an anxiety of history. Anthropologists in particular are still licking their wounds from a legacy of poor science that was steeped in racist, sexist, and classist agendas.[12] Not so long ago, some ill-mannered scientists with social and political agendas peed in the pool of human evolutionary biology research. Some probably had no particular social or political agenda but were simply products of their time period. Nonetheless, since those missteps, many anthropologists are not eager to jump back into the water. I propose the filter of time has run its course and it is safe to wade in a bit, albeit with caution and vigilance for the ill-mannered types.

Now that we are duly primed on some basic background information, we are ready to discuss male mortality and aging. Onward.