

AFRICAN AMERICAN LONGEVITY ADVANTAGE: MYTH OR REALITY?

A RACIAL COMPARISON OF SUPERCENTENARIAN DATA

by

ROBERT YOUNG

Under the Direction of Frank J. Whittington

ABSTRACT

Demographic researchers have identified a crossover pattern between the mortality rates of the Caucasian-American and African-American oldest-old (80+) populations for over a century. Debate has centered on whether the crossover effect is due to age misreporting or the heterogeneity hypothesis or if it continues beyond age 99. This thesis addresses these issues by using new data from the SSA's study of supercentenarians. The study identified 355 persons aged 110 or older whose ages could be verified, creating the first reliable American dataset for this population group. Analysis of the data has indicated that mortality rates at ages 110-115 were significantly lower for African-American supercentenarians than for their Caucasian-American counterparts, and that the African-American proportion of the population increased steadily with age. The results of this analysis show that the crossover phenomenon is multicausal and cannot be fully accounted for by age misreporting, suggesting a need to consider genetic and environmental impacts on racial variations in maximum human longevity.

INDEX WORDS: Supercentenarians, African-Americans, Longevity, Maximum Life Span, Crossover Effect, Oldest-Old, Gerontology, Demography, Race, Myth

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ROBERT YOUNG

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Figure 1.
Bettie Wilson, age 114, seen in New Albany, Mississippi
Photo courtesy of Memphis Commercial Appeal

DEDICATION

I would like to dedicate this thesis to my French-born great-great aunt, Marie Ralston (June 14 1893-June 10 1990), whose longevity (she lived to the age of 96 years, 361 days) and late-life activity (she participated in a “rock-a-thon”¹ in 1989) inspired me to a career in longevity research; to Jeanne Calment of Arles, France (Feb 21 1875-Aug 4 1997), the *doyenne de humanité* who not only defied astronomical odds² to live to 122 years of age (surpassing the Biblical 120 years of Moses) but who personally could always find a reason to enjoy life, even beyond 115 years of age (“I think, I dream, I go over my life, I never get bored”); to Bettie Wilson (1890-2006) of New Albany, Mississippi and Susie Gibson (1890-2006) of Tuscumbia, Alabama, whose families graciously allowed me to interview them for Oral History class in 2004, providing a qualitative research window into how to successfully live to 115 years of age; and to all the longevity researchers—past, present, and future—who defied the prevailing myths of longevity in their era and dedicated themselves to the search for the truth regarding the maximum human life span, to answer the question “how long do humans live?” according to scientific precepts, and not the biases that have so permeated past discourse and continue to exist even in this modern-day world. To them, this paper is dedicated. I intend to continue in the traditions of William Johns Thoms, Thomas Emley Young, Walter G. Bowerman, and the like.

¹ This was a rocking-chair-rocking event. My great-great-aunt, affectionately known as “Tantine,” was featured in the local Fort Lauderdale newspaper in 1989 (SIT-DOWN EVENT FEATURES SENIORS ROCKING IN CHAIRS, Diane Lade, Staff Writer; Sun Sentinel; Oct 19, 1989; p. 6), age 96, for having rocked the chair for 50 consecutive minutes. Each participant had a personal goal, so this was not a record. That she died as a result of an accidental fall also spurred my concern into quality-of-life and eldercare issues for the oldest-old population.

² With an estimated annual mortality rate of 50% above age 110 and figuring the chances of reaching age 115 to be one in two billion; the odds of surviving to age 122 would be one in 40 billion. However, the survivor-curve hypothesis holds that once a remaining population reaches a very small sample (less than 30), mortality rates decelerate, meaning that such an estimate may be a little overstated. However, it gives some idea of just how rare a true 122-year-old is. Put another way, using a 50% annual mortality rate, someone on their 110th birthday has a 1 in 4,096 chance of reaching age 122. Yet Jeanne Calment lived another 164 days, so the chance of making it to 122.45 years is approximately 1 in 5939 persons.

While realizing that further refinement and improvement of our maximum life span model is still needed, I hope this thesis serves as an inspiration for the next generation, who face the newfound challenge of fighting the myths of longevity which have found new life in recent years via the internet. Thus I dedicate this work to those whose past research has laid the foundations for this study, and to those whose future work may expand research into this area further than what is presented here.

ACKNOWLEDGEMENTS

I would like to acknowledge the hard work and dedication shown by those who have had a part in not only this thesis but in my career. The following persons have seen in me a promise, and I hope to fulfill their faith and trust, that it was not based on blind faith but on an early recognition that I had potential. Some saw a raw talent: they believed I had the ability to do more, but was in need of mentorship and guidance. Without their belief in me I would not have believed in myself either, or have become the person I am today—someone whom the media trusts to turn to as an “expert” in the niche field of supercentenarians and age validation research. I have been quoted by over 1,000 newspapers on five continents (including the *New York Times*, *Wall Street Journal*, and *Tokyo Times*), as well as major international media outlets such as CNN and the BBC and currently hold the position of Senior Consultant for Gerontology for Guinness World Records (since 2005). Truly, for me this has been a dream come true. But this dream took twenty years to become a reality.

To Dr. Leonard Poon, whose early work with centenarians and supercentenarians at the Georgia Centenarian Study in 1988 served to inspire and show me that there was more to the field of extreme longevity than simple newspaper mentions of 111th birthdays and lots of candles on a cake;

To Dr. L. Stephen Coles, whose Gerontology Research Group has, since 1998, served as an outlet for disseminating factual information about the human lifespan and supercentenarians, and who has since 1999 posted on the GRG website my work on supercentenarians, while entrusting me to be the Senior Claims Researcher for the Gerontology Research Group’s list of the world’s oldest people;

To Dr. James Vaupel, whose year 2000 invitation to his inaugural Supercentenarian Workshop at the Max Planck Institute for Demographic Research, Rostock, Germany served to move me from a national to an international career path;

To Dr. Bernard Jeune, who early on in my career took an interest in my supercentenarian lists and who sent me two books, the *Validation of Exceptional Longevity* (1999) and *Exceptional Longevity from Prehistory to Present* (1995), which focused and increased my understanding of the validation process and the history of extreme longevity research;

To Dr. Jean-Marie Robine, the validator of the Jeanne Calment case and one of the founding forces behind the International Database on Longevity, who early-on recognized the need to combine national supercentenarian data into an international database, and whose early work with me [in 2000, we worked to see that Marie Bremont of France (1886-2001) was accepted as the world's oldest person by Guinness World Records] also helped me to establish myself in my current position as the Senior Consultant for Gerontology for Guinness World Records;

To Dr. Tom Perls, who in 2001 invited me to my first Gerontological Society of America conference, whose early faith in me led to my first published journal article in 2006, and who chose me to be a researcher for the newly-formed New England Supercentenarian Study in 2006;

To Dr. Bert Kestenbaum and Renee Ferguson of the Social Security Administration, who chose me to help work on the SSA's first-ever study of supercentenarians, and who since 2001 have entrusted me with the entire research set of the SSA's study on supercentenarians, without which this thesis would not have been possible;

To Mary Mackinnon, whose sweet personality and consideration for others overlays a strong-willed commitment to mentoring and thus ensured me a smooth transition into the

Gerontology Institute at Georgia State University in 2005, without which this thesis might not have occurred;

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To Dr. Elisabeth Burgess, whose social gerontological heft and rigorous research-paper writing emphasis pushed me to do more, and helped prepare me to write this thesis;

And most of all to Dr. Frank J. Whittington, who graciously put in many hours to shape and form a diamond in the rough (this thesis and myself), polishing my prose with methodical precision; who socially and emotionally and financially invested in my success beyond the call of duty (for Dr. Whittington, it is not just a job, it is a passion); and who managed to help me put together the pieces of this thesis that would have made the attempted re-assemblers of Humpty-Dumpy jealous.

And finally, to all those who will come after me and will keep the traditions of William Thoms, Thomas Emley Young, and Walter G. Bowerman alive, I commend you...Filipe Prista Lucas of Portugal most especially.

And to all those out there who helped me along the way but whom I did not mention, my apologies in advance that, for the sake of brevity and not to offend those left out, I did not name everyone. But I appreciate your work as colleagues and mentors.

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PREFACE

My personal interest in human longevity began when, at four years of age, I met my 85-year-old great-great aunt. I was hooked as she “flapped” her “wings” (folds of skin on her arms) and joked that she was “flying.” Perhaps it was this buoyant, positive attitude that instilled in me early a positive sense of aging. But, at the same time, the death of her World War I-veteran husband, Ralph Ralston, in 1978, made me realize the downside. It seemed that older persons were closer to death. Nonetheless, I was an optimist: is not there always a chance of surviving to the next year? If one can live to age 85, why not 86? How old could one get to? 100? 101? It was in 1979 that I saw my first news report: a woman had celebrated her 109th birthday. Wow. Hard to believe, but somehow it seemed real. Two years later, in 1981, the woman (whose identity is lost to the memory of a child) turned 111. Amazing. Just how long could humans live? By 1984, I had my answer: the Guinness Book, which claimed to be “completely authenticated,” said that Shigechiyo Izumi of Japan was 118 years old, and the oldest person ever. Somehow, age 118 seemed hard to believe. I thought 113 or 114 sounded a bit more on the mark. I thus began a quest to do a little research of my own: even if Izumi was really 120, he would have been a fluke. Most of the people recognized as “world’s oldest” were female (including Izumi’s immediate successor, Mamie Eva Keith, who took the title at age 112 in 1986—a much more believable age). As my interest grew in the world’s oldest people, I became aware that there were two kinds of supercentenarians: authenticated (true) ones and unauthenticated (status uncertain, maybe false) ones. I had begun compiling lists of supercentenarians, one with cases that were reportedly verified (especially if they were in the Guinness Book); the other with unvalidated claims. I was on my way.

Fast-forward two decades. To make a long story short, after twenty years of studying the world's oldest people, I have become an expert in the field, and I have moved from content consumer to content provider. My lists, which initially began with just a few supercentenarian cases, continued to grow longer as I found more claims. In 1999 I joined the Gerontology Research Group (www.grg.org), where Dr. Coles has hosted my lists of the oldest people, along with those of competitor Louis Epstein. In January 2000, Guinness World Records asked me to find candidates for the world's oldest person for the first time (basically, I had become a junior consultant). That year I also attended my first Supercentenarian Workshop with the Max Planck Institute, the first of several international workshops and conferences on supercentenarians. In November 2000, my recommendation of Marie Bremont of France as the world's oldest person was accepted by Guinness, another personal milestone (my first recommendation of Marie Bremont in January 2000 was superseded by the discovery of Eva Morris of the United Kingdom, who had been several months older at the time). In 2001, I was invited to the Gerontological Society of America's annual conference in Chicago by Dr. Perls of the New England Centenarian Study. I also had become involved with the Social Security Administration's supercentenarian study, and in 2002 I founded the World's Oldest People web group, which became a portal for information-sharing among volunteer (and, eventually, professional) supercentenarian researchers (it is now the first hit on the Yahoo search engine for "world's oldest people")³. In 2004 I was an organizing member of the Supercentenarian Research Foundation⁴. Yet 2005 really was the breakthrough year: the year that Guinness World

³ <http://search.yahoo.com/search?p=world%27s+oldest+people&ygmasrchbtn=web+search&fr=ush-news> (accessed July 21, 2008).

⁴ <http://www.supercentenarian-research-foundation.org/organization.htm> (accessed July 21, 2008).

Records asked me to serve as their Senior Consultant for Gerontology, bypassing several older candidates for the job. I was honored to be chosen; I still am today.

As the Senior Consultant for Gerontology for Guinness World Records (since 2005), I am entrusted with a tremendous responsibility: to choose the world's oldest person for the entire world (or at least that part of the world that looks to science for its answer to the question, "Who is the world's oldest person?"). This choice must be made, not based on emotional appeal, but based on the scientific method. Part of the scientific method entails refinement and adjustment of an existing model based on new data. Indeed, I was not afraid in 2004 to recognize Ramona Trinidad Iglesias-Jordan of Puerto Rico (Aug 31, 1889-May 29, 2004) as the world's oldest person, even though such recognition displaced a woman I had already met in person and grown to love (Charlotte Benkner, Nov 16, 1889-May 14, 2004), and even though Puerto Rico had a history of age exaggeration: for under close scrutiny, the case of Ramona Trinidad Iglesias-Jordan was impeccably validated. That a certain region has had a history of inflated age claims does suggest we should approach new claims from that area with skepticism, but we should also not prejudge: we must treat each case individually.⁵ Even more, the belated recognition of Maria Capovilla of Ecuador (Sept 14, 1889-Aug 27, 2006) in December, 2005, as the "world's oldest person" overturned the then-accepted belief that the 1880s generation was extinct and raised the age of the oldest verified living person at the time by almost a year (replacing both Hendrikje van Andel-Schipper of the Netherlands, June 29, 1890-Aug 30, 2005; and Elizabeth Bolden of the USA, Aug 15, 1890-Dec 11, 2006—Ms. Bolden would later regain her title after Maria's death). Even more, Maria came from a nation (Ecuador) with a long history of age exaggeration (the Vilcabamba myth), but a close examination found that her case was much different than

⁵ Likewise, that the U.S. African American population has a history of age-inflated claims does not discount the fact that many of the cases investigated on an individual basis have turned out to be true, such as Elizabeth Bolden (the first living African American person recognized as the "world's oldest person" by Guinness World Records).

those in the past: she came from the city (not the village); lived near sea level (not the mountains); and was well-educated (not illiterate). Her case contrasted with the 1970s myth that village people living in the high mountains of Ecuador lived to “special” or “magical” ages (130+), perhaps due to the thin air or water. Note also that her age, 116, was younger than the oldest validated supercentenarian of all time (Jeanne Calment, 122) while the mythical age claims from the 1970s, such as Miguel Carpio Mendieta, exceeded age 122 by a considerable amount (127 years old, 142 years old, etc).

Even so, the reverse situation is also true: Japan, an area of well-attested documentation, can sometimes produce an invalid claim. I do note that the Shigechiyo Izumi (1865?-1986) and Kamato Hongo (1887?-2003) cases of Japan remain controversial, despite official acceptance by the government of Japan and recognition as the world’s oldest person by Guinness World Records. Although I accepted the Hongo case at the time (2002), I also began the re-investigation into her age; research by Michel Poulain of Belgium has suggested she may have been a few years younger than her “official” age of 116 (detailed results not yet published as of May 2008). However, as both the accepter and the later source for the questioning of her age, I did hedge my bets: age validation research and record-keeping is like baseball; we sometimes need to use an asterisk when records appear to be suspicious.⁶ Age validation is also like instant replay: sometimes we need to review a past decision as well. As Guinness World Records has put it succinctly:

No single subject is more obscured by vanity, deceit, falsehood and deliberate fraud than the extremes of human longevity.
-- Guinness Book of World Records, 1986

⁶ Barry Bonds may be currently listed as the “official” career home-run recordholder, but both his mark of “73” and the prior record of Mark McGwire are properly viewed with a grain of salt by fans.

Guinness World Records said it best when describing the never-ending cycle of longevity myths, from past to present, that cloud our view of how long humans really live.⁷ While some may argue that there are other areas of human anatomy and physiology that are even more mythologized (such as the phallus), it remains a universal truth that all humans currently alive can expect to die within thirteen decades, one hundred twenty-five years or so at the most. It is this fear of death and its universality that pushes cultures, worldwide, to exaggerate human longevity: for when we hear reports of persons living to 150 years of age, many are comforted with the idea that death can be delayed: death is moved from our everyday consciousness to some time far in the future. To 50-year-olds, hearing about living to 150 means they can imagine another century of life, not the more realistic view that their life is half-over (or two-thirds, if we are to live to just age 75). Our interest in the world's oldest person, ultimately, is not about them: it is about us. When we see someone who is 114 years old on television, we feel young, as if death is something far from us. While wondering what it would take for us to reach that age or whether it is worth it to live that long, the average television viewer can find comfort in the fact that such an age (114) is far removed from their present reality of daily life and is an age they cannot relate to, thus avoiding having to confront their own aging and mortality situation. Many people hold the view that they would rather not know how long they are going to live; hearing about 114-year-olds helps them to keep the issue of their own mortality a mystery whose solution lay firmly rooted in the future.

⁷ Yet I am not afraid to admit that Guinness' aspiration to having only "completely authenticated" records did not always lead to the proper choice when it came to the world's oldest person: like solving identity fraud and theft, it is often difficult to separate fact from fiction, especially when documents exist that purport to support a claim. In some cases, age misstatement may not be intentional fraud, but simple error: i.e., a mental hospital patient's age may be guesstimated incorrectly at their admission: this is hypothesized to have happened with the Carrie White case, whereby her age claim of 116 in 1991 was based upon a claimed entry age of 35 in 1909. Later research would suggest, inconclusively however, that she may have been 102, not 116, years old at her death in 1991.

Yet a second, more basic question in our mind soon arises: is the age claimed real? Was the person just shown on television really the age claimed? As much as we'd like to believe extreme claims of longevity, doubts arise: the claim is nothing if not true, and many people have heard of past longevity claims turning out to be false. Modern science has done a fair job to educate us as to how long humans really live—in the last two decades, the oldest living person has ranged from age 114 years, base to 122 years, tops. Yet for every report we see of Edna Parker, 114,⁸ we see another one of some wild claimant, such as Mariam Amash of Israel (who recently claimed to have been born in 1888)⁹ claiming to be far older than the official world's oldest person. Yet there is a difference between the two: Edna Parker's age is real, validated by scientific methods, and whose validity is attested to by Guinness World Records and even readily-available original census, marriage, and other documents: documents written in 1900, or 1913, long before anyone thought that Edna would one day be recognized as the world's oldest living person. Mariam Amash's age claim, in contrast, is a myth: the reported age of her youngest son, 54, would mean that if she were 120, she would have given birth at age 66 in a time and place before modern fertility interventions allowed post-menopausal women to get pregnant. On closer examination, for her to be even 100 years old would have required her to give birth naturally at 46 years old, which is on the cusp of believability. A discerning reader would thus conclude that her claim to age 120 is not credible.¹⁰ Yet those who may be lesser-educated, gullible, more willing to give someone the benefit of the doubt, or did not hear the report on the age of her son, may have allowed themselves to believe that this woman was the

⁸ <http://abcnews.go.com/US/wireStory?id=3490185> (accessed Apr. 14, 2008).

⁹ http://www.dailymail.co.uk/pages/live/articles/news/news.html?in_article_id=515351&in_page_id=1770 (accessed Apr. 14, 2008).

¹⁰ See <http://politiken.dk/udland/article478249.ece> for more.

age claimed (some even citing that if Jeanne Calment could live to 122, this case could be plausible). Thus we have a problem: above the age of the highest proven individual (currently Edna Parker, 115), there is a gray area of longevity claims which, though most likely false, might appear to be true to some part of the population. Above this lay the longevity myths, for which there is no shadow of scientific doubt that they are untrue, but that has not stopped the popular imagination from accepting them. There is a sliding-scale of believability: many people might find a claim of 116 to be credible, but few literate persons would believe a claim to 140. Where do we draw the line between myth and reality? What do we call those cases in the gray zone? For this issue I use the term “longevity claim” to refer to unvalidated claims above age 110 that might have a small possibility of being true. I tend to use age 130 as the upper boundary, due in part to even the most skeptical of today’s researchers, such as Dr. Jay Olshansky of the University of Chicago, betting (billions of dollars, mind you) that no humans will live past age 130¹¹ (whereas no one was willing to bet on age 125). Yet for those claims above 130, or below that mark but clearly shown to be false, I reserve the more direct term, longevity myth.¹²

Longevity myths are claims to extreme age that are widely believed, especially by a lower-educated populace or subculture, but which are not true. I have long been fascinated by them; not only what drives people to inflate or exaggerate their age but also why so many people tend to believe stories that, upon closer examination, are not credible. As it turns out, the causes of myth-making are many: religion, nationality, familial history, financial reasons, attempts to gain attention...the reasons are myriad. In this paper, I give a general overview of the root causes of these myths, with a focus mainly on those myths tied to race and religion. I also plan to

¹¹ <http://sciencenow.sciencemag.org/cgi/content/full/2001/209/1> (accessed June 1, 2008).

¹² There is no sugar-coating that claims above 130 are certainly false, and we should not give the benefit of the doubt to them.

examine the intersection of race, religion, and extreme age claims. I will also note the bifurcation of beliefs regarding longevity myths: those persons who believe in a religion are more likely to also believe in the myths of aging, while those who adopt a secular viewpoint are more likely to consider the myths of aging false. Longevity myths are rooted in religious myth, which is taught at church; the scientific perspective is taught at public schools. I realized as a child that these two competing ideologies (the myth of aging versus the scientific quest to determine how long humans really live) were not really compatible, and I was torn between which one to believe—at age ten. In 1984, I opened my first Guinness Book of World Records and read that Shigechiyo Izumi of Japan was the “world’s oldest person” at age 118 (as of June 29, 1983). Even at age ten, I found the Izumi claim hard to believe,¹³ and I began a quest to find out how long humans really live. I have over the past two decades adopted the scientific perspective, and have embarked on a journey to “shoot down” the myths (while respecting others’ right to believe them). Yet there always remained a lingering doubt: what if at least a part of the “myth” was true? Someone could be younger than the age claimed, but still old enough to be the world’s oldest person. What if someone claimed to be 135 but was really 115, while the oldest verified person was 114 simultaneously? Could it not be that if we were omniscient and knew everything, that the *real* world’s oldest person might be someone older than our oldest verified living supercentenarian? Other supercentenarians may not have exaggerated their age at all: they could have been 115 for real, but simply lacked proof of their age. Thus, it was not enough to dismiss, whole-sale, all longevity claims: further investigation was needed.

As a person of scientific mind but who has been raised in a nation with Judeo-Christian values instilled from childhood, I view this paper as the culmination of a journey: this journey is

¹³ Later Japanese researchers such as Toshihisa Matsusaki would cast doubt on the claim in 1987, suggesting Izumi was only 105, but the government of Japan has never officially retracted it. Shigechiyo Izumi died Feb 21 1986, recognized by Guinness as the oldest man ever at 120 years 237 days.

not mine alone, but one for all *who have wondered about the length of human life and desired to know how long humans really live*. While there are many branches of the longevity myth tree, for the purposes of this thesis I will be focusing on the “race and longevity” myth—in particular, the African American myth of longevity. I note that there are other race longevity myths in other nations, but in the United States the African-American longevity myth has been the most prevalent (Myers, 1966; Rosenwaike & Stone, 2003) and we do not have data by race for other countries. Further, the United States also has, by far, the world’s largest validated supercentenarian population (currently comprising over 575, or 52%, of the world’s 1100+ validated cases, as of May 2007).

Does longevity really vary by race, as reported in the popular press? When we see Timex watch commercials with the “world’s oldest man,” alleged to be William DuBerry, 121 (1870?-1991) an African American from South Carolina; or when we read that “ex-slave” Arthur Reed, 123 (1860?-1984), died in South Carolina, or hear that “ex-slave” Charlie Smith of Bartow, Florida is “137” (1842?-1979), a pattern begins to emerge: it seems that the oldest people (in America, at least) are all African American, and, paradoxically, come from a hardscrabble background. As children, we tend to believe what is reported in the major media outlets (such as television or newspaper) as “gospel truth”; only later do we begin to question unvalidated assertions that may have little or no basis in reality but make for great media stories.¹⁴

¹⁴ For example, the story of Frank Calloway, a “112”-year-old artist despite being a mental patient since 1952, has recently made the national press (<http://www.cnn.com/2008/LIVING/07/20/elderly.artist.ap/index.html#cn-STCText>) (accessed July 21, 2008). In this case, no one bothered to ask if his age were verified, and indeed the Gerontology Research Group researchers Louis Epstein and Filipe Prista Lucas had already determined that, based on early census records, Mr. Calloway was only 93, not 112, years old. In other words, a “feel-good” human interest piece may be too good to be true, but that doesn’t stop journalists from writing them, blissfully uninformed and continuing to spread the myth of longevity.

In the 1970s, the most frequent “longevity myths” came from the Soviet Union, where claims to extreme old age in the Caucasus Mountains¹⁵ fit together snugly with the racial notion that white or “Caucasian” peoples originated there (an idea since discredited, although the “multiregional hypothesis” still has a few adherents) or even that those people lived longer because they came from a “Holy Land,” were closer to God, lived in the mountains, or as some Christian apologists have stated, their genes had not dissipated as much since they were of the “original stock” (Noah’s ark having landed on Mount Ararat!).

However, as I grew older and learned more, it became apparent that longevity myths far preceded the 1970s, Communism, or the Soviet Union. Indeed, scientists would date the origin of the first longevity myths to the advent of agriculture. Prior to farming, hunter-gatherer societies had little use for elderly persons, and those who managed to survive much beyond the life expectancy of 20-25 years often only made it to age 40. The constant moving required of hunter-gatherer societies ensured that being an old and slow individual was an economic drag on the group, and the scarce resources meant that the “elders” (those rare individuals who managed to survive youthful violence and competition for resources) often were turned out from the tribe, to their deaths, when it became apparent that their continued existence was becoming a practical burden for group survival. A few cultures still existed even into the 20th century which operated in this manner (Foner, 1985).

This began to change with the advent of agriculture. The need to constantly watch crops (coupled with the need to stay in one place) meant that elders could be economically productive, even while not having to move around. In addition, passing down oral traditions and teachings (e.g., how to make pottery, jewelry, etc.), proved beneficial to society. Since those who had died young would not be able to carry on these functions, and many of the living young were busy

¹⁵ <http://www.time.com/time/magazine/article/0,9171,908667,00.html> (accessed Jan. 31, 2008)

hunting or caring for children, societal organization began to shift towards a re-valuation of the need for at least a few elder persons as vitally important for tribal or group survival. Indeed, many scientists today favor the idea of the “grandmother effect,” or that the benefit of the grandparents caring for grandchildren (thus freeing up parents to do more work outside the home) led to an increased lifespan. At any rate, for a simplistic culture, that the persons living the longest were often those who knew the most about gods, magic, and medicine led to the conflation of longevity with spiritual or magical powers. Additionally, societies organized around inheritance favored eldership (as well as the “oldest son,” or primogeniture). Societies often developed matrilineal or patrilineal cultures, whereby either an aged mother- or father-figure gained stature. With this re-valuation of elders came competition between elders, from both within and without the familial, tribal, or group structures. This Darwinistic competition favored the oldest or wisest elders as “most valued,” much in the way that trees attempt to outgrow each other in a forest in order to gain the most sunlight. In this context, the next step—age exaggeration and inflation in order to secure primacy over rival elders—is evident. Unlike tree height, however, which is a biological construct where “cheating” to be the tallest tree and thus secure the most sunlight cannot be a factor, claims to extreme age made in order to secure “oldest elder” status are a social construct that until the advent of written records have been easy to fabricate and difficult to disprove. Moreover, for groups that still put much faith in spiritual or superstitious beliefs, claims to extreme age were hardly the subject of doubt.

Differing groups often had their own maternal or paternal deity, for “protection.” In part because group structures often involved lineage and inheritance, it stood to reason that someone attempting to gain legitimacy as an elder might try to connect themselves to a “god” or “goddess.” We find in the Christian Book of Luke a genealogy connecting the birth of Jesus all

the way back to God himself (Luke 3:23-38), thus giving Jesus stature as a “son of God.” Likewise, we also find proxy exaggerations of age: it is not sufficient to claim great age for oneself, but also for one’s ancestors or family members. This is often done to advance the notion that one’s family or group is qualitatively different from the general population, or from the world population. Claiming that one’s ancestors lived even longer also served to throw off suspicion from a current claim. In the Bible, for example, Jacob lived “just” 147 years, which did not measure up to the age of his father, Isaac (who died at “180,” we are told). In a related vein, extreme age was often associated with status: that Joshua lived to just 110 (while Moses died at 120) assured Moses of greater status. Even here, though, we find competition: Moses’s older brother, Aaron, was “123”—which was not meant to secure Aaron’s status individually, but the primacy of the Aaronic priesthood as older than the prophet tradition. Yet for all these examples of the myth of longevity in the far past, we also see them continuing even today. Had Moses been alive in 2008, his age claim of “120” wouldn’t even be enough to make him the world’s oldest claimant (Moloko Temo of South Africa, who claims to be 134, is one of several current world claims older than 120).

Claims to extreme age are often associated with magic: in Nigeria, for example, a man recently claimed to be 140 years old and an “herbalist.”¹⁶ He also had multiple wives and many descendants. Ozo Esegwuja Nwaeze’s claim was not to “world’s oldest” status but to being the “eldest in two communities” (Ajibo, 2006). Hence, his claim to extreme age is an attempt to establish local status and power and should be viewed in this context. Nonetheless, the reporter co-opted the local village myth into a nationalist one, using the title “Nigeria’s oldest man” for the article. We can also see the article saturated with religious association (“how many more

¹⁶ <http://www.sunnewsonline.com/webpages/news/national/2006/oct/25/national-25-10-2006-04.htm> (accessed June 2, 2008).

years would you want God to add your life span?” and an anti-science perspective: “testimony that even today people can live long” contrasts with the comment “one hundred and forty years may look like eternity.” In other words, the newspaper writer, aware that some people may find the claim hard to believe, wraps it thoroughly in mythical contexts, with religious, tribal, cultural, familial, festive, food, and medicinal associations: the implied message is that doubting the claim would be akin to doubting the power of God and denying one’s own culture.¹⁷ Given such social pressures, most local persons would accept the claim, even if they had private doubts.

Understanding the contexts from which human longevity myths arise (intricately intertwined with religion, status, the desire to live forever, etc.), it follows that any discussion of “longevity myths” should first provide a basic background, framework, and descriptive context that would explain how and why false beliefs about longevity are so prevalent, while allowing a discerning researcher to separate the longevity myth from the reality. Many times this was not done in the past, as even scientists were willing to believe false associations of longevity with various myths, even into the early 1980s. It seems that the innate human wish not to die is at the foundational core of longevity and its studies, fact or fiction. If we hear about some 130-year-old person, we can push the fear of our own death to the back of our mind, realizing we have a ways to go before we get anywhere near such an age. Thus, in one sense believing a longevity myth is psycho-socially beneficial, in much the way many persons find comfort in religious/spiritual belief. Yet this denial of reality does not serve to help us to identify the causes of aging or what factors and life-choices are truly associated with longevity, and certainly anyone taking a scientific approach to an investigation of longevity needs to be cautious about mixing

¹⁷ This is no different than politicians in the USA wrapping themselves in the flag, in order to avoid having to confront reality.

correlations with rationalizations. As I will discuss later, the myths of longevity come from many causes; most fall into the categories of favored identity or financial advantage.

In this thesis, I shall investigate the association of “race” with longevity. While I would like to explore many of the other longevity-myth angles, from folktales to pension fraud, I find that the scientific data that are the most easily accessible, but not yet studied, are the racial demographics of supercentenarians. Indeed, since the data has not yet been publicly released but is available to me as a person who worked on the study, I find an opportunity here that might not last, and thus I take it. Data gathered in the USA in the last several years present an opportunity to eliminate the biases that come from age misreporting, in the USA at least, and also to compare the variables of age misreporting and race (before and after) to see if, as has often been theorized, age misreporting can entirely account for the race crossover effect. Therefore, this study will use these data to answer the question implied by popular reports of the “oldest living American:” do African American supercentenarians live longer than their Caucasian American counterparts? If we eliminate the myths of longevity and look only to factual records, will we still find a disparity between the longevities of the Caucasian American and African American oldest-old populations?

Let me take this moment to mention that my initial goal with this study was in fact to prove that, once and for all, there was no longevity difference by race, that we in fact all potentially live the same length of time. Suffice it to say that, as the data returns became available, I began to be swayed in the other direction: taking a scientific-based approach did indeed eliminate most of the racial disparity between the apparent oldest African Americans and oldest Caucasian Americans. However, using only verified cases, I found it intriguing that as of 2006, 9 of the 11 former Confederate states of America (plus the District of Columbia, 10 of 12)

had as their all-time oldest verified person an African-American. Requiring that we count only validated cases (even though the validation process favored the white supercentenarian population, which was far more likely to have records to prove their age) was not eliminating the crossover effect: in fact, at one point in 2006, three of the four oldest living Americans were African American. The preliminary evidence favored the argument that, even after the mythical component of age exaggeration is peeled away, there still may be some kernel of truth to what some may have dismissed as little more than folklore.¹⁸

This study answers several important questions, as well as raises new ones. First, this study quantifies the African American longevity advantage at the oldest ages. Until this point, such an advantage has been rumored and supposed in the popular media or inferred anecdotally but not actually addressed directly in the scientific literature, which often implied that it was due merely and entirely to age misreporting. Second, this study connects a relative-maximum longevity advantage¹⁹ to the crossover effect, whereby it has been demonstrated that African Americans at age 80 and above tend to outlive their white American counterparts—a reversal of the white longevity advantage at birth. Third, this study proposes to examine the four main hypotheses as to why this apparent advantage exists (statistical artifact, errors in data, environmental causes, and/or biological factors). In particular, this study most strongly calls into question the hypothesis that any maximum longevity advantage must be due entirely to age misreporting: if the data are clean and the effect is still demonstrated above age 110, a cause other than age misreporting must account for at least part of the apparent longevity advantage. I

¹⁸ Given that that the term “folklore” was coined by the original longevity skeptic, William Thoms, in 1846, we have come full circle.

¹⁹ By “relative maximum,” I mean that African Americans were more likely to reach age 110 or even 115, but this did not translate into a measurable gap in absolute terms. It remains to be seen if, given equal population proportions, such a gap could in the future be demonstrated.

ask these questions against a background context of the myths of longevity in general and the African American myth of longevity in particular. I contrast these past myths (and science's failure to recognize them) with the recent, renewed efforts to produce extreme longevity data cleaned of age inflation, bias, and misreporting (which may also include age underreporting).

A fourth major purpose of this thesis is (perhaps controversially) to argue for a biological or genetic basis for human longevity. I do so as a result of the findings; I have noted already that my initial position was opposed to such an idea. In the early 1980s and before, most researchers assumed that the factors affecting human longevity were mainly due to the environment (but also with the notion that longevity may be biologically "fixed" and "constant.") Research by centenarian studies in the 1990s, in particular the New England Centenarian Study,²⁰ began to challenge that notion, showing that long-lived individuals tended to have long-lived siblings (Perls, 2002) and even long-lived parents and children. Continuing that thought, many sociologists have been too quick to dismiss the biological components of race, claiming that race is a mere "social construction." Much of their argument seems to be based on politics, not science²¹ (Douglas, 2006). The argument often is advanced that there is more "within-group" variation among Africans than between Africans and non-Africans and thus suggest that "race does not exist."²² Much of this argument in the 1980s and 1990s helped shift scientific thought away from the old "Caucasoid, Negroid, Mongoloid" racial classification system which was used for much of the early 20th century and into the 1960s. However, in recent years geneticists and

²⁰ The New England Centenarian Study was founded in 1994 by Dr. Perls. In 2006, the New England Supercentenarian Study was created as subset of the larger centenarian study.

²¹ And yet we see scientists pressured to modify their findings to conform to political dogma: "people, including me, would rather believe that significant human evolution stopped between 50,000 and 100,000 years ago, before the races diverged, which would ensure that racial and ethnic groups are biologically equivalent" (Douglas, 2006). And yet the words "the races diverged" suggest that "race" is in fact a biological concept.

²² http://www.eurekalert.org/pub_releases/1998-10/WUiS-GSRD-071098.php (accessed June 18, 2008).

biologists have uncovered new data which argues for a new understanding of “race” that has a biological basis: “some (geneticists) say the genetic clustering into continent-based groups does correspond roughly to the popular conception of racial groups” (Wade, June 2007).²³ Thus we find not just “within-group” variation but between-group variation on a genetic level, and the between-group variation roughly corresponds to the older categories of “race.” Within-group variation, ironically, could be used to explain the idea of a genetic advantage for African Americans: non-African populations that suffered through population bottlenecks and a loss of genetic diversity (over tens of thousands of years of evolution) are more likely to suffer from the genetic effects of an in-breeding population, while a more diverse African gene pool would avoid such negative effects and be more robust. At least when it comes to the extremes, Africans (and by extension, African Americans) would do better: not only would they be more likely to avoid the negative effects of inbreeding, but they might also be more likely to inherit genes that promote extreme longevity (given that the genetic sample is more diverse). Even the argument that African Americans are often mixed with white ancestry would not matter; that would only increase genetic diversity, not limit it. Perhaps the problem with “race” as a “biological construct” is the grouping system, not the idea. If we replace the older notions of what “race” means with a newer, gene-based construct of haplogroup type (see Appendix A), we find that although humans are a mosaic and do not neatly fit into simplistic race models of “white, black, yellow, red,” they do roughly correspond to five main continental groups: African, Indo-European, East Asian, Australian, and American Indian/Native American (Wade, June 2007). We also can recognize that through genetic testing it is possible to identify one’s likely racial

²³ The irony is that some academics choose to find another term to replace a word (“race”) which has negative connotations in our society (Wade, June 2007). However, in part because the political, legal, and governing institutions of the United States continue to use the terms “white” and “black” and the Social Security data were coded that way, I also shall use the terms in this thesis.

group and geographic place of ancestry. Taking a Darwinian perspective, it stands to reason that different groups of persons, breeding in isolation, face variable selection pressures, which results in adaptation, change, and microevolution at the group level—changes that are small but potentially enough to account for minor biological variations in race-group longevity.

Theoretically, the group that has evolved the most due to selection pressures of evolution would likely be the biologically strongest: again, we see that group to be the “African” group (see Appendix A for details). We should see small but real variations in race-group longevity. A word of caution, however: these differences are much less than the differences seen on a species-level (the oldest living chimpanzee is 75, some 37 years behind the human record), or even a gender-level (women live 5-7 years longer than men). In the same way we see longevity variations between families, we might see minor differences in race-group longevity, but to a much lesser degree of difference due to statistical regression toward the means.

Addressing the “race as social construction” argument, however, does not scientifically answer the question first asked: do persons of one race have a different maximum lifespan than persons of another? Does a group longevity advantage equate to a maximum lifespan advantage? Anyone that is a follower of team or national sports knows that “depth” does not necessarily equate to having the single best player or being “the best,” but it does give the group more chances of success. Many may suppose that any variation in maximum longevity is due to environmental circumstance and that all humans have the same maximum lifespan. However, no one has attempted to quantify this assumption through statistical testing. To completely answer such a question, we would need to study the differences between many worldwide population subgroups or races. Unfortunately, informative worldwide data are not yet available. However,

the United States represents a microcosm of the entire world (Wilmoth & Robine, 2003),²⁴ and with the world's largest and most racially diverse supercentenarian population, is the prime candidate for addressing this issue. We may find that there is an African-American longevity advantage, which would show more in the proportions of a population subset; i.e., the percent of persons aged 113+ in the USA who are African American have so far been much greater than expected.²⁵ By tying together race data on American supercentenarians with the crossover effect, a much clearer picture should emerge in the debate that attempts to explain African American longevity utilizing the competing explanations of environment, biology, statistical artifact, and erroneous data.

²⁴ This paper by John Wilmoth and Jean-Marie Robine suggested that the “maximum longevity minimum” expected in the USA is age 113; for the world (a much larger sample size), the minimum goes up to only age 114. Hence, increasing the sample size on an order of 20-fold only increased the minimum-maximum expected age by about 0.9%. A world study, however, could add additional racial variables (Japan has the second-largest supercentenarian dataset, well over 100 persons).

²⁵ But we might not find a lifespan differential, if the data reconverge at, say, age 113.

CHAPTER I

INTRODUCTION

As other fields of science have advanced since the Dark Ages, when faith-based approaches to learning and reason held sway, the study of aging and longevity has lagged, remaining one of the last bastions of mythology. Indeed, even the word “gerontology” was not coined until 1903 by Elie Metchnikoff; the Gerontological Society of America was only founded in 1945²⁶; and a significant effort to study supercentenarians on a more than per-case basis²⁷ did not really emerge until the last decade (especially since 2000). With the post-industrial age explosion of centenarians (persons 100+ are the fastest-growing age group in most Western nations) and predictions of huge increases in the numbers of extremely aged individuals in the near future (1 million+ centenarians in the USA and Japan each by the year 2050), together with the growing concern over the funding of elderly entitlement programs such as Social Security, a new emphasis on studying supercentenarians has emerged. While amateurs had already begun compiling lists of supercentenarians in the 1980s and 1990s, and historical study of single individuals that included ascertaining whether their claimed age was real or false dates to the 1870s with William Thoms, serious scholarly efforts to study supercentenarians as a population cohort really began in 2000, with the Max Planck Institute’s first Supercentenarian Workshop in Rostock, Germany.²⁸ The first U.S. governmental research effort began at that same workshop

²⁶ <http://www.geron.org/history.htm#NIA> (accessed Apr. 14, 2008).

²⁷ In other words, early research on supercentenarians tended to attempt to prove or disprove individual claims to extreme longevity. Recently, a new focus of supercentenarians as a population cohort has emerged. This has been most noticeable in the demographic community, where stories such as abounded of women living beyond their life-insurance policy limits of age 110. New data tables have now extended the policies to age 120. In another example, France in the 1980’s rounded any reported death above 110 down to 109, since they did not have a 110+ age category.

²⁸ See http://www.demogr.mpg.de/en/calendar/workshops_1.htm for details (accessed Jan 15, 2008).

with the Social Security Administration, where it was recognized that many persons on the Social Security benefit rolls, allegedly aged 110 or older, actually had passed away decades earlier—and often with relatives collecting benefits, sometimes assuming the identity of the deceased (for example, Pearl Hackney of Arkansas allegedly died in 2004, aged 117, but it turned out the woman who died was age 93 and had assumed her aunt’s identity).²⁹ In other cases, a person simply lied about their age when in order to apply for early benefits (such as Eddlee Bankhead, who in 1956 claimed birth in 1883; after he died in 1999 it emerged he was born in 1899 and hence was 100, not 116, years old).³⁰ It was speculated by Social Security administrators that major cost savings could be realized if a scientifically-based, actuarial study of this extreme population age group were conducted. The Social Security Administration’s rationale for its study was that a study was needed to root out fraud and also to predict future pension costs associated with living to 110 and beyond. Actuarial tables, which had ended at age 110, were extended to age 120.³¹

While research has simultaneously been going on in Europe, Europe has faced “meta-data” issues: that is, the data from various nations may not be strictly comparable, depending on the differing rules and methodologies used to produce it, and the sample sizes are mostly too small for an individual study. Issues of confidentiality and international cooperation were also barriers to data gathering. Additionally, almost all of the European supercentenarian cohorts represent a monoracial grouping of “Caucasian” or “white” persons. The U.S. data are, in comparison, biracial (about 99% of the cohort being either white or black) and based on a larger

²⁹ Efforts with nonagenarians began in 1989 but funding was cut in 2000: see http://www.governmentattic.org/docs/SocialSec-Nonagenarian-Project_1989-2000.pdf for details.

³⁰ In other words, if Mr. Bankhead had given his true age in 1956 (57 years old), he would have had to wait eight more years to begin collecting a retirement pension. By claiming to be born in 1883, he made himself well over the minimum age of 65, and probably enough to avoid scrutiny.

³¹ In one case, a woman outlived her life insurance policy, which only went up to age 110.

population sample. As of 2008, the U.S. supercentenarian dataset (over 570 validated cases) exceeds that of the rest of the world (about 500 cases). Neither the U.S. Social Security nor world (mainly European, Japanese, Canadian, and Australian) databases have yet been made public, with a few exceptions. Because I am in the advantaged position of having been involved in the process of the U.S. database creation and I have access to this data³² and an understanding of its implications, I plan to use this confluence of opportunity and knowledge to examine, scientifically, whether African Americans have a maximum longevity advantage over Caucasian Americans, as the mythology has implied.³³ For the purposes of this thesis, I shall focus on a racial comparison of supercentenarians in the United States. France has had a few Afro-French supercentenarians, but not enough for a study sample. Additionally, French law bars collecting data by race (based on the concept that everyone in France is “French”)³⁴ while U.S. law requires the collection of data by race (under the presumption of preventing discrimination).

Past research on race and longevity has observed a “crossover effect”: that is, even though the life expectancy at birth for white Americans exceeds that of black Americans by about five years (2003: 78 for whites, 73 for blacks),³⁵ this white American longevity advantage

³² In 2000, I was invited to the first Supercentenarian Workshop in Rostock, Germany, having been noticed first as a member of the Gerontology Research Group (www.grg.org). Indeed, I had maintained lists of supercentenarians as a hobby since the 1980s (when I was 13) and with my own dataset and knowledge of cases having grown large, I was recruited to help in the effort to find U.S. supercentenarian cases for the Social Security Administration’s study of supercentenarians, which is ongoing. In exchange for behind-the-scenes research, I was given access to the Social Security data. For a detailed look at this study, see Rosenwaike & Stone, “Verification of the Ages of Supercentenarians in the United States: Results of a Matching Study” (2003).

³³ Myths of racial differences abound, including those of physical prowess, mental ability, even the size of the male sex organ. Occasional attempts have been made to either refute or support such race-based claims.

³⁴ While some may laud a race-blind approach as better, it has been noted that France has used its no-race policy as a justification for maintaining colonies such as New Caledonia. For a fuller treatment, I recommend reading “Empire of Love: Histories of France and the South Pacific” by Matt K. Matsuda: <http://www.oup.com/us/catalog/subject/History/WorldHistory/GeographicalAsianHistory/HistoryofAsia/?view=usa&ci=9780195162950> (accessed July 18, 2008).

³⁵ http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_14.pdf (accessed Mar. 26, 2008).

has tended to disappear in statistics around age 80,³⁶ and definitely by age 85, so that African-American life expectancy in late life exceeds that of whites. In prior research this advantage has been shown to exist, up to age 99 (Preston & Elo, 2006). While discussions have occurred of whether this phenomenon has been a real difference or simply an artifact of age misreporting, attempts to determine whether the longevity advantage continues at ages beyond 100 have not been made. Usually, the argument has been “not enough information is available” or “the data is not accurate”.³⁷ That has changed. With the data available from the SSA study (which is ongoing and has not yet published full results, but has issued a “Phase I” dataset and has allowed partial publication of results), I propose to extend the “crossover effect” research to age 110 and above to determine if the effect continues beyond age 99, the previous limit of study.³⁸ My hypothesis is that, human longevity does not vary much, if at all, by race, and that differences might have more to do with cultural/environmental influences, but I expect the results still to show an African American advantage (based on my anecdotal knowledge of past supercentenarians). I do not have the data to investigate causation at this point, but it would be premature to speculate on causation without first demonstrating a correlation. Hence, I plan to test the data to see if, after eliminating the biases of age misreporting, the data still show a statistically significant difference by race.

Also to be discussed will be whether past racial longevity gaps will continue to exist as future generations age. If the reasons for the crossover effect are primarily socio-cultural, they

³⁶ <http://paa2007.princeton.edu/download.aspx?submissionId=71505> (accessed Mar. 26, 2008).

³⁷ For example, we can from this report conclude that the numbers of African-American supercentenarians are higher than expected, especially at ages 105 and above. <http://www.census.gov/prod/99pubs/p23-199.pdf> (accessed Mar. 26, 2008). However, the data has not been cleaned for age misreporting.

³⁸ This skips over age 100-109. While data is not available for these age groups, if the crossover effect is still seen at age 110, it would imply that it exists in the 100-109 age range as well. Future studies may close this gap to confirm this.

would likely disappear if the cultural conditions that led to the longevity advantage change. Just as some have suggested that Okinawa may lose its current ranking as the world leader in life expectancy as its younger generations shift away from a healthy diet of fish and seaweed to a more “Westernized” diet of McDonald’s hamburgers and French fries, so there is already a concern that many of the factors that have in the past led to remarkable African American longevity—greater familial support, greater church support, a positive mindset (“we shall overcome”)—are being replaced in a younger generation that is more fractured (less fatherly support, more children born out of wedlock, more young black males in jail), less integrated (one of the ironic effects of desegregation is a loosening of the within-group bonds) and less culturally positive (e.g., “gangsta” rap/hip hop culture)³⁹ than prior African American generations. Thus, despite the fact that African Americans born in the 1870s to the 1890s appear to have a maximum longevity advantage when compared to their white counterparts, we cannot say that such advantages will continue. With this understanding, it becomes even more important for this quantitative research to illuminate areas where further qualitative study may be warranted.⁴⁰ If we can identify a positive correlation between African American longevity and cultural lifestyle factors (among the oldest-old), we can then argue for the adaptation of these factors for both non-African American older persons as well as the next generation of African Americans as they age. I shall discuss this further in Chapter 5.

Demographic researchers have identified a crossover pattern between the mortality rates of Caucasian-American and African-American individuals for at least the past century (Preston

³⁹ Hip hop is seen by many as glorifying violence and early death, in contrast to the historical African-American church emphasis on “living right.”

⁴⁰ Yet the issue is deeper than simply “yes” or “no”---it is one of degree. I do not expect the data to align perfectly; it remains to be seen if differences that emerge are statistically significant, and whether African-American longevity can be tied into the “crossover effect” phenomenon, or the tendency of African-Americans to live longer than their white counterparts after age 80.

& Elo, 2006). For a long time, the crossover effect was an accepted phenomenon, with the dominant explanation being the “heterogeneity hypothesis” (Lynch, Brown, & Harmsen, 2003). This hypothesis states that, in a given sample, the frailer/weaker members of the sample die off first, leaving a surviving population that is tougher; thus the death rates at the highest ages for the survivors are less than would be otherwise expected (this is called the “survivor curve”). Additionally, the heterogeneity hypothesis holds that when selection pressures are greater, higher early mortality will result among the weaker members of a given population and when selection pressures are less, weaker members tend to survive longer. This results in a differently distributed pattern of mortality which necessarily results in a crossover effect (Liu & Witten, 1995). In the African-American population, lower life expectancy is assumed to be due to greater negative selection pressures (such as lower socioeconomic status, less access to health care, etc). The result of this is earlier death of the weaker members, with the stronger members more likely to survive into old age. White advantage, however, means that the deaths of frailer members of the white population are shifted to older ages. The result of these two differentials is that, since the causes of death among the oldest-old shift to more biological than environmental factors, and the early white advantage has resulted in a generally frailer older white population, a point will come where the death rate for whites will catch up to and actually exceed that of blacks. If this is the case, the “crossover effect” is merely a statistical artifact of a differently-distributed mortality curve, such as the Gompertz curve⁴¹ or the Sigmoid-curve⁴² (see Appendix B). In both cases, there are possible explanations for both total mortality slowing and for in-group mortality differentials. I shall examine these possibilities in greater detail later.

⁴¹ <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1076153> (accessed Jan. 31, 2008)

⁴² “S-curve” stands for “Sigmoid function”; it is a curve characterized by the slowing of changes at the margins: see <http://mathworld.wolfram.com/SigmoidFunction.html> (accessed Jan. 31, 2008).

An alternate explanation, which has gained increasing currency in recent years, is that the phenomenon is entirely due to age misreporting (Preston & Elo, 1996). One purpose of this data analysis is to test this hypothesis. I shall argue that the Social Security Administration's validation procedures were very thorough and likely sifted out almost all false or misreported age claims, even erring on the side of caution (i.e., some real claims were not accepted as validated). This, together with the "whole population sample" methodology, indicates that the data are more akin to a "census count" than a "population estimate," and thus if there is a remaining longevity gap, it must be real (not attributable to age misreporting) and due to some other factor.

A third rationale, that the crossover effect is due to biological and/or environmental factors, has not been as popular, but still has some support (Corti et al., 1999). This third rationale is usually divided into either biological or environmental factors. Biology is seen as fixed, while environmental or cultural factors (lifestyle) may change over time (i.e., can be temporary and disappear when the causative factors are modified).⁴³ Those arguing for a biological or environmental explanation are cautious to note that they are only positing minor group differences (generally less than two years) which is opposed to the longevity-myth race age gaps (often five to fifteen years; for example, in January 2007 Alberta Davis, an African American woman from the state of Georgia, was alleged to be 125, while the oldest white American was more than a decade younger at age 113). It should be noted that previous studies have suggested, for example, that the supercentenarian mortality rate is lower in summer than in winter (and thus they may live a few weeks longer, on average); those born in rural areas tend to

⁴³ However, we should also remember that even if "biology is fixed," environmental impacts may prevent the full expression of biological potential. For example, a spruce tree near the coast may be weather-beaten, with its growth limited by both wind and a high salt content in the soil. Likewise, we see animals in zoos live far beyond their normal life spans in the wild, due to the elimination of environmental constraints.

live longer (Stone, 2003); those born to younger mothers tend to live longer, etc. (Gavrilova & Gavrilov, 2007) .

Identifying the correlations between longevity and specific factors of genetics and environment could lead to a better understanding of aging and perhaps to ways to extend the current life expectancy among those aged 85+. Given that data in the past have indicated a greater life expectancy among African Americans aged 85+, it follows that a more thorough investigation is needed to determine if the crossover effect for this population subset is real, and, if so, what could be its causes. Four propositions have been advanced: (1) the crossover effect is not real but caused by age misreporting; (2) it is real but linked to statistical artifacts; (3) it is real but linked to temporary environmental advantages; and finally, (4) it is real and linked to continuing genetic advantages, which tend to be masked at younger ages due to the higher selection pressures facing the African American population as a whole. I will discuss these four propositions as they relate to the literature currently available.

Is “race” a factor in human longevity? Recent studies have shown that gender is a major factor in human longevity: approximately 90% of persons aged 110 or older are female.⁴⁴ Research has also demonstrated that longevity is inherited, and that siblings of centenarians are far more likely to reach 90 years of age than siblings of non-centenarians (Perls et al, 2002). Researchers also have shown associations between rural and urban residence (Stone, 2003), early-life situations, and even time of month of birth as having at least a marginal impact on observed life span. Yet, no one has done research that analyzes supercentenarians on the basis of racial classification. This may be, in part, due to currents in mainstream thought that “race” is

⁴⁴ In this study below:

http://muse.jhu.edu/journals/demography/v040/40.4rosenwaik_e_tables.html#tab01 we see that 226 of 246 verified cases were female (91.86%) and that 268 of 297 census-matched cases were female (90.24%). Other data suggest that around 90-91% is the expected percentage, here's the GRG main file list: <http://www.grg.org/Adams/I.HTM>.

socially constructed and claims that there is more in-group variation than variation between groups. Yet such contentions, while politically popular, also fail to recognize that a fairly large body of race-based medical research has been conducted (and not just sickle-cell anemia: heart studies, for example). Even if race is socially constructed, different group barriers and life situations are predictors of future variation between groups. Additionally, some research also has suggested a biological component may be associated with race. When it comes to skin color, darker-skinned peoples have an advantage of more natural protection from the sun, while light-skinned peoples have the converse benefit of being able to manufacture more vitamin D in their skin. What has not been thoroughly investigated, however, is whether the environmental and biological components of race serve to confer a cumulative longevity advantage to one group or another, or how much impact environment and heredity have on longevity. Research on Danish twins has suggested that the proportion of the longevity variance attributed to biological factors increases after age 75 (Christensen et al., 2000; vB Hjelmborg et al., 2006). Paralleling this research are studies that have shown a racial “crossover effect” in the United States. Could the same factors be at work in both of these statistical trends? While it seems likely that the answer could be “yes,” this issue has not been studied before—mainly because of the claim that there was not enough data for persons aged 105 or older or that this data were of poor quality. Both of these obstacles have been significantly reduced in the past decade, giving rise to an opportunity to investigate whether the African-American longevity advantage seen at ages 80 to 99 is also apparent at ages above 110; if so, given the data suggesting that extreme longevity is mostly biological, it stands to reason that we could then test for the potential causative factors for such a phenomenon. But first, it must be established whether the phenomenon exists at the highest ages.

A “crossover effect” is an observed inversion of the usual statistical relationship between two variables. In the context of this thesis, a “race crossover effect” is observed when the expected white life expectancy advantage reverses (or appears to reverse in the data), usually at age 80+. For purposes of brevity, the use of the term “crossover effect” in this thesis will indicate the effect observed when comparing oldest-old African American to oldest-old Caucasian American population groups, even though in theory it could involve a comparison of other races or even cross-species comparisons (for example, in some fishes, the mortality rates actually slow down in middle to old age). Since the life expectancy for white Americans is generally higher than for blacks, the greater life expectancy observed for African Americans at the highest ages is described as a “crossover effect” or “race crossover.” Whether the effect is real or simply apparent is one of the focal points of this thesis.

Although research has been done suggesting a race crossover effect exists among U.S. oldest-old populations,⁴⁵ with African-American populations aged 80+ showing greater life expectancy than Caucasian American populations aged 80+, so far no research has been done to determine if this effect translates into a maximum longevity advantage for the African American population vis-à-vis the Caucasian American population. Most prior research has ended with an upper age limit of 100 or, rarely, 105 years old (and even then, an assumption has been made that the data above age 99 was unreliable). In part, the lack of quality data for persons 105+ and the relatively few numbers of persons reaching this age in the past have precluded study of this population subset until recently. Moreover, some researchers have suggested that the crossover effect may be due to age misreporting, statistical error, or simply a statistical artifact (such as

⁴⁵ Various researchers use 80+ or 85+ to define “oldest-old.” Because some of the literature may be excluded using a cutoff age of 85, I chose the lower threshold of age 80 for this paper. Little if any data suggest a race crossover phenomenon earlier than age 80.

rectangularization of the mortality curve)⁴⁶ and thus have not considered the proposition that lower death rates at ages above 80 might translate into a maximum longevity advantage. However, in the past decade, quality data on these population subsets have become available, thus removing a barrier to this line of study.

If a study were done on U.S. populations aged 110+ (supercentenarians), would a race crossover effect still be statistically significant? Based on anecdotal evidence, it seems likely that a significant crossover effect would still exist for the population subsets aged 110-112. Data for age 113+ should show hints of a convergence (if the effect is due to statistical artifact) but not enough to completely erase the African American advantage (if there are other factors involved). Additionally, population subset data, such as African American females, may show that the African American longevity advantage is greater when comparing males (black males over white males) than when comparing females (white females closer to black females). This population subset data may be too sparse to draw firm conclusions but could offer additional insights into possible factors associated with the apparent longevity advantage.

The objective of this analysis is to determine if the race crossover effect exists at the highest age bracket (generally considered to be 110+). Simply taking the U.S. data on persons 110+, dividing the data into Caucasian American and African American categories, statistically analyzing the two datasets, and then comparing the two could yield the answer to this question. A further analysis of annualized mortality data (age 110, 111, 112, 113, 114, 115+) could determine if the effect disappears at the highest ages. Using newly-available data from the Social

⁴⁶ From www.grg.org. As the distribution of deaths is moved from younger to older ages, the result is the mortality distribution shifts from a 'slide' shape, towards a 'rectangular' shape. Since a perfect rectangle would assume that everyone died at the same age (i.e. 120 years), a perfect rectangle will never be achieved, but the more rectangular the shape, the greater proportion of the population is surviving to the same advanced age.

Security Administration's study of persons 110+ and analyzing for the variable of race, this question could at last be answered quantitatively.

Such a study would be significant for several reasons. Researchers have been divided over whether the crossover effect exists and, if it does, what causes it. By examining the extremes, we can help to identify potential causes and factors. In particular, those that claim age misreporting is the cause of the effect would be disappointed if it could be shown that the effect translates into maximum longevity advantage for the oldest-old African American population, because it would show that even when age misreporting were accounted for, the effect would still exist. Research on age and gender has shown that the gender gap in longevity at birth in the U.S. (currently about 5.3 years)⁴⁷ also translates into a maximum longevity advantage for females (currently about four years, with the oldest validated U.S. female on record being 119 years versus 115 for the oldest validated male)⁴⁸ as well as a female age dominance at the highest ages. For example, my analysis of the GRG database shows that 89% of persons 110+ are female, and this goes up to 92% by age 112⁴⁹ (note that the continual widening of the gender gap strongly supports the conclusion that there is a maximum lifespan differential by gender). Worldwide, data show a maximum longevity advantage for females of almost seven years (122.45 years for Jeanne Calment vis-à-vis 115.69 years for Christian Mortensen). Using the worldwide perspective, it would appear that the female longevity advantage that exists in the life expectancy numbers at birth increases at the highest ages—there is little indication that the gap is closing, as had been postulated in the 1990s.

⁴⁷ http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_14.pdf (referenced Dec. 6, 2006).

⁴⁸ <http://www.demog.berkeley.edu/~jrw/tribute.html> (referenced Dec. 6, 2006).

⁴⁹ <http://www.grg.org/Adams/BB.HTM> (accessed July 18, 2008). Though not explicitly stated, a calculation of the database shows these numbers, and the sample size is fairly large—over 250 persons.

Most researchers agree that a maximum longevity advantage points to biological, not statistical, factors. Conversely, if the data showed that the crossover effect narrowed or disappeared, we could conclude that it was either a statistical artifact (if narrowing were shown) or statistical error (if the phenomenon could not be detected). Moreover, if the crossover effect disappeared before the Gompertz-like curve “tail,”⁵⁰ it may suggest the effect of environmental factors and differential mortality patterns instead.

⁵⁰ For an explanation of Gompertz-like “tail” curves, please see <http://www.springerlink.com/content/871763176j622151/> (referenced Dec. 6, 2006).

CHAPTER II

CONCEPTUAL FRAMEWORK

Background

Longevity Myths

First, however, let us return to the origins of the myths of longevity. For purposes of understanding, two words in particular need defining:

Longevity: “long life, great duration of life.”⁵¹

Myth: 1. a. A traditional, typically ancient story dealing with supernatural beings, ancestors, or heroes that serves as a fundamental type in the worldview of a people, as by explaining aspects of the natural world or delineating the psychology, customs, or ideals of society: *the myth of Eros and Psyche; a creation myth.*⁵²

I note that these words can mean other things to other people, even in the same field: some speak of “statistical longevities.” Others may use the word “myth” to mean the more colloquial usage of “false stories,” as in “that’s a myth.” Even though that may be an apt description of a false claim to extreme longevity, that is not entirely what I mean here: I am not just referring to the everyday colloquial use of the word “myth,” but to the fuller understanding of “myth” as a deep-rooted belief; many supercentenarians have ascribed their long life to “God’s blessing,” and so if it turns out that their age is incorrect, the issue can become heated.⁵³ We find that many stories of longevity, though technically incorrect, have ancient cultural origins and roots, and thus have more meaning than a simple misapprehension of reality. Hence, it would be incorrect to simply ascribe the more “pop culture” definitions of myth, which derive from the original definition:

⁵¹ <http://www.answers.com/topic/longevity> (accessed Nov. 25, 2007)

⁵² <http://www.thefreedictionary.com/myth> (accessed Nov. 25, 2007)

⁵³ Indeed, it is this deep-rootedness that can lead to some persons being quite upset when told that their family matriarch is not the age claimed (such as with William Coates, a 92-year-old man who claimed to be 114, debunked by the *Washington Post* and myself in 2004).

2. A popular belief or story that has become associated with a person, institution, or occurrence, especially one considered to illustrate a cultural ideal: *a star whose fame turned her into a myth; the pioneer myth of suburbia.*

3. A fiction or half-truth, especially one that forms part of an ideology.

4. A fictitious story, person, or thing: "*German artillery superiority on the Western Front was a myth.*" (*Leon Wolff*).

when, in fact, the original definition is the precise meaning I am intending for this paper⁵⁴ (and if both definitions fit, then double entendre intended). This issue has some equivalence as some have suggested that calling something a “myth” is disrespectful. Explaining that the first definition carries more dignity as well as a more teleological association is thus necessary to avoid such potential objections to the use of the term “myth.” In fact, it may be argued that calling stories of Greek or Roman gods “myths” while reserving judgment on similar Judeo-Christian stories is, in fact, the real bias we need to be careful of. In this paper I leave room for others to disagree, while taking an approach (Christian context-inclusive, factually secular) that would leave both believers and atheists less than satisfied. If achieved, I would take that as a sign that the use of religious belief in this paper is therefore balanced. Following is a generalized overview of the primary myths associated with longevity.⁵⁵

Patriarchal Longevity Myth

Longevity myths have been around for as long as humanity. The first longevity myths were probably the patriarchal/matriarchal myths. These tended to be formed in an effort to link humans to the gods or a god. In some cases, the ages of people in the past were exaggerated to extend a pseudo-genealogy further back into the past. Such extreme exaggerations were used in Sumeria; ages claimed corresponded to calendar cycles and special dates. A later and reduced

⁵⁴ Some would say “contending”: the sociological debate concerning whether the word “myth” is a pejorative or respectful term is one reason for the need of definition. Let me be clear: we can be respectful of others, but that should never trump the greater truth, which benefits the greater community.

⁵⁵ Parts of this are based on an essay by Robert Young (i.e., me) and then posted to Wikipedia on Nov 22, 2005. The article still exists, in modified form: http://en.wikipedia.org/wiki/Longevity_myths (accessed Jan. 15, 2008...of course Wikipedia is never the same article twice!).

form of the cyclical-calendar genealogy myth was used in Japan, which inflated ages of emperors in an attempt to date Japanese history to 660BC:

EMPEROR JIMMU'S CONQUEST OF THE EAST

Again, a conspicuous effort is made by the myth-tellers to link the imperial line with the Sun Goddess in this story of Emperor Jimmu. There is also assertion of the superiority of the imperial line, and the emperor was presumed to rule all under heaven under one roof (Hakko Ichiu), which gave later nationalists a justification for Japan's imperialistic expansion.

In reading this selection, pay special attention to the year kanototori. The yin-yang and five element doctrines and the art of calendar-making were probably introduced to Japan from China between the sixth and seventh centuries. According to these theories, the year kanototori is supposed to bring forth great changes, and the most significant change is to occur every twenty-first time kanototori takes place (each calendar operated on a sixty-year cycle, thus the twenty-first time makes it every 1260 years). The year 601 A.D. was a kanototori, and was a year of great innovation and reform under Empress Suiko and Prince Shotoku (see Chapter II). Having this in mind the writers of the Nihon Shoki probably decided to push back the legendary beginning of Japan 1260 years or to 660 B.C.

Even though the founding of the empire in 660 B.C. had no historical foundation, it was so accepted officially until 1945. The Founding Day of the Nation was celebrated on February 11 every year. (The first day of the lunar calendar in the year 660 B.C. would have fallen on February 11 in the Gregorian calendar.) In 1967, February 11 again became a national holiday in spite of strong protests by many noted historians.⁵⁶

In the case of Japan, the need to extend Japan's beginning back in time in order to correspond with calendar cycles necessitated increasing the reign-years of the emperors. Given that in some cases, their reign lasted over a century, their age must necessarily be inflated as well. Hence, we see that the need for age exaggeration often has less to do with the individual than with a group system that favors a myth of ancient ancestry. Much akin to the idea of primogeniture, or inheritance passing to the oldest son first, by placing the Imperial ancestry in the ancient past, the myth-makers also supported the primacy of the monarchy over the feudal families, whose origins came centuries or millennia later. The point here is that the myth-making of genealogy and extreme longevity is universal and not limited to one culture. However, for the sake of

⁵⁶ <http://www.sp.uconn.edu/~gwanng/id96.htm> (accessed Feb. 20, 2008).

familiarity I intend to use the Western myth of patriarchy and genealogy as found in the Bible as an example.

The Patriarchs of the Bible do "connect man to God" (see Luke 3:23-38), and the extreme ages claimed are highest toward the beginning (see Figure 2 below and Genesis chapters 3-11).

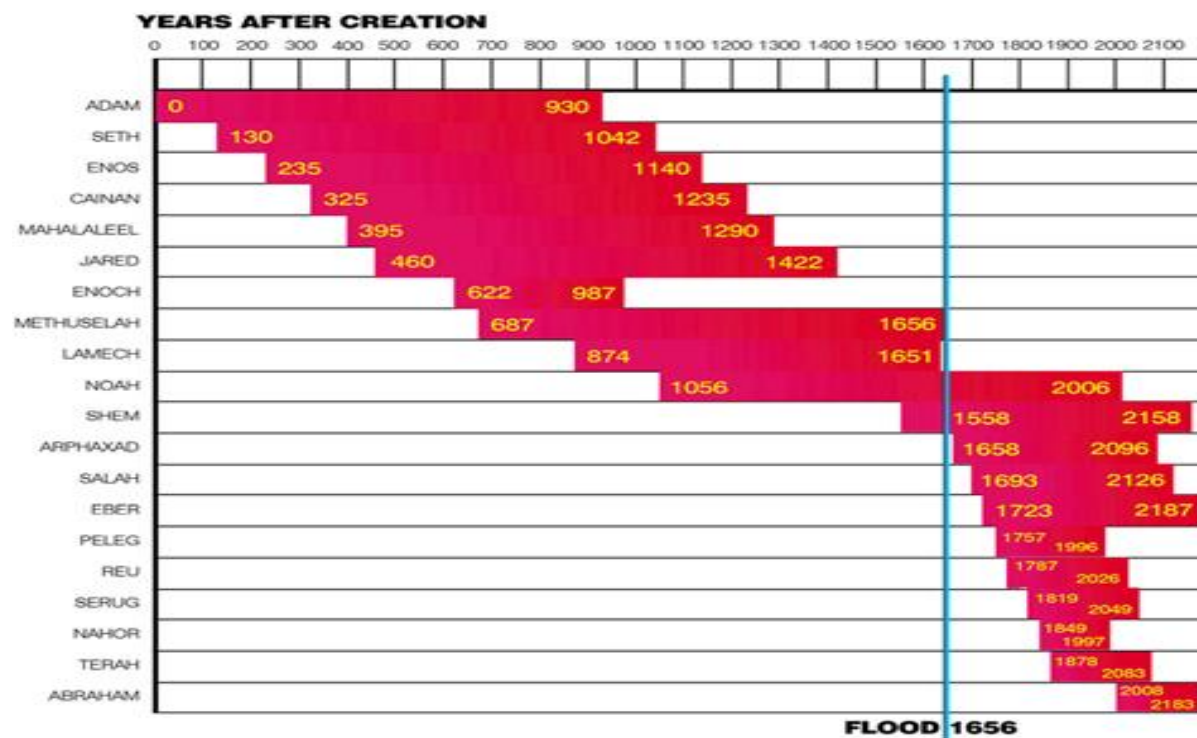


Figure 2.
Graph of the Reported Ages of Biblical Patriarchs, Using the Biblical Genealogy
 Source: AnswersinGenesis.org⁵⁷

These ages represent a reverence for genealogy and ancestry; high age often correlates to high status in this respect, and the further back in time one goes, the more reverence for that person and the higher the age claimed. The Biblical patriarch Jacob, said to be 130 at the time he met pharaoh, complained: “And Jacob said unto Pharaoh, The days of the years of my pilgrimage are

⁵⁷ Taken from http://www.answersingenesis.org/home/area/magazines/images/252ancestors_graph.jpg (accessed June 11, 2008) which gives credit to *From ‘Meeting the ancestors,’ Creation 25(2):13–15, March 2003.*

an hundred and thirty years: few and evil have the days of the years of my life been, and have not attained unto the days of the years of the life of my fathers in the days of their pilgrimage.”

(Genesis 47:9). In addition, a cosmology of "sin" that equated early death with punishment for sin and, conversely, long life as a blessing from God, means that early Biblical ages have allegorical, not necessarily literal, meaning.⁵⁸ For example, Moses's age of "120" corresponded both to his life having been "three generations" (one generation was said to be "40" years; forty times three=120) and, as the bringer in of the law, the fulfillment of Exodus 6:3's warning that man's life would be shortened to "120 years" as punishment for sin. Moses was both blessed with a long life but also not allowed to enter the Holy Land due to his sin at the waters of Meribah (the point being, he could have lived even longer had he obeyed God). The theological significance is that, although man was once potentially immortal (Genesis 3:22 says

And the LORD God said, Behold, the man is become as one of us, to know good and evil: and now, lest he put forth his hand, and take also of the tree of life, and eat, and live for ever--KJV)

he became mortal through four "falls"⁵⁹ of man and thus had his life shortened in four successive stages (from potentially everlasting in the Garden of Eden to less than 1,000 afterward; then to less than 500 after the Flood; then to 250; then to 120). Note that Genesis 2:17 said that in the day Adam ate of the Tree of Knowledge he would surely die, while 2 Peter 3:8 says that "a day to the Lord is as a thousand years." Since 930 years is less than 1,000, the prophecy was fulfilled.

Interestingly, equating shorter life to "punishment for sin" may be a rationalization for the effects of oral history: the closer to real time an event was, the more likely the ages claimed would be realistic. By the time of King David (1000 BC) of Israel, there were an imperial court

⁵⁸ In fact, there are no fewer than 15 Biblical verses that support the idea that long life is a blessing from God; see <http://bible.cc/exodus/20-12.htm> for details (accessed Jan. 15, 2008).

⁵⁹ "Falls" from "God's grace," not a physical event.

and record-keepers. Not surprisingly, in a time of documentation, the ages recorded were rather ordinary: King David was said to have lived 70 years, and most of his successors died at ages between 40 and 70. Not one king listed after David lived past age 70. Additionally, some of the ages given (41, 68) are not rounded numbers, either, suggesting they may be accurate. Thus, it might be said that the debunking of longevity myths only is in discord with parts of the Bible. It should be noted that the “four falls of man” hypothesis provides a convenient rationalization for reconciling the idea that extreme ages claimed today are false, whether or not the ancient Biblical ages are to be believed. In other words, since the Earth in the early Biblical times was in a different “dispensation era” of God, the God-fixed lifespan was different then than it is today. Note the suggested limit of “120” years fits remarkably well with today’s data, although a few Christian literalists have been upset that Jeanne Calment lived to 122 (or two years greater than the expected maximum). For this conjecture, I conveniently note that in the Bible, the “Age of Grace” begins in the New Testament, so we are no longer “bound by the law.” If only it were this easy to dispense with the scientifically-determined maximum lifespan!

Village Elder Longevity Myth

Probably the second longevity myth, the “village elder” myth, is a localized version of the patriarchal myth. It is generally assumed that persons today cannot attain the ages of the ancients, but still one’s “village elder” should be honored (e.g., the story of the 140-year-old man from Nigeria). The village elder myth originally centered around a tribal chieftain, but in places where local power was distributed (instead of centrally concentrated), elderly men and women began to be substituted. In this devolution, the “village elder” represented a source of pride, oral history, and a person to commemorate. Still in a time of no written records, the ages claimed tended to be limited by the masses’ ability to believe them. Most claims of this type have been to

ages less than 200 years old, with ages of 140, 150, and 160 seemingly representing the cusp of believability for the peasant masses (not the experts!). These myths continue even today, in places such as Bangladesh. Statistically, ages tended to be rounded off to the nearest five or ten years (called “age heaping”)(i.e., 125 or 130, not 123 or 129).

Fountain of Youth Myth

The more recent “Fountain of Youth” myth seems to have come from a different angle. Many people in Europe feared death (especially after the ravages of the Black Death that began in the 1340s), while the Enlightenment and humanism brought a focus on the individual and many sought ways to extend their own life span. Unlike the previous myths, which were rooted in patriarchal, ancient, and communal beliefs, the Fountain of Youth myth is anchored in the individual, medieval, and Renaissance identity. The idea that humans could change their environment (such as in alchemists’ attempts to turn lead into gold), while not often supported by facts, became popular during the 1400s and 1500s. Consequently, Spanish conquistadors, already searching for fabulous cities of gold (the “Seven Cities of Cibola”), added the idea of finding the “Fountain of Youth.” Ponce de Leon explored Florida in 1513, seeking the fountain in vain; instead he found a land that would later be known for its aged population, not its youth.

Interestingly, a competing idea (caloric restriction) also emerged during the Renaissance. A legend in Italy is that a 40-year-old man named Luigi Cornaro had lived an unhealthy life and was dying. He decided to change his diet, adopting a calorie-restricted diet and “temperate” lifestyle, and allegedly ended up living to be 102!⁶⁰ This may have been the beginnings of the caloric-restriction movement. Today, there is scientific debate about whether this idea or even this story is a myth. However, for many rich persons, giving up the good life was not the course

⁶⁰ <http://nutrinexus.com/images/Luigi%20Cornaro.pdf> (accessed July 18, 2008).

they preferred; buying a magical potion that would restore youthfulness, energy, and virility would be. Thus we have the beginnings of the “anti-aging” industry as well.

The Fountain of Youth myth is connected to longevity in the idea of example-ism (or, the “testimonial fallacy”). People need an example of success to believe that a mineral water, snake oil, or potion carries beneficial (magical) properties, bestowing extraordinary longevity on those who use it. To satiate this need, charlatans often searched for a very old person, offering him or her as an “example” of success. The idea continues today, in reduced form, but was still very prevalent in the 1970s, when claims of extreme longevity from the Caucasus Mountain in the USSR led to Dannon yogurt endorsements. Note also the co-opting and overlapping of motivations for mythology: what may have started as a local myth became a Nationalist myth (q.v.) and then a Shangri-La (q.v.) and finally a Fountain of Youth myth.

Shangri-La Longevity Myth

An extension and adaptation of the Fountain of Youth myth is the idea that a particular place, rather than a substance, possesses what is needed to attain extreme age. It is not enough to take a potion from a bottle in Merry Olde England; a person seeking extreme longevity instead needs to move to “Shangri-La.” Shangri-La was a fictional paradise in the 1933 novel *Lost Horizon*. In it, author James Hilton describes a place where the residents are happy, isolated, and live years beyond the normal lifespan. This myth was popular in the 19th-century “Age of Empire” during the period of colonialism and was often used to entice colonizers and travelers to visit, or possibly move to, exotic locales.

This myth differs from the Fountain of Youth myth in that it focuses on an entire village or mountain region, where the water, air, etc. is said to be qualitatively different than elsewhere (not scientifically true, of course). Modern examples of this myth include the Caucasus mountain

region in Russia; the mountainous Vilcabamba region in Ecuador; and the Hunza Valley in Pakistan (which, interestingly, James Hilton visited and may have served as a partial inspiration, along with Tibet). In this type of myth, extreme age is common: thus, the Caucasus did not merely claim to have a 168-year-old, but to have hundreds of people aged 120+. Instead of one village elder, the entire village was purported to be a “village of centenarians.” In some cases, apparent age heaping showed how unreliable the claims were: in places like the Hunza Valley, for example, the oldest ages reported often ended in 0 or 5 (140, 135, 130, 125, 120, 115), indicating that the age claim was a guess, not a real measurement (or possibly due to a significant rounding-up of the total; for example, if someone were “118” they would round their age off to “120”).

Nationalist Longevity Myth

The next extension of the Shangri-La idea is the “Nationalist” longevity myth. Why seek some exotic locale when longevity occurs right here at home? The idea of the Nationalist longevity myth was rooted in the rise of Nationalism in the 20th century. As people’s ideas became focused on their “one nation” versus another (with their nation being the “right” one, “powerful” one, “God-blessed” one, etc.), extreme age claims became a source of pride. Even in the U.S., in the 1970 census, 106,000 people claimed to be 100 years old or older (some claimed to be over 130!) as the U.S. sought to counter Soviet claims that the Soviet communist lifestyle resulted in extreme longevity. The Soviets merely borrowed the localist traditions of the Caucasus (really an amalgamation of several localist myths: the Azeris, Georgians, Abkhazians, Chechens, Armenians, etc. all had a localist myth culture) and adapted them to a Marxist ideology. The U.S. did not go as far, but to stem the tide, even publications such as Time Magazine in 1967 featured Sylvester Magee, “126” (he died in 1971 at the claimed age of 130)

and Charlie Smith, “125” (who died in 1979 at the discredited claim of 137 years of age). Both of these claims may have been put forth by publicity-seeking individuals, but the nationalist media chose to elevate these unsubstantiated claims in the context of ideology (not surprisingly, they were a counterfoil to the USSR claim that Shirali Mislimov was in his 160s... note that no Western journalist was permitted to interview old Shirali, an Azeri).

Longevity myths lost their vogue in the late 1970s, as both American and Russian experts came forward to debunk both sides. In one case, Khlaf Lazuria of Soviet Georgia had claimed to be 131, but a year later, interviewed by the same journalist, she was “141.” Alexander Leaf of National Geographic publicly questioned whether these extreme claims were true. Meanwhile, Zhores Medvedev of the USSR questioned the basis of the Mislimov and other claims⁶¹; in 1979, the New York Times questioned the validity of the Charlie Smith claim (was he 136 or just 104?) and the Vilcabamba claim was also exposed, as the oldest man in the village was just 96, not 142, years old.

Yet the Nationalist myths are not completely over. With the Cold War continuing in Cuba, local Nationalism still fuels unverified claims in recent years such as the claim that the “world’s oldest man” is Benito Martinez (1880?-2006).⁶² In the context of Marxist and nationalist ideology, we see claims such as Du Pinhua of China (1886?-2006), a claim used to counter China’s traditional rival, Japan, whose Kamato Hongo (1887-2003) was recognized at the time as the world’s oldest person.⁶³ We also see continuing Nationalist myth outside the context of Marxism: whether Habib Miyan of India or Moloko Temo of South Africa, localist

⁶¹ <http://www.time.com/time/magazine/article/0,9171,908667,00.html> (accessed July 18, 2008).

⁶² Fidel Castro liked the idea of a “120 Club” because he could say that he would rule Cuba another 40 years; i.e., he is “not too old” to rule Cuba. Unfortunately for him, a case of diverticulitis in 2006 changed that plan.

⁶³ The irony in this situation is that Western experts, such as Dr. Michel Poulain of Belgium, have doubts about the Kamato Hongo case as well.

pride often leads to a bandwagon effect of informal acceptance, even in the face of doubt. Even in the United Kingdom, we saw the recent claim of Buster Martin to be the “oldest worker” at 101 garner much press and community support, before questions were raised about his age. In its final form, a Nationalist myth could even have a true claim: the true case of Henry Allingham of England (112-year-old World War I veteran) has taken on mythic proportions (he has become a living symbol of the British Royal Air Force, British gallantry, etc.), as did Jeanne Calment of France (who was filmed in a movie at age 114, whose bon mots or “wise sayings” became culturally popular, and who was exploited to make a “rap” album at age 121). Perhaps we can say that our human need to believe in something, to have an idol to look up to, can be reconciled with the scientific need for truth.

Religious/Spiritual Myths

Aside from the previously mentioned patriarchal myths, religious/spiritual (and even philosophical) myths are ideas that if one follows a certain philosophy or religious practice, a person can live to an extreme age. These types of myths are most common in Eastern thought. For example, some Daoists have claimed to live to over 200 years. Li-Ching-Yuen claimed to have been 256 years old in China when he died in 1933. Not only was his age claim fantastical, but the rationale was that he lived so long due to his following a certain practice or way of life. While it should be noted that Daoism incorporates some healthy aspects (such as exercise), much of it is based on irrationality (why is the number “8” more special than 9?). This type of myth is also found in Buddhism (Nyala Rinpoche claimed to be 142 in 1978, and to have attained a state where he no longer consisted of flesh but was “pure light”) and also Hinduism. In this type of mythology, extreme age is associated with the supernatural and often is achieved through some process of self-effort. (This is different than the concept of “religious blessing” common to

monotheistic religions, whereby longevity is attained by finding grace or favor from God or gods). Claims of this nature continue today. The Swami Bua claims to be a different age each time he is interviewed, but generally claims to be born around 1889. Offering no evidence, the message seems to be that meditation and loss of awareness of time leads to extreme longevity (sure, if one doesn't keep track, they can imagine themselves any age). While scientific evidence does show some benefits from meditation, spiritualism, and faith, measurable longevity tends to fall within scientific proof (i.e. living to age 109 or 110 and being a Seventh-Day Adventist or Christian Scientist is not a stretch of the imagination; claiming to be a 118-year-old male due to meditation is). Note that not only are the age claims not credible, the claimant is often in better association of living longer and better, not just extreme age. There is no scientific evidence that religious philosophy or practice can extend the human lifespan, though it may positively impact relative longevity.

Other Longevity Myths

Other longevity myths include both racial and familial explanations of longevity. Some people believe that a certain race or family (theirs) tends to live longer than others, despite no scientific evidence to support their claim. It can be a source of familial or racial pride to claim that a relative lived to an extreme age. In fact, most families do have a story or an extremely long-lived individual; often the age claimed is inflated and there is no documented evidence for the claim. On the smallest scale (the familial myth), families believe that their own family members live a very long time, and the further back in the past they go, the easier it is to insert a family member aged 108, 113, or even 120 years old into the family tree, usually without evidence. This myth is a reduction of the patriarchal myth of longevity.

Sometimes one myth is used to prop up another: for example, in 1939 a man in Illinois claimed to be 110 and stated that his father lived to 120. Since there has been a scientific demonstration of a correlation between familial genetics and longevity, we can say that longevity does tend to run in families, and the notion of the familial myth might derive from a kernel of truth. We should not allow the myth-makers, however, to use this to buttress undocumented claims. In the Illinois case neither age was demonstrated to be true, and in some cases the ages of both generations were shown to be false. For example, Mattie Owens claimed to be 119 years old in 2003, and her son was said to be “87.” An investigation determined that Mattie was in fact only 105 years old, and her son was only 80. In another example, John and Eli Phipps were said to be the “oldest twins” at 108 years of age in 1911, with one dying at 108 and the other at 113. However, an investigation found that they were most likely 99 and 104 years old at their deaths.⁶⁴

Another source of age exaggeration and mythmaking is the claim to be the “old soldier.” This motif was even used by author Flannery O’Connor as a literary device. In her story, *A Late Encounter with the Enemy*, the “104-year-old” “general” wasn’t really 104, and wasn’t really a general, but vanity, pride, and the myth of Southern longevity and the “Lost Cause” conspired to make him out to be more than he really was. Though a fictional character, many people in the 1940s and 1950s did falsely claim to be “Confederate veterans,” invoking a myth of Southern longevity. Arguing for the “Lost Cause,” it was even stated that “if we can’t beat ‘em, we can outlive ‘em” (outlive the Union veterans). Thus, Southern claims to extreme age can be viewed as part of a passive resistance strategy of a national subculture. Walter Williams claimed to be a Confederate veteran and born in 1842 when he applied for a Confederate pension in 1934; by the time he died in 1959 he was allegedly 117 and the last Confederate veteran. However, research

⁶⁴ <http://www.twinstuff.com/twinfact1.htm> (accessed July 18, 2008).

by New York Times reporter Lowell K. Bridwell uncovered evidence that he was actually born in 1854 (according to the 1860 census) and was hence not a veteran and not 117, but just 105, years old. While at the time, Southerners rallied to his defense against the “Yankee reporter,” in subsequent decades it was generally accepted that his claim was invalid. In fact, as it turned out, not one of the Confederate ages claimed in the late 1950s turned out to be correct (John Salling claimed to be 112, but was 101). Also of note, the last Union veteran, Albert Woolson, claimed to be 109 but research has shown that he was just 106; and the oldest Union veteran, James Hard, claimed to be 111 in 1953 but investigation showed him to be 109. While the Union veterans were actually veterans, their ages were often inflated as well. It should also be noted that fictionalized accounts of extreme age and war service continue to the present day. Merlyn Krueger recently claimed to be born in 1895 and a World War I veteran, but research has shown him to be born in 1917 and hence a fraud.

Having painted a generalized picture of the myths of longevity, I shall now shift to an examination of our own Judeo-Christian creation-longevity myth.



Figure 3. Artist's Impression of the Creation

Judeo-Christian Longevity Myth

“IN THE BEGINNING, GOD CREATED THE HEAVEN AND THE EARTH.” Genesis 1:1
(King James Version).

And so begins the first book of the Bible, which for many in America is an article of faith. For Western culture, this phrase often has been the starting point of our attempts to explain the world we live in. Indeed, the first two chapters of Genesis are the Christian “Creation myth.” For millennia, all human cultures have endeavored to answer such compelling questions as “What is life” and “Why do we die?” At its core, a “myth” is really a story meant to explain things that, until the advent of science and the modern scientific method, were mysteries. In the greater context of attempting to explain why we came into being, why we live, and why we die, it must have become apparent that some people lived longer than others. Why this is so may have been

chalked up to “Divine favor.” Regardless, there has long been a human desire to avoid death, to live forever. The very story of the Garden of Eden deals with the lost promise of everlasting life, and the entire Bible is a long story of how we as a society and a people can be restored to that original, blissful state of eternal existence. Thus we see the “Tree of Life” mentioned in both Genesis (the Beginning) and Revelation (the End). Looking at Genesis 3:22-23⁶⁵, we see: “And Jehovah God said, Behold, the man has become like one of Us, knowing good and evil; and now, lest he put forth his hand and take also from the tree of life and eat and live forever--Then Jehovah God sent him forth from the Garden of Eden, to work the ground from which he was taken.” In short, the Creation myth in Genesis ascribes our not living forever to humanity’s disobedience; loss of everlasting life is a punishment for sin. That is, mankind began in a blissful state (and would have lived forever, had Adam and Eve simply chosen the Tree of Life instead of the Tree of Knowledge of Good and Evil as their source of nourishment, so the story admonishes) but mankind has since “fallen” to the state we are in today. The Bible tells us that if we confess our sins and God forgives us, we may have eternal life. In fact, we see the Tree of Life again in Revelation 22:2: “And on this side and on that side of the river was the tree of life, producing twelve fruits, yielding its fruit each month; and the leaves of the tree are for the healing of the nations.” We also see in Revelation 20:12 the words “book of life.” According to 1 Corinthians 15:26, “Death, the last enemy, is being abolished.” This is fulfilled in Revelation 20:14: “And death and Hades were cast into the lake of fire. This is the second death, the lake of fire.” Hence, we see that the Bible is ultimately a story about how to avoid death and live forever.

What can we, as scientists today, draw from our Judeo-Christian myth, which attempts to explain why humans do not live forever, despite God’s wish that they do? For one, we have a background context to understand both the Christian and even the universal human psyche. Our

⁶⁵ All Bible references are from the Recovery Version (2004) unless otherwise specified.

greatest fear is Death; our greatest desire is Life. The entire Bible is a warning and admonition about how to live properly and find God as the source and path of Life, that He may forgive us and bless us with Eternal Life. Yes, there are other motifs: Love, some would argue, is the central theme. But whether we see “love versus hate” or “death versus life” as the central theme, the bottom line is this: for most of our history and pre-history, these stories have been ingrained in our collective psyche and represent a nonrational but noble attempt to answer the questions surrounding the mysteries of our existence.

Note the connection between the life/death motif and longevity: In Witness Lee’s “Four Falls of Man,”⁶⁶ he notes that there are four stages of early humanity which correspond with four different life spans of mankind.⁶⁷ In the first stage, mankind could potentially live forever. But, due to sin (disobeying God), the first punishment is the loss of potential everlasting life and a replacement with a shortened life span--less than one thousand years. Note that the Bible says “a day to the Lord is as a thousand years” (2 Peter 3:8). Indeed, if we check the genealogies of the patriarchs, Adam is said to have died at 930, and Genesis 2:17 says that “but of the Tree of Knowledge of Good and Evil, of it you shall not eat; for in the day that you eat of it you shall surely die.” Thus, accordingly, the prophecy of death was fulfilled: Adam died within 1,000 years. In fact, checking all the Biblical ages given, we find Methuselah, at 969 years, to be the top age mentioned. Thus, Methuselah has come to represent longevity in Western culture. Yet unknown to most, Methuselah’s death also had a prophetic significance: a simple calculation

⁶⁶ Life-Study of Genesis, volume II, 1987, pp. 227, 287, 361, 481. The four falls are given as: Adam’s disobedience in the Garden of Eden; Cain’s murder of Abel; the Deluge (Flood), and the Tower of Babel. Note that we see a clear life-shortening connection with three of them: Adam’s loss of everlasting life; the shortened lifespans before/after the Deluge; the ages given after the Tower of Babel incident are also lower. However, these do not align perfectly with the “four” life spans. One possible explanation is that God delayed his punishment (so we don’t see the results immediately; this is implied in Genesis 6:3).

⁶⁷ Christian mythology is patriarchal; hence the use of the term “man” kind.

finds that Methuselah died in the year of the Flood (2344 BC by the Ussher chronology), and some Christian scholars have interpreted his name to mean “when he dies, the flood will come.”⁶⁸ Indeed, it has been said that the fact that Methuselah lived longer than anyone was simply a measure of God’s compassion for humanity and a withholding of judgment on a wicked generation. In other words, God gave mankind the longest time to repent of sin and turn back to God (most Biblical stories of punishment emphasize that God gave the sinful a chance before punishment, thus reconciling the conflict of how a just God can punish people). Once again, we find the idea of longevity tied to “Divine favor,” intertwined with issues of sin, righteousness, promise, and a hope for the future.

We also find Genesis 6:3 to be of significance: “And Jehovah said, My Spirit will not strive with man forever, for he indeed is flesh; so his days shall be one hundred and twenty years.” The shortening of mankind’s life from everlasting to less than 1,000 years was merely the first punishment, for the first sin. According to Lee, there are actually three additional sins and three additional punishments that shortened man’s life from everlasting life to 1000 years; from 1000 to 500 years; from 500 to 250 years; and finally from 250 to 120 years (which roughly equates with the actual human lifespan today...no need for further age-shortening rationalizations). Note that the ages of the patriarchs fit nicely into these categories: Arphaxad died at age 464; Peleg died at 239; Moses died at 120. Note also that as the fourth punishment was a life span of 120 years, and Moses was the bringer in of the law, Moses died at age 120, even though “his eyes were not dim, nor his natural force abated” (Deut. 34:7). Hence, Moses’s

⁶⁸ <http://www.christiananswers.net/dictionary/methuselah.html> (accessed Nov. 26, 2007)

age of 120 was not associated with living to the maximum human potential but with fulfilling the Biblical law.⁶⁹

Interestingly, extreme ages in the Bible, as is near-universal, are associated with patriarchy. In the times of King David and his successors as Kings of Israel and Judah (the beginnings of the written period of the Bible, or that which was actually written down rather than orally recollectd), we find the ages claimed to be quite consistent with Europe in the Middle Ages: most of the kings died between ages 40 and 70. Checking the ages, we also see continued references to “sin” as the reason for ever shorter and shorter reigns and life spans. Eventually, the Bible story changes with the coming of Jesus, the way of “salvation.” Jesus, crucified at a mere 33 ½ years old, died for “everyone”. It is said that “one died for all, therefore all died.” (2 Cor. 5:15, 17). In the “age of grace”, the age of death was finally unhinged from “punishment”. Note also that Jesus’s relatively young age at 33 and Earthly death is associated with his dying for the sin of “mankind” rather than his own. Unfortunately, very few ages are mentioned in the New Testament, but we do see that Anna is mentioned as being 84 years old and an elder (not an extraordinary age, again consistent with modern records).

What can we glean from these stories, contextually, that relate to more modern versions of the myths of longevity? First, at least in our Judeo-Christian culture, longevity myths are associated with male longevity--and studies of age misreporting show that male ages were more likely to be exaggerated (Myers, 1966). Second, longevity myths are associated with ancientness: thus we see extreme ages for those born in the most ancient times, with more reasonable age claims since about 1000 B.C. (the start of the written, historical records—not a coincidence). Perhaps most important, however, is that we should see that for the vast majority of

⁶⁹ Moses’s brother Aaron was said to be three years older and died at “123.” Scholars today associate Aaron’s age with an attempt to elevate the status of the Aaronic priesthood as older than Moses.

supercentenarians, who very often have professed faith in God as their reason for why they have lived so long, there is a strong Biblical association between longevity and blessing, and conversely between dying young and a “curse.” There is even a verse that says, “Honor thy father and thy mother, that thy days be long on the Earth.” In fact, this admonition appears more than once: first in Exodus 20:12 and again in Deuteronomy 5:16. The connection between “long life” and “spiritual blessing/reward” is unequivocal. Even if we take an atheistic approach to our analysis of longevity myths, we must still recognize that an understanding of this spiritual foundation is very much a necessity if we are to conduct research into the associations between religious belief and practice and their potential effects on American longevity.

African-American Myth of Longevity

My first inkling that there might be an African American myth of longevity began in the early 1980s, when I began to pay attention to claims of extreme longevity that were beyond the believable “111th birthday” story on the local news. While I read in the Guinness Book that a Greek woman, Liakou Efdokia, might have been 118 but had no birth certificate, I began to notice that, from the United States at least, an inordinate number of “world’s oldest” claimants seemed to be African-American. In 1984, Arthur Reed, the “last American slave,” died at “123”. Was this his true age? Or was the whole story false? I was intrigued. I began to compile lists, usually two: the proven cases, and the hard-to-believe ones. It seemed that the proven cases were mostly white, mostly younger (aged 111-114) and the harder-to-believe cases were mostly black, often a lot older (alleged to be between 114-137 years old). Yet there was a little bit of overlap, and so I could not say, with certainty, where to draw the line. When Clara Rogers (an African American woman) died in 1986 at “113,” this was fully within the realm of possibility.

Somehow, I believed (or wanted to believe) that Arthur Reed might have been 123. However, when I heard that Charlie Smith was “137”--no way was this true.

It would turn out, later, that my suspicions were well-placed. Finding an older edition of the Guinness Book (the 1979-1981 editions carried the story), it said that the “137”-year-old Charlie Smith, star of a Disney movie (*Charlie Smith and the Fritter Tree*) and a man who had claimed to have ridden with Jesse James and Billy the Kid, was a fraud: his marriage license would have made him just 105 (and the 1900 census would have put his age at a mere 100). Old, yes. A record breaker? No way. Over time, other cases (Sylvester Magee, “130”; Susie Brunson, “123”) also fell when scrutinized more closely. To be sure, not all the cases were African-American: Walter Williams, the “last Confederate veteran” at “117,” turned out to be a fraud as well. Yet I didn’t see any whites claim to be 120 or older, while a continued dribble of news stories (Mary Duckworth, 121; Katie Bruce, 121) continued about African-Americans in the semi-mythical age range. Remember, as mentioned in the Biblical narrative, the human life span was set at “120” years, and Guinness claimed the world record was “120” (Izumi died in 1986 at that age, according to them). More skeptical sources suggested that the maximum lifespan record was even lower, between 113 and 115. So, as a child, I wondered: can we prove these people are over 120, or not? In some cases, I found that they were not (Katie Bruce, 121, turned out to be 107). In others, the case was never solved (so Mary Duckworth remains 121 on paper). However, I later gained a better understanding of the myth of African-American longevity, mainly from the movies and P.T. Barnum.

In the movie “Coming to America,” Eddie Murphy bragged that Joe Louis lived to be “137” (he really died at 67). This seemed to be a reference to Charlie Smith. It was also part of the passive-resistance, “fool-whitey” motif (Galang and Tabios, 2003), which involves a

marginalized community's attempts at subverting the authority of the "white masters" by claiming superiority, in challenge to the tendency of the white culture to denigrate the non-white. In the book "Screaming Monkeys," Galang and Tabios note the likening of nonwhite persons to "monkeys," for example, which makes them seem less than human. Claiming that Joe Louis lived to be "137" is both an invocation of the myth of African-American longevity and an inside joke.⁷⁰

Later, I read that P.T. Barnum had advertised Joice Heth as a 161-year-old slave woman in the 1800s. Then it dawned on me: these people were made by the dominant white culture to be slaves--only 3/5ths human according to our original Constitution. Additionally, there was (and is) a continuing racial tension: the white masters constantly feared a slave revolt. This fear, combined with the fact that many slaves were originally not Christian, combined to make them easy targets to be "witches" (including Tituba at the Salem Witchcraft trials!). This intersection of "not quite human" and "magical" has continued even today in the "Magical African-American Friend" motif. In movies such as *Ghost*, *Pirates of the Caribbean*, or the *Legend of Bagger Vance*, whites were given the starring roles, while the African-Americans were given the "friend" roles--but not just a "friend" but a "magical friend." Why? Because the movies are made from a white mind, for a white audience, and since the white psyche fears African-Americans (rooted in the slavery era) and exotic/different persons are often seen as magical, it follows to make the "magical friend" character an African American. Likewise, it follows that it was easier for P.T. Barnum to convince people that a slave woman was "161" years old than it would have

⁷⁰ This is a common motif not limited to the black-white dichotomy. As noted in *Screaming Monkeys*: "The customers of a Chinese Laundromat ask the couple that runs it, 'How do you get these clothes so white?' Keeping the box of amazing detergent well-hidden, they reply, 'ancient Chinese secret,' laughing to themselves at how easy it is to fool 'Whitey.' This is a time-honored strategy practiced in many marginalized communities, where it is well-known that a little dishonesty can be the best policy for ensuring social harmony" (267).

been for a white person (although we saw white claims as high as the 130s in the same era). Going back to our tribal, patriarchal theories of longevity myth, or our histories' mythology, it makes perfect sense that a people with no written records of existence would be more likely to exaggerate their age than the whites whose births were often recorded in church registers. Indeed, we find that the few white extreme age claimants were often older male transients--persons for whom documentation was hard to come by. This was definitely the case with Noah Raby, a transient older white male who claimed to be 131 years old in 1904, but for whom recent research shows him to have been only 81).⁷¹

It should be noted that the myth of African-American longevity was rooted in a larger context. African-Americans also were seen as physically stronger and more virile, harder workers, and better able to take the heat. As in the story, "The Telltale Heart" by Edgar Allen Poe, we often find guilt motifs in the culture of the dominant class,⁷² which takes advantage of other groups. In 1988, I was told about a 114-year-old ex-slave who had been forced to wear an Iron-maiden-like torture device on his penis (this from a 9th grade teacher who had returned from a visit to Kentucky). Again, the myth of virility and the myth of longevity overlapped. (This myth is not entirely limited by race: the "dirty old man" hypothesis holds that men that are virile at older ages are more likely to live a long time, such as Strom Thurmond, whose last child was born when he was 77 and who lived to be 100 years of age).

While I doubted whether all of these stories were true, I rationalized that, like most oral histories, there may be a grain of truth to them. It is true that African-Americans shipped

⁷¹ Noah Raby claimed birth in 1772 and died in 1904 (<http://www.findagrave.com/cgi-bin/fg.cgi?page=gr&GRid=10515516>); recent research suggests he was only 81 years old (http://en.wikipedia.org/wiki/Image:1870_census_Raby.jpg).

⁷² <http://archive.salon.com/news/feature/2000/02/17/guilty/index.html> (accessed Jan. 22, 2008).

overseas during the slave trade must have faced greater selection pressures than the European Americans who came over on free ships, with the weaker ones dying along the way. And, as Jimmy “the Greek” Snyder unfortunately mentioned on TV, African-American slaves were often “bred” for strength. While it would be impossible to directly breed for “longevity” if one did not keep track of how long the slaves lived (and families often were broken up, making record-keeping of ages nearly impossible), other micro-evolutionists⁷³ have suggested that “founder effects” increase longevity,⁷⁴ so why not “breeder effects” as well? We do know that slave masters selected for breeding those slaves thought to be the most virile or fecund (both male and female). Given the correlation between virility/fertility and longevity,⁷⁵ as well as between farming and longevity, it would stand to reason that a byproduct of such a situation would be greater potential maximum longevity, although the overall life expectancy for slaves was far less than for their white, free counterparts.

Finally, it can be argued that the differential environmental pressures faced by African-American population cohorts in the 1860s to the 1880s, while less favorable overall than those pressures faced by whites of the same era, afforded a means for some African American individuals to not merely survive but to live quite long. For example, studies have already suggested that rural-area residents have tended to outlive those in urban areas; that those who

⁷³ The idea that evolution can occur very rapidly is once again on the comeback, after falling out of disfavor. A recent study found that microevolution, or minor changes within just a few generations, occurs in some butterflies. See <http://news.bbc.co.uk/2/hi/science/nature/6896753.stm>, for example, for more details.

⁷⁴ I am using “founder effect” here mainly to refer to the genetic advantages that may accrue from initial colonization of virgin territory or resources: that is, “settler effects”. For example, if rats are let loose on an island they previously did not inhabit, has no predators, and ample food supply, their initial population will increase rapidly. In a similar vein, opossums that live on islands off the coast of Georgia live longer than those on the mainland: <http://www.uthscsa.edu/mission/article.asp?id=298> (accessed Jan. 22, 2008). Interestingly, another close use of the term can have both a positive and negative meaning: <http://evolution.berkeley.edu/evosite/evo101/IIID3Bottlenecks.shtml> (accessed Jan. 22, 2008).

⁷⁵ <http://www.argusleader.com/apps/pbcs.dll/article?AID=/20071126/LIFE/711260313/1004> (upgrade citation)

worked on a farm tended to live longer; that the death rates among the oldest-old are lower in warmer climates, at least during the winter season (most African Americans in this time period lived on farms in the South). In addition, many African Americans were forced to be physically fit through work, while many upper-class whites fanned themselves and did little or no physical activity. If one is a believer in the adage that nothing ever really comes free in this world, those who enjoyed the benefits of free labor also may have suffered in the long run, having been less fit. Again, if true, this situation appears to be reversing itself: recent research has shown that obesity in minority communities in America is now higher than in the white population,⁷⁶ whereas this was not always the case.

Race: Social or Biological Construction?

Before I go further, issues of race (what is “race” and how is it defined?) must be addressed. Due to the past history of race relations in America, or even of science and race (i.e., the Tuskegee Experiment), many may view a thesis that examines whether the African American myth of longevity is real or false with either suspicion or distaste. Some might argue that this thesis may itself be based on another “myth”—that of “race.” Indeed, many sociologists, anthropologists, and other scientists have argued over the past century that “race” might not exist as a biological construct, but instead should be viewed as solely a social construct. Issues of appropriateness of topic intertwine with issues of sociology. Is race socially constructed, as many sociologists allege? Or do biological differences exist (such as sickle-cell anemia) that justify the use of the term for reasons of biomedical and health research? Are these differences minor and overlapping, or more substantial?

⁷⁶ http://obesity1.tempdomainname.com/subs/fastfacts/Obesity_Minority_Pop.shtml (accessed Jan. 22, 2008). Note that “African American women of all ages report participating in less regular exercise than white women.”

Let me begin by saying that I reject the old “Social Darwinist” ideas, which oversimplified “race” into neat categories of black, white, brown, yellow, and red; as well as the Kipling-esque image that we are all very different and “never the twain shall meet.” I recognize that, if racial differences do exist, and there are races, that in fact the lines between the races are often blurred and will continue to be more so in the future. Indeed, I believe that if my research finds little or no racial differences associated with longevity, it will help put to rest the idea that we are so “different.” (However, I suspect that I will find the opposite: that there are quantifiable differences in longevity that can be correlated to distinct racial categories.) I will thus briefly review the history of the concept of “race” as used in science and consider the two main viewpoints today: one that race is socially constructed and the other that race has both biological and social components to it.

Scientific Classification and Race

The concept of “race” originally grew out of the Western European attempt to categorize every living thing into neat little groups. Carolus Linnaeus (1707-1778), a Swedish naturalist, developed the field of taxonomy in the 18th century, attempting to classify every living thing into distinct groups, subgroups, and supergroups, which would define the relative relationship of two living things through categories or levels. The main levels were kingdom, phylum (or division), class, order, family, genus, and species. Living things classified as the same species were the most closely related; those in separate kingdoms were the most distant (plant and animal). The Linnean system made it possible for scientific specialization in botany and zoology, bringing order to chaos (and not just due to the “universal naming system”: specialists could more easily find related species to study). Over the past three centuries, his classification system has been

expanded greatly, but what exists even today is remarkably similar in format to the original system.

The issue of what to do with humans soon arose, however. Aside from the religionists' objections to the labeling of humans as "animals," the issue of group differences within the human population arose. Were all humans the same species? If yes, were there still subgroups of the population? Note that at the time, animals and plants were categorized according to similar characteristics, not according to evolutionary or biological linkages. It should be no surprise, then, that humans as well would be categorized according to the most obvious outward differences: skin color, hair color and texture, the shape and color of one's eyes.

Linnaeus himself categorized humans into four main "varieties": *Homo Europaeus*, *Homo Asiaticus*, *Homo Afer*, and *Homo Americanus* (Gossett, 1963, p. 35). Though competing naturalists came up with different schemes (Georges Buffon preferred a "six-race" scheme), this system became the established groups of the "white, yellow, black, and red" "races" that permeated not just scientific thought but also Western culture well into the 20th century. Later naturalists attempted to follow up on Linnaeus's work, using variables such as skin color, geography, climate, and cranial measurements in vain attempts to come up with a universal classification scheme of race.

Social Darwinism

It may not appear that the original scientific origin of the "race classification system" was "racist" per se, but the concept of race soon took an ideological bent which is best described as "racist ideology." Many European "scientists" used the concept of "race" to make various propositions about the supposed superiority or inferiority of various races, and their schemes usually had the black, Negro, or African race at the lowest rung. Josiah Nott and George

Glidden's 1857 work, *Indigenous Races of the Earth*, proposed to use cranial measurements to demonstrate that the Negro was an intermediate stage between human and chimpanzee.⁷⁷ Also around this time, a debate was raging between the idea that humans had a single origin (monogenism) or multiple origins (polygenism). This debate made for some strange bedfellows, so to speak: Christian leaders supported the idea of monogenism, as it accorded with the single origins of "mankind" mentioned in the Bible—Adam and Eve. Southern white U.S. racists supported the other idea, polygenism, which posited that humans originated in separate races similar to species, with some races inferior to others.⁷⁸

The 19th century also saw the coming of Charles Darwin's *On the Origin of Species* in 1859 and the beginnings of the idea of evolution through "natural selection." While his ideas of natural selection are, on the whole, commendable, one particular line of reasoning was dangerous: Social Darwinism. In his 1871 work, *The Descent of Man*, Darwin laid out arguments (more along an anthropological than biological line) that there were "civilized races" and "savage races" that competed against each other for resources, and that the "savage races,"⁷⁹ being less technologically developed, would eventually be destroyed. Though Darwin was actually an abolitionist and not an advocate of such destruction, many in the Age of Empire used Darwin's ideas as rationalizations for the exploitation of areas of the world colonized by "inferior" races. Even more, Darwin's argument that helping the poor and infirm went contrary to natural

⁷⁷ See <http://en.citizendium.org/wiki/Race> (accessed June 11, 2008). Note also that, contrary to popular belief, Charles Darwin did not come up with the idea of "evolution": others, such as Jean Lamarck, had proposed that giraffes evolved longer necks by stretching them to reach leaves high in the acacia tree. Rather, Darwin originated the mechanism that could scientifically explain the evolutionary process: natural selection.

⁷⁸ Note that the debate continues today between the "multiregional hypothesis" (multiple origins of humanity) and the "single recent origin hypothesis." The irony is that even the single recent origin advocates (now the predominant position) believe that humans did not suddenly evolve from one pair of created humans but from multiple pairs. Thus neither side of the debate was entirely correct.

⁷⁹ It is interesting to note here that Darwin's concept of "race" was more akin to "tribes," and his arguments to "tribalism" or the competition between tribes for resources, power, etc.

selection was used out of context as an excuse, for example, by the British not to relieve the famines of India, where some 30 million died between 1878 and 1902 (Davis, 2001). We even see the connection between conquest and race:

...as Conrad's Marlow said in *Heart of Darkness*: “The conquest of the earth, which means the taking away from those who have a different complexion and slightly flatter noses than ourselves, is not a pretty thing when you look at it too much.”⁸⁰

Taken out of context and to its ultimate extreme, Darwin’s ideas of separate races of differing levels of superiority and inferiority, coupled with the idea of an intense (warlike) struggle for survival, and his cousin’s (Francis Galton’s) theory of eugenics, paved the way for the brutal Nazi regime with its ideology of “natural superiority.” The *Holocaust* seems to be a worst-case scenario of scientific philosophy being misused for political ideology. Yet in fairness to Darwin, he did not really intend this result (instead taking a more observational role— his ideas may be seen as a fairly accurate description of the colonialist expansionism prevalent in the 19th-century “Age of Empire.” Moreover, Darwin’s ideas of *sexual selection* and testing the offspring of two groups for sterility helped cement the idea that all humans were of the same race, as they could interbreed successfully.

Social Constructionist Argument

Given the great misuse of the concept of race to rationalize or justify various ideological sins, such as slavery, racism, colonialism, and war, and that sociologists specialized in studying society and human interaction, it is logical that a reaction to the ideas of Scientific Racism and Social Darwinism would begin with sociologists. Yet it was an anthropologist (in a closely related field), Franz Boas, who in 1910 began the pushback by arguing that craniometrics, or the studying of the shape of a human skull, to categorize people by race was a “false” notion (Wade, 2002). Ironically, new research in 2002 would suggest that Boas was incorrect; modern forensic

⁸⁰ <http://books.guardian.co.uk/reviews/history/0,6121,424896,00.html> (accessed June 11, 2008).

experts that specialize in facial reconstruction can in fact often determine a person's race just by the shape of the skull.⁸¹ Perhaps more disturbing is the suggestion that Boas may have sacrificed scientific validity in an effort to stem the racist views of his day:

Evidence of Boas' disdain for the often typological and racist ideas in anthropology are evident Boas' motives for the immigrant study could have been entwined in his view that the racist and typological nature of early anthropology should end, and his argument for dramatic changes in head form would provide evidence sufficient to cull the typological thinking (Sparks & Jantz, 2002, p.14638).

In other words, it appears that Franz Boas may have manipulated the interpretation of his data in an unscientific manner for an admittedly worthy social cause. Yet as modern researchers today, we must be careful not to allow our personal biases and political persuasions to affect the conclusions we draw from scientific data. Do the ends justify the means in this case? That may be a question for philosophy, but my personal philosophy is that "the theory should fit the data, not the other way around."

Regardless of the utility or validity of craniometry, both sociologists and anthropologists continued to study the issues of "race" in terms of "race relations." Anthropologists such as Margaret Mead continued to write on the social role of race from the 1920s to the 1960s, although the classical categories of race as "Caucasoid, Mongoloid, and Negroid" remained strong into the 1960s. However, by the 1970s a new perspective emerged, that race is "socially constructed." The social constructionist perspective on race can be summed up best by Joel Best (2002, p. 529):

When sociologists say that race is a social construction, they mean more than simply that race, like every other term, is a category people learn through interaction and use to make sense of their world. Calling race socially constructed is also a way of challenging the mistaken assumption that race is a meaningful distinction somehow grounded in

⁸¹ "A trained artist can look at a skull and immediately tell the race and gender of a corpse." <http://www.cnn.com/2007/US/11/27/riley.sketch/index.html?iref=newssearch> (accessed June 11, 2008).

fundamental biological differences. Sociologists understand that race lacks that sort of conceptual clarity.

Their idea that a social construction has no meaning outside its construction has been bolstered in recent years by the inability of biologists to find a “race gene” (Sorensen, 2001).

This raises the issue: does race exist? Social constructionism does not necessarily require the concept of “race as a biological construct” to not exist. For example, we could say that Democratic presidential nominee Barack Obama is socially “black,” as he chose that socially-constructed identity; and biologically “multiracial,” as he has a black father and a white mother. Yet as Joel Best reiterates: “Sociologists do not really believe in the idea of biologically based race” (Best, 2002, p. 529). Thus I turn to the issue of whether race “exists” from a biological standpoint.

Race Does Not Exist?

In the 20th century, the view that “race doesn’t exist” has gained steam among mainstream scientists, including not just sociologists but even some biologists. Researchers from the human genome project in 2002 proclaimed that the “race gene does not exist,”⁸² and we also find arguments made that “genetically speaking, race doesn’t exist in humans” (Fitzpatrick, 1998). In the “Biological Case Against Race,” Joseph Graves (2002) argued that

...our social construction of race was contingent upon the assumption that significant biological variation between groups of human beings existed that could be used to identify and classify these same races. Scientists now know that this was a false proposition, both at the level of the physical features and of the genes that produce them.

⁸² <http://www.foxnews.com/story/0,2933,43298,00.html> (accessed June 17, 2008).

By the year 2001, much of academia had accepted the notion that the concept of race was “biologically meaningless,” with an editorial in the *New England Journal of Medicine* expressing that proposition.⁸³

Yet since 2001, the pendulum has begun to swing back towards a second look at “biology and race.” First, the arguments put forth against the concept of “race” as having a biological basis seem to be contingent upon a narrow “straw man” definition of race that employs “neat categories” that can be tested for by identifying genes associated with race. Tony Fitzpatrick lays out the argument that the concept of race was based upon the “candelabra model”: “three distinct populations emerging from a single stem, each of them separate genetic entities that have not mixed genes, and thus are distinct, biological races.” Few, if any, modern researchers would disagree that such an idea was dead.

However, in 2003 some geneticists began to push back. Dr. David Risch and nine co-authors argued that “race corresponded broadly to continental ancestry and hence to the branches of the human family tree described by geneticists.”⁸⁴ It should be noted that the very study that Tony Fitzpatrick used to proclaim a biological basis for race as a dead concept in fact noted that 15% of the genetic variation in human DNA was attributed to “race”—not an insignificant amount.⁸⁵ Further, research in other fields, such as epigenetics, has begun to identify differences that may exist on the sub-genomic level.⁸⁶ Finally, even though no one has located a “gay gene,”

⁸³ <http://query.nytimes.com/gst/fullpage.html?res=9901E1D6103DF932A25754C0A9659C8B63> (accessed June 17, 2008).

⁸⁴ <http://query.nytimes.com/gst/fullpage.html?res=9C06E2D81331F933A15750C0A9659C8B63> (accessed June 18, 2008).

⁸⁵ http://www.world-science.net/exclusives/050128_racefrm.htm, note this is a weak reference, but alludes to a real study which I will search for. (accessed June 18, 2008).

⁸⁶ <http://www.hopkinsmedicine.org/press/2002/november/epigenetics.htm> (accessed June 18, 2008).

it is most peculiar that the popular media support the idea that sexual orientation has a biological basis (but race does not?). Even research into Alzheimer's disease has had trouble locating more than one "Alzheimer's gene," yet the condition seems to be inheritable and its outcome can be predicted. All this suggests that the argument for a biogenetic basis for longevity, race, sexual orientation, etc. all remain open questions. Below, I present the modern argument for biological consideration of racial variation between groups.

Biological Race Argument

Geneticists recognize that population bottlenecks (such as the Ice Age, the Sahara Desert)⁸⁷ and founder effects are responsible for genetic-group differentials which, when compared to the stark American dichotomy of "European-American" and "African-American," finds that these correlations are real, even if the current divisions are indistinct and overlapping.

For example, James Jacobs states that

The "Weak Garden of Eden" model for the origin and dispersal of modern humans posits a spread around 100,000 years ago followed by population bottlenecks. Then, around 50,000 years ago, a dramatic growth occurred in genetically isolated, small populations. In a 1998 article, Stanley Ambrose proposed an alternative hypothesis—a volcanic winter scenario—to explain recent human differentiation. The bottleneck was caused by a volcanic winter resulting from the super-eruption of Toba in Sumatra. If Ambrose's hypothesis is correct, modern human variations differentiated abruptly through founder effect, genetic drift, and adaptation to local environments after around 70,000 years ago.⁸⁸

In fact, we find this idea is a recurring theme in recent literature on human genetics and evolution (Wade, 2007). Whether group differences today that are labeled "race" differences may be more correctly labeled with another term, such as "haplogroup" differences, the point is, a biological foundation has been established that between-group differences are biological, not just socially constructed (see Appendix A for maps). Within-group similarities may be ascribed to one having

⁸⁷ That is, environmental factors that reduce genetic diversity or separate genetic pools.

⁸⁸ <http://www.jqjacobs.net/anthro/paleo/bottleneck.html> (accessed Jan. 22, 2008).

more ancestry in common with genetically similar groups of people that grew, adapted to different environments, and evolved in different times of isolated human migration over the last 100,000 years or so. Whether this is the ability to process milk or the employment of epicanthal eye folds to ward off the cold or sandstorms, we should not allow current socio-political arguments in vogue in sociological circles to be an excuse to overlook what may be promising areas of research. Dividing humans into categories for scientific analysis does not imply that these categories are a perfect representation of reality. Then again, we must understand that all scientific models are a simplification of reality, a tradeoff that allows for a distillation of an extremely complex reality into a simpler conceptualization to a level that is both manageable and allows us to “create explanations of how we think some part of the world works”⁸⁹ In the case of Americans and race, the white/black race model has traditionally been employed. Although in recent decades, the two-race model has been replaced with a multiple-race one, for the purposes of this paper the two-race model best achieves a data fit, given that the data come from the USA birth cohorts from 1865 to 1889, and that this population sample can be overwhelmingly characterized using the white/black model (over 99% of the group, or 353 of 355 persons, are either white or black).

Human Ancestry and Race

The first human ancestors are believed to have split from chimpanzees in Africa between 6 and 7 million years ago. About 2 million years ago, the first archaic humans (genus homo, but different species) left Africa. Most scientists believe these early humans survived some 2 million years, becoming extinct just 13,000 years ago. The prevailing “single recent origin hypothesis” is that all humans today are descended from the “homo sapiens” species which arose in Africa

⁸⁹ <http://www.wcer.wisc.edu/ncisla/muse/naturalselection/materials/section2/lesson2A/handouts/handout1.pdf> (accessed Jan. 22, 2008).

about 160,000 years ago; the first from this line outside Africa made it to Israel about 100,000 years ago. Yet, as mentioned below, at least three and possibly more species of archaic humans still existed at the time. [Some, like *homo heidelbergensis* in Germany, *homo habilis* in Africa, and *homo ergaster* in Georgia (former USSR) had become extinct already—the total number of “homo” species has not yet been settled, but it likely was at least seven to ten and probably more.] This theory holds that the more advanced *homo sapiens* may have killed off the early archaic humans, who disappeared along with the woolly mammoth, saber-toothed tiger, etc. Others ascribe the extinctions to climate change.

Today's “racial” differences are mostly due to group migrations and isolations over tens of thousands of years (see appendices for detailed maps and charts on haplogroup migrations). Perhaps a better question than what “race” or “color” are we is “what is your haplotype profile?” If we took someone's DNA profile, we could probably tell where they came from. But is it less a matter of “what race” that person belongs to, and more about what proportion of each haplotype/migration gene pool predominates? This information can be useful in finding out what genetically-inherited diseases we may be susceptible to.⁹⁰ Finally, it is interesting to note, that just 30,000 years ago there were at least four species of humans on the Earth, but three of them are considered to have gone extinct:

homo erectus (extinct 25,000 years ago, Indonesia)

http://news.nationalgeographic.com/news/2003/02/0227_030227_javaskull_2.html

<http://www.innovations-report.de/html/berichte/studien/bericht-34347.html>

homo neanderthalensis (extinct 24,000 years ago, Spain)

http://www.livescience.com/php/multimedia/imagdisplay/img_display.php?pic=050310_neanderthal2_02.jpg

homo floresiensis (extinct 13,000 years ago, Indonesia)

90

<http://www.techreview.com/Biotech/13211/>

<http://www.physorg.com/news89313361.html>

A minority view is that some of them, particularly Neanderthals, may have interbred with *homo sapiens*. Given that two of four lived in just one country, and one was found as recently as 2003, it is likely scientists will find more species of archaic humans. The real point here is that human ancestry, race, and evolution are not merely more complicated than the simplistic racial categorizations of a century ago; they are also more complicated than the simplistic arguments made by some in the sociological community that “we are all the same,” which has its origin in politically-correct dialogue, not science; and which also, ironically, is a detriment to minorities because the “add-and-stir” approach that begins with the Caucasian model of health and merely extends that model to minority groups fails to account for variations in disease susceptibility (not just sickle-cell anemia: look at what happened to the Native Americans) and fails to recognize that some groups may have positively adapted in a harsher environment and thus overlook conferred longevity advantages that may come through those environmental adaptations. When it comes to trees, we can recognize that the Asian variety of elm is less susceptible to “Dutch elm disease” than the American variety; why cannot we have scientific dialogue concerning human differences without a scientifically invalid politicization of the issue?

Returning to our evolutionary origins, a final note: had *homo sapiens* continued to be isolated, we could have separated into different species: human evolution is 'speeding up,' and humans were on pace to split into multiple species.⁹¹

⁹¹ <http://www.timesonline.co.uk/tol/news/uk/science/article3031104.ece>

Mark Henderson, Science Editor

Races have evolved away from each other over the past 10,000 years, according to new research that challenges standard ideas about the biological significance of ethnicity.

A genetic analysis of human evolution has shown that rather than slowing to a standstill it has speeded up, with different pressures on different populations pushing racial groups further apart. Scientists behind the **findings**

Review of Literature

Supercentenarians

Extreme Longevity Tracking: History

While literature reviews for major subjects often cover just the last ten or fifteen years, the specialty field of research into supercentenarians has long been marginalized, only occasionally emerging into the mainstream scientific and public discourse. I therefore plan a general overview of the literature from its beginnings in the 1870s to the present day. Much of the research was interrupted by wars, at which time nations shifted their focus to more pressing immediate concerns than the long-term debates that surrounded those on the maximum human life span—simply surviving the present was paramount.

I also should note that interest in human longevity goes back to time immemorial, and that the Romans, Greeks, Babylonians, Jews, Japanese, and other societies all kept lists of long-livers, many well in excess of 110 years. Often, those closest to the beginning lived the longest, and usually to some extreme age that seems impossible by today's modern scientific standards. In the Judeo-Christian tradition, the first man, Adam, was said to have lived 930 years. Over time, extreme age claims gradually fell. In some instances, a claim was on the cusp of believability, but still wrapped up in religious mythology. For example, St. Paul of Thebes allegedly lived 113 years, but his case seemed more an example of one-upmanship than true story: St. Anthony (who

suggest that European, African and Asian populations grew genetically more distinct from each other over several thousand years, as their environments took them down different evolutionary paths.

This would call into question the popular scientific view that race has little or no biological meaning, as the genetic similarities between ethnic groups greatly outweigh differences.

was said to have lived to 104) had been boasting about living in the desert the longest among all hermits (a source of pride), only to be humbled by an even older hermit. While age 113 seems possible by today's standards, the physical representations of St. Paul of Thebes do not belie a man of 113 years of age, and viewed in the larger context of a story that includes "devils, centaurs, and satyrs,"⁹² we can understand why a claim of 113 years might not be the most unbelievable part of the story.

In the Middle Ages, extreme longevity claims were taken for granted (as if true). When esteemed physician William Harvey (who discovered the circulatory system) examined the body of Thomas Parr, said to be 152 years of age, he did not once mention that Parr might not be the age claimed. It was not until the 1870s, when British folklorist and House of Lords deputy librarian William J. Thoms began a systematic inquiry into extreme age claims and published the results in 1873 (finding that nearly all were false and that he could not verify the age of anyone over 103 years of age), that the field of scientific inquiry into supercentenarians as a *purported population cohort* truly began.

It should be noted that several prerequisite factors had already been met when Thoms took advantage of the opportunity to do what no one had done before. The 1800s was an age of industrialization, along with movements toward science, socialism, and increasing government control. Governments in Western Europe began instituting retirement pensions, retirement age, help for the poor, and other social reforms. In order to figure out how much governments would have to pay, it became necessary to know how long humans really lived. False age claims, rooted in religious, nationalist, localist and familial myths, were under assault for the first time. Compulsory birth registration (in other words, near-100% of the new-born population was registered, as required by law) in England became mandatory in 1837, but partial registration

⁹² <http://www.newadvent.org/cathen/11590b.htm> (accessed May 13, 2008).

was already common in the 1700s. In this same time period, there was a general attempt to debunk “old wives’ tales” and other common unscientific conceptions as *myth*. In their skepticism, some of the harsher critics may have gone too far, but they helped shift the burden of proof from the debunker to the claimant.

Thoms’s work was soon taken up by actuaries for life insurance companies, and much of the focus shifted to the United States. Interest in the subject was strong in the early 20th century; we see supercentenarian Ann Pouder featured on the cover of National Geographic in 1917, as Alexander Graham Bell (better noted as the inventor of the telephone) vouched that her age was authentic. The tradition of age validation as a science continued, despite World War I, with Alexander Graham Bell (better noted for the telephone, Bell dabbled in many fields) studying centenarians in 1918—at least one of whom was said to be 110 or older and documented (Ann Pouder, 1807-1917). One of the effects of Thoms’s work was to lower the bar of believability (i.e., claims above age 105 or so were viewed with skepticism; those above age 125 were viewed as frauds). After tearing down the myths of longevity—suggesting that no claim to an age above 103 could be verified—it was incumbent upon his successors to attempt to verify the ages of extreme claims, in order to establish new records. Thomas Emley Young in 1899 settled upon age 106 as the oldest documented person then living, but this soon was pushed to age 110 by Margaret Ann Neve (1792-1903). Young eventually was persuaded to accept the Pierre Joubert claim to 113, and this became the longevity limit among many skeptics for the next few decades. Even as late as 1974, this line had not changed:

The fact is that no man or woman with a verifiable birth record is known to have lived longer than 113 years. As Actuary Walter G. Bowerman has pointed out, assertions of extreme longevity originate mainly in remote, underdeveloped regions among illiterate peoples whose only evidence of age is their own claim, possibly supported by an interested relative.⁹³

⁹³ <http://www.time.com/time/magazine/article/0,9171,908667,00.html?promoid=googlep> (accessed May 13, 2008).

Yet the Pierre Joubert case was itself a fiction. It was eventually replaced by Delina Filkins (1815-1928), whose age (113 years, 214 days) was verified by E. Ross Eckler Jr. (1927-) in the 1970s.⁹⁴

Nonetheless, interest began to wane in the middle part of the century; whether during the “roaring 20s” (a time focused on youth, money, movies), the Great Depression, or World War II. Bowerman’s 1939 treatise in this time period stands out, almost orphaned. Research into supercentenarians continued to be little more than a side hobby of actuaries. There is one interesting idea from this period to note, however: In 1951 a French demographer, Paul Vincent, suggested that the maximum human life span was 107 years, using an exponential function model of mortality. Thus, the mathematicians continued to be cautious about predictions of people reaching age 110, but few others were.

The 1950s saw the rise of the Guinness Book of World Records and a popular media interest in Civil War veterans in America. In 1959, a New York Times reporter, Lowell Bridwell, discovered that Walter Williams, allegedly the last Confederate veteran at age 117, was a fraud (not even a veteran), and only 105 years old. Nonetheless, deep sectional division meant his work was not accepted in the US South, and government authorities up to President Eisenhower sanctioned the longevity myth. For many, there was a sense of “let the dead rest in peace,” and since the South had lost the Civil War, conveniently allowing them to win the longevity myth (it was even said “if we can’t beat ’em, we can outlive ‘em”) was seen as a consolation prize.⁹⁵

⁹⁴ In 2005, I reinvestigated this case, and it may be the second-best validated case of all time, as well as the second-most outstanding outlier for its time (after Jeanne Calment) <http://www.demogr.mpg.de/calendar/files/23312.3112487793-Workshop%20Program.pdf> (accessed June 3, 2008).

⁹⁵ It was a pyrrhic victory, however; today the Walter Williams case no longer has U.S. government sanction. Sadly, William’s replacement as “last Civil War veteran,” John Salling, is also seen as a fraud, and research in 1991 found

In the 1960s and 1970s, we see two disparate trends regarding supercentenarians and the myths of longevity: one toward public recognition of age-validated centenarians and supercentenarians (in the United Kingdom and Western Europe) and one toward a new era of age inflation (in the USSR and the United States). The British began tracking supercentenarians in 1966, and the Guinness Book gained a media foothold as the authentic source for the world's oldest person. However, we also see the Cold War being played out, and both the USSR and the USA used longevity myths (Shirali Mislumov, 168; Charlie Smith, 137) to claim that their system of government was a better way of life. Scientific acceptance of the longevity myth was seen in both *Time Magazine* (1967) and *National Geographic* (1973). However, the tide would begin to turn: in 1974, a Russian scientist named Zhores Medvedev debunked the Soviet myths as a Stalinist fabrication⁹⁶ while Alexander Leaf and other Americans who had initially accepted claims of extreme longevity in remote, mountainous regions such as Caucasia, the Hunza Valley, and Vilcabamba began to sour on the ideas when repeated interviews led to the exposure of fabricated claims. For example, in one interview Khfaf Lazuria of the Caucasus claimed to be 130; two years later she was “140”—a mathematical impossibility. The age myths in America, which led to an over-reported 106,441 U.S. centenarians in the 1970 census⁹⁷, braced for a pushback as well. By 1979, the New York Times and other newspapers published a retraction of Charlie Smith: no longer “136,” he was now just 104 years old (Thompson, 1986).

The 1980s would see a new push towards age validation (the year 1980 also saw professor James Fries suggest the age of ‘110’ as the realistic human longevity limit as part of

that the third-to-the last Confederate veteran, William Lundy, was also a fraud. The last Union veteran, Albert Woolson, had also inflated his age, claiming to be 109; research in 2006 showed he was 106.

⁹⁶ <http://www.time.com/time/magazine/article/0,9171,908667,00.html> (accessed Feb. 20, 2008)

⁹⁷ By 1980, the number of reported centenarians in the U.S. was just 32,194, although the Census estimated the “real” centenarian counts even lower, at about 4800 centenarians in 1970 and 15000 in 1980 (Krach & Velkoff, 1999).

his “compression of morbidity” hypothesis... perhaps a bit low and an overreaction to the myths, but closer to reality than believing someone was “137” years old). Both Guinness World Records and the mainstream world press launched new efforts to provide more accurate, more reliable information on who the world’s oldest person really is... often without success. The Guinness “world’s oldest man,” Shigechiyo Izumi (1865?-1986), would be called into question by Japanese authorities who stated this he was really only 105 years old (Asahi news service, 1987); the American claim of Carrie White (1874?-1991) would later be scrutinized as well (with a suggestion that she was only 102 years old). By the late 1980s, skeptics had suggested that no one had ever lived to 115 years old: the oldest proven case at the time accepted by skeptics was Anna Eliza Williams of the United Kingdom at 114 years, 208 days (record set in 1987).

That would soon change. On February 21, 1990, Jeanne Calment reached her 115th birthday, and a new era of scientific accord between the Guinness Book and the scientific community (both had Jeanne Calment as their “world’s oldest person”) had begun. For those that demanded proof, the Jeanne Calment case was impeccable.⁹⁸ While Calment pushed the envelope of longevity to age 122 in 1997, suggesting that perhaps humans lived longer than skeptics previously had thought, skeptics would respond that the life span of Calment and her successors (such as Marie-Louise Meilleur, 117; and Sarah Knauss, 119) was a “new” phenomenon. Dr. Bernard Jeune of the University of Odense, Denmark, had proposed a new hypothesis: “no supercentenarians before 1950” (Jeune & Vaupel, 1995). Human life span was not fixed, he claimed. Corollary to that, Dr. Vaupel (founder of the Max Planck Institute for Demographic Research, 1996) proposed the idea that, at the highest ages, supercentenarians experienced “mortality deceleration” or a slowing-down of the increase in the exponential mortality rate (partly an attempt to account for Jeanne Calment, whose age did not fit many

⁹⁸ <http://www.demogr.mpg.de/books/odense/6/09a.htm> (accessed June 6, 2008).

statistical models). In order to test these ideas, however, large numbers of supercentenarians would be needed...an unlikely prospect given their extreme rarity (about 1 in 5-10 million, even in industrialized nations).

While the Europeans were working on demographic theory, Americans were busy building the foundations for a supercentenarian database. The Guinness Book stopped publishing their list of oldest persons after the 1991 edition, but others such as Louis Epstein and myself kept the candles burning, so to speak, tracking supercentenarian cases as a hobby (and attempting to figure out who was for real and who was not). In 1998, the Gerontology Research Group began hosting Mr. Epstein's supercentenarian tables, and in 1999 I joined the GRG team of worldwide extreme longevity investigators.

The decade of the 2000s saw more research done on supercentenarians than the previous century combined. Just as in the Thoms era, many factors had come together to make the setting ripe for progress: the rapid growth of the centenarian and supercentenarian population; research in the 1980s that suggested that longevity was inherited; the desire of governments and insurance actuaries to control pension, Social Security, and life insurance costs. The advent of the internet allowed for much greater communication, and researchers interested in a small, niche market could now come together. In March 2000, I was invited to the first Supercentenarian Workshop in Rostock, Germany. This initial conference brought together many of those who had done the groundwork necessary for launching a major research expansion.⁹⁹ It was decided that each interest had a "part of the pie" and that only by combining datasets, would there be enough data

⁹⁹ These included: James Vaupel (co-founder of the Max Planck Institute, advocate of the mortality deceleration hypothesis); Jean-Marie Robine (validator of the Jeanne Calment case, a French demographer); Bernard Jeune (Danish advocate of the recent emergence of supercentenarians); Roger Thatcher (the UK researcher who began tracking English and Welsh supercentenarians in 1966); Vaino Kannisto (founder of the Kannisto-Thatcher database); Louis Epstein (leading American amateur tracker of supercentenarians); Robert Young (competing American amateur tracker of supercentenarians); Richard Anderson (representative of the US Social Security Administration); and Gert Jan Kuiper (leading Dutch amateur tracker of supercentenarians).

for the emergence of the study of supercentenarians as a population cohort. Since that initial meeting, despite occasional disagreements, we have seen the establishment of large supercentenarian databases with the Social Security Administration, the International Database on Longevity, and the Gerontology Research Group database. Later, the GRG launched the Supercentenarian Research Foundation (2004); the SSA database led to further work at the University of Pennsylvania¹⁰⁰ and Duke University; the International Database on Longevity has already seen published work from Latrobe University of Australia. Meanwhile, the New England Centenarian Study launched the New England Supercentenarian Study (2006).

Today, in the 21st century, we can see emerging two main research tracks: the demography of supercentenarians, and the biology of supercentenarians. These two are not really separate, but intertwined. Recent studies have attempted to tie the likelihood of living to 110 to early-life predictors, such as birth month and climate (winter months vs. summer months). This particular thesis, which intends to examine supercentenarians and race, fits within that tradition. Below, a short summary of each person or article that I have identified as being particularly important and relevant to both today's research and the history of the field. Less well covered are theories which seem to have led science astray, and which in retrospect appear to be nothing more than the myth of longevity couched in the name of science... ideas that the "secret" to aging is yogurt, or living in the high mountains. I find it particularly ironic that we have seen supercentenarians in Tokyo, Hiroshima, and New York City (all large, urban, sea-level cities), which contradicts the longevity-myth assertion that living to extreme age requires living in rural places at high altitude. In Ecuador, their oldest resident (Maria Capovilla, 116), lived her entire life in the sea-level city of Guayaquil (population over 3 million today), far from the mountains of Vilcabamba and the mythical village elder. What has emerged is that the most important

¹⁰⁰ <http://cairo.pop.psu.edu/allen/Wpapers.cfm>

factors in extreme longevity are intrinsic, not extrinsic; the external effects of environment can shorten one's life, but not really lengthen it. Each one of us has a maximum potential; when we reach our potential, that is as far as we are going to go. George Buffon's assertion (1749) that the human life span is "fixed" and about 90-100 years may have slightly underestimated the plasticity of aging, as the observed maximum human lifespan has increased from age 108 in 1837 to 122 in 1997. Yet the increase in maximum human lifespan appears to be incremental and slow, and increasingly difficult to push higher. Unless and until someone comes up with a scientific breakthrough for aging on the order of nuclear fusion for physics, whereby lead could finally be turned into gold, we find that a century later, it was the insurance actuary, Gore, who knew more about human longevity and its future than the "scientific" visionary, Metchnikoff, who, Nobel Prize notwithstanding, managed to live to only 71 utilizing a diet of sour goats' milk (which he had predicted would result in a 140-year life span). Perhaps it was the exercise of sheepherding, not the lactase, which made village elders so healthy: but even then the primary explanations for their longevity claims are that they are false. In the end, many have been led astray by the false promise of extreme longevity. Below, I review some of the major works regarding supercentenarians over the past 130 years.

William Thoms (1873; reissue, 1879)

In *Human Longevity: Its Facts and Its Fictions*, Thoms almost single-handedly launched the niche field of extreme longevity investigation.¹⁰¹ Having already made his mark on history once, by coining the term "folklore" in 1846,¹⁰² Thoms made the connection between the mythology of folktales and the stories of extreme age, such as that of Thomas Parr (claimed age

¹⁰¹ It may be stated, however, that Thoms was at the forefront of an historical move; Fraser's Magazine in 1872 investigated the ages of the Biblical patriarchs, and just five years after his book was published, the Tache investigation in Canada marked the first government use of his methods.

¹⁰² Georges, Robert A., Michael Owens Jones, "Folkloristics: An Introduction," Indiana University Press, 1995.

152); Catherine, Countess of Desmond (claimed age 140); and Henry Jenkins (claimed age 169). But Thoms went much further than merely suggesting that these patriarchal or matriarchal folk figures were frauds; he also systematically investigated claims to ages beyond 100 in 19th-century England, and found that no claim older than 103 could be verified as true and all the supercentenarian claims to be false. Thoms details his long-running disputes with the “true believers,” but perhaps more importantly, he laid down rules of critical inquiry that remain the gold standard even today. These include the need for not just original certificates of birth, marriage, and death but also the need to interview the alleged supercentenarian claimant (to see if their story matches well with the records); the need for a family-tree reconstruction; and a need for a search for a 100th birthday story. If someone is 110 now, shouldn’t they have been 100 years old ten years ago? Or, more extreme: if Thomas Parr were 152 today, why did no one hear of him until he was 152? Many extreme claimants were unable to produce even a simple piece of evidence such as an earlier mention of their extreme age. This red flag can be seen even in today’s news.¹⁰³ It should be noted that not one claim that Thoms named as “validated” has been refuted, while later imitators have left decidedly mixed track records. The 1878 Tache investigation in Canada, which thoroughly investigated 421 claims to centenarian status and found only about two percent to be true, was nonetheless duped by the Pierre Joubert claim to age 113.¹⁰⁴ Joubert’s real age would emerge over a century later as a mere 82 years old (Jeune & Vaupel, 1999). Thomas Emley Young, whose next-generation work would prove nearly

¹⁰³ http://news.bbc.co.uk/2/hi/middle_east/7247679.stm In the Mariam Amash claim, we have a claim to ‘120’ but the claim started now; there is no 119th, 118th, 117th birthday story, there is no 100th birthday story. For a claim to begin at an extreme age is a sure sign that something is amiss.

¹⁰⁴ See <http://www.demogr.mpg.de/books/odense/6/04.htm> for details.

impeccable, also fell for the Pierre Joubert claim, as did Walter Bowerman in 1939. More than 130 years later, it remains remarkable that the man who started it all remains unscathed.

Man's Span of Life (1898)¹⁰⁵

This magazine article, for the noted literary magazine *North American Review*, is a skeptical appraisal of how long humans really live, which was remarkable for its time period (the 1890s). In this case, what is remarkable is that, more than a century later, many readers fail to understand the author, Langdon Kain's, point. An uninformed reviewer of a genealogy blog wholly missed the point with this summation:

Summary: An article from *North American Review* recounting numerous instances of centenarians in the 19th century, illustrating that those who lived to old age could live very long indeed!

Actually, the point of the article was entirely the opposite: Kain was telling us that most claims to extreme age are false, and points to the need for record-keeping to mitigate the problem of unverified claims in the future. If we focus on the author's own words, we see Kain note the skeptical point of view (that humans had not been proven to live beyond 103 years), the mythical point of view, and then chide the pro-myth writers for citing cases from long ago that cannot be investigated. Kain notes that "the census invariably shows that wherever the intelligence and prosperity of the people are highest, the centenarians are fewest...the inference was that the intelligent and prosperous people have more accurate sources of information and are more trustworthy in their statements of age than the ignorant." Kain then takes to task a German statistician for believing Russian and Brazilian claims to age 130, 140, and 150 years old, introducing the concepts of the "laws of chance" and "age heaping" (the tendency of age exaggerators to round off ages to the nearest five or ten years). Kain calls claims to such ages

¹⁰⁵ <http://www.elderweb.com/home/node/2855> (accessed June 6, 2008).

“ciphers”...defined by Merriam-Webster as 1a: [zero](#) 1b: one that has no weight, worth, or influence : [nonentity](#).¹⁰⁶ Thus, we see that Kain believed that extreme claims of longevity carried zero weight and were of no account. Yet we have modern, uninformed readers, a century later, proclaiming that this article illustrates that those who lived to old age “could live very long indeed.” If anything, we can see that even when the experts proclaim the myth of longevity as false, popular opinion often still favors belief in what appears to the scientific perspective as wholly irrational. Kain goes on to offer a reason for age exaggeration: a “sense of vanity in being phenomenally old.”

We also see the writer explicitly mention that the Brazilian is a “negro born in Africa.” Here, we see two longevity myths in play: the myth that Russians, or especially those from the Caucasus, live to extreme ages; and the myth that Africans also live exceptionally long lives. Later, we see references to “Hester Jackson, a colored” and “born a slave”—clearly, Kain was aware that one of the associations with extreme claims of longevity was the African American myth of longevity, as perpetuated by P.T. Barnum and his Joice Heth hoax. Mostly, however, Kain’s focus seems to be on the myths of the lower-classes, noting that many questionable claims were put forth by “paupers” making unsupported statements, and with little or no evidence.

The oldest person Kain seems to believe in is Emily Robins Talcott, who died April 20, 1896 at age 105. Yet his belief in this case seems mostly due to her “memories” of meeting George Washington and the Marquis de Lafayette: Kain did not seem to consider an even more skeptical view, that “memories” are often not that of the individual, but stories often told by the person’s parents, elders, or a previous generation or generations. Many modern false claims today are based on alleged “memories” of historical events...events that anyone could cite, since

¹⁰⁶ <http://www.merriam-webster.com/dictionary/cipher> (accessed Apr. 16, 2008).

anyone could know about them. A true test of memory is to ask an alleged supercentenarian pertinent details of their lives, something that only they would know the answer to.

In summation, we can see that Kain took a mostly skeptical view of claims to extreme longevity. He rightly discounted ancient and Medieval myths as uncheckable using modern records; he suggested that claims to 130-150 not be believed. And though he did not endorse the hyper-skeptical views that no human could live to 110, he did seem to pick age 105 as about as far as he would believe a longevity claim without sufficient documentation. Kain finishes with a swipe at claims that extreme long-livers had grown “new teeth” (suggesting instead that the gums of the extreme aged had receded, exposing old tooth roots) and then makes an exhortation for record-keeping, so that instances of unproven claims won’t be a problem in the future. Too bad it is taking so long for us to heed his advice.

T.E. Young (1899)¹⁰⁷

Thomas Emley Young (1843-1933) was the pre-eminent longevity claims researcher at the turn of the 20th century. He was president of the Institute of Actuaries (Britain's top actuarial organization), 1896-1898. His centenarian cases came from life insurance policies, and so were much more accurate in that whoever lived to 100 had the motivation of age fame pre-eliminated: who in 1800, when applying for a policy, thought that one day they might live to be 100 years old? How about 110? In addition, insurance rates are lower for younger ages, providing a disincentive against age exaggeration. But if that is not enough, Young insisted that validated cases must include proofs of birth/baptism, marriage (if applicable), and death (or survival to age 100+). In his initial book, *On Centenarians* in 1899, Young mentioned no one older than 106 years of age. However, in his later researches (1905 edition), Young was apparently able to identify one true supercentenarian: Margaret Ann Neve (nee Harvey), 1792-1903 of the Channel

¹⁰⁷ T.E. Young wrote "On Centenarians" in 1899; reissued with updates, 1905

Islands (UK). However, Young was apparently eventually persuaded to accept the case of Pierre Joubert (allegedly born 1701, died 1814), whom he believed to have reached 113 but who was shown to be only 82 years old in 1990.¹⁰⁸

With Thoms having established a firm tradition, others such as Young built upon it, even if they didn't maintain such a high level of skepticism. In at least one regard, Young's work was an innovation: Thoms tended to round ages off to the nearest birthday (i.e., 101 years 333 days=102). T.E. Young may have been the first to stress the use of the year/day age count, the first to build a Guinness-like age table of "verified" centenarians, and the first to include living persons with their age "as of", such as "Miss Mary Barber Alexander, born on 11 September 1803 and [at 30 September 1905 in the book] still living at age 102 years and 19 days" (e-mail communication, Feb 12, 2008, Institute of Actuaries, London). Note also that these cases accord with Thoms's "100th birthday" test: Thoms stated that almost all fictitious supercentenarian claims were not preceded by a corresponding 100th birthday previously, so one way to eliminate a large swath of false claims is to check for a 100th birthday story.

But this still does not eliminate pension-claim fraud. When it comes to life insurance, there is actually a benefit to claiming to be younger (a lower rate), so starting with life insurance tables further reduces the motivation for fraud, but often the vast majority of the population was uninsured. For those who relied on pensions, claiming to be an older age (i.e., 65 instead of 55) meant early retirement, and this might later affect the reported claims to extreme longevity (someone who is 100 but claims to be 110 is more likely to live longer than someone who is really 110). Thus, Young believed in age verification, and like Thoms believed that at least three

¹⁰⁸ See <http://www.demogr.mpg.de/books/odense/6/04.htm> for more details on this case. It should be noted that the Joubert case was accepted by a Canadian census official, Joseph-Charles Tache, in 1878, and perhaps there had been an overreliance on birth records and not enough emphasis placed on identity-matching. Note that we do not find this problem with William Thoms, who some 130 years later remains unscathed by a false-positive.

conditions must be met in
order to verify a person's age:

1. original proof of birth (issued at or shortly after birth)
2. proof of death or survival to age 100+X
3. proof that the person in document A is the same person in document B.

In the case of Pierre Joubert (the claim was that he was 113; he turned out to be 82, a father/son combination), the Tache investigation in 1878 failed to properly vet condition B, and later researchers merely repeated the error, assuming it was correct. Young did not accept the Joubert case initially in his 1899 book; however, he was persuaded by others to accept it by his second edition in 1905. Yet Young's insistence on the reliance of documents cannot be overlooked due to this one case; surely the point of publishing results is, in part, that it would allow future generations to check the work. Young also fought the idea that the human life span would dramatically shift in the coming decades, correctly asserting that the life expectancy gains made in the late 19th and early 20th century were mostly due to the reduction of infant mortality and childhood diseases, and little to elderly persons living longer than before.

New York Times article (1909)¹⁰⁹

As a new century dawns, a government agency in the United States is worried about the increasing life expectancy and the increasingly large number of people living to older ages. Some scientific researchers are predicting that, with modern technology, 140-year human life spans could be just around the corner. Sound like a news article from 2008? Yes, it does. But this article by Allan Benson was actually published in the New York Times on May 16, 1909. In it, many of the issues relevant to supercentenarian research today are laid out.

¹⁰⁹ <http://query.nytimes.com/gst/abstract.html?res=9B01E5D91539E733A25755C1A9639C946897D6CF> (accessed June 6, 2008).

This article from the New York Times is interesting in several aspects. For one, if we ignore some of the dated expressions and names for causes of death, much of the debate in this article is just as relevant today as it was nearly a century ago. Just as King Solomon said that “there is nothing new under the Sun, and what will be done, has been done before” (Ecclesiastes 1:9-14), so we find that much of what is touted as new ideas in aging and longevity research today existed a century ago. We find in this article a “prophet” of science predicting that scientific advances will lead to 140-year life expectancies. On the other side, we find the demographers—those that study population aging—saying “not so fast,” that they did not believe age claims to age 125 or above.

While we do not find the word “supercentenarian” in the article, we do see sentences such as “he (T.E. Young) had examined a great many cases of persons who declared that they were 125 years old or more, without ever having found one that satisfied him.” John K. Gore, actuary of Prudential Insurance Company and President of the Society of American Actuaries (basically, the American equivalent of T. E. Young’s British title as Society of Actuaries, London), states, “Records...tend to disprove the theory that men may yet live to be 125 or 150.” We also see Gore presciently interpret the apparent fall in life span in 19th century Europe as due to “less error than there used to be in giving the ages of the very old.” Perhaps the best line is also uttered by Gore:

It is a strange fact that of all the newspaper reports that one sees about the death of men and women who are said to have died at the age of 125 or 130, no one has yet been able to verify the ages claimed.

Nearly a century later, we find the assessments by Young and Gore spot-on (still true a century later), while the overly optimistic predictions of Nobel prize winner Metchnikoff little more than “pie-in-the sky” beliefs that failed the test of time. Yet Metchnikoff’s ideas that extreme

longevity could result from a lactase-based diet would still find adherents in the 1970s, when Dannon yogurt attempted to tie its sales to claims of extreme longevity from the Caucasus mountains. Sadly, old myths die hard.

Finally, Benson brings out the longevity myths in discussing “Serbia and the Balkan states.” We see elements of the village elder, nationalist, and Shangri-La myths, as he describes “a pastoral folk who take life easily,” “subsist on sour goat’s milk,” and reside in the “favorite abiding places of those who have lived to be 100 years or more.” Yet, ironically, their death rates are much higher in low and middle age: only in extreme old age is there an apparent longevity advantage. Here, we see the survivor-curve hypothesis espoused: the idea that only the strongest survive a tough childhood, so those that do make it to age 35 tend to live longer. Interestingly, the writer fails to tie Gore’s statistics (that improvements in recordkeeping lead to shorter apparent maximum life span) to the myths of aging.

Robert Myers (1966). Validity of Centenarian Data in the 1960 Census

This short article was written concerning centenarians (not “super” centenarians) and has often been overlooked by mainly European demographers citing the history of supercentenarian research. Yet it provides a very succinct and relevant base point in the history of supercentenarians and age validation. First, Myers (a demographer and actuary) recognized that neither the number nor the ages of reported centenarians in the U.S. census were reliable,¹¹⁰ at a time when the general public perhaps placed too much faith in the “official” census numbers. Second, Myers noted that the data for African American claims to age 95 and over were particularly unreliable. Third, we see that even though data quality improved slightly from 1930 to 1950, by 1960 age inflation in the U.S. centenarian data was higher than ever. Myers

¹¹⁰ Note that this is concerning late-life claims, not early census matches. For example, a listing of a child of four in the 1900 census is considered reliable, in part because it would have occurred long before anyone thought about the child living to be 110 years of age.

estimated that in 1960, the ratio of reported to real African American centenarians was over 11 times (or 1,160% higher than expected) for African American males and over ten times (1,036% higher) for African American females. Conversely, the ratios for white males still showed marked exaggeration (over three times, or 347%) and but for white females the ratio was less than two (still too high at 82% above expected). It is interesting to note that in 1930, 1940, and 1950 between 55% and 66% of the reported centenarians in the United States were African American (statistical “proof” of the African American myth of longevity). By 1960, a new-found increase in age exaggeration among the white population led to a decline in the African American percent to just 27%, but still well over the expected count (I note that Myers erroneously uses the 1960 African American percent of the U.S. population, about 10%, instead of the figure from 1860, which would be more directly comparable).

In this discussion, Myers noted that “there remains the even more important question of whether the persons who report themselves to be centenarians really are this old.” He follows by noting that of ten Social Security beneficiaries who claimed to be 110 or older, none of them could prove the age claimed. Myers thus concludes that “understatement of ages seems to be particularly the case among those who claim to be aged 110 or over, and it is believed that there probably are no persons who are actually this old.” Perhaps influenced by Paul Vincent’s 1951 assertion that the maximum human life span should be about 107 (which erroneously assumed that the exponential model would hold for the highest ages), I do note that supercentenarian data for this period is sparse and more than four decades later, there still remains few validated American supercentenarians for this time period (although we had a few proven outlier cases, such as Delina Filkins, 113 in 1928, and Betsy Baker, 113 in 1955). Robert Myers and other contemporary demographers held a continuing skepticism toward

supercentenarian claims, a skepticism quite apart from the prevailing moods of both the general public and the popular media at the time.

Bernard Jeune (1995 and 1999)

In *Exceptional Longevity: From Prehistory to Present* (1995) and *Validation of Exceptional Longevity* (1999), Bernard Jeune proposes the “incendiary hypothesis...that there were no true centenarians before 1800 and no true supercentenarians (110+) before 1950 in any population or period of history” (1995, p.9). Both of these books are part of the Odense Monographs on Population Aging series from the University of Odense, Denmark, in association with the Max Planck Institute for Demographic Research, Rostock, Germany, founded in 1996 by James Vaupel. Jeune’s hypothesis reignited scientific interest in studying supercentenarians in the 1990s. A skeptic among skeptics, his ideas were based on demographers’ studies of the exponential mortality rate among the oldest-old. Work by Roger Thatcher (UK) and Vaino Kannisto (Finland) had led to questioning the reliability of centenarian data, with Kannisto suggesting that the U.S. in the 1980s may have had only 5,000 living centenarians (much lower than the census-reported numbers). Yet at the same time, a growing number of validated supercentenarian cases (such as John Evans of Wales, 1877-1990) were emerging. Was this emergence a recent phenomenon? Yes and no. Jeune’s hypothesis led to a plethora of research which eventually concluded that his hypothesis as originally stated was not correct: centenarians existed before 1800, and supercentenarians before 1950. Yet everyone agreed that the numbers of centenarians before 1800 and supercentenarians before 1950 were quite sparse (isolated instances) and that as a population group, supercentenarians did not seem to really emerge until the 1970s. Consider that at late as 1972, the number of validated living supercentenarians was

just two, whereas it is currently 74 (as of June 9, 2008). Looking at a chart of the validated numbers since 1980, we see a major increase:

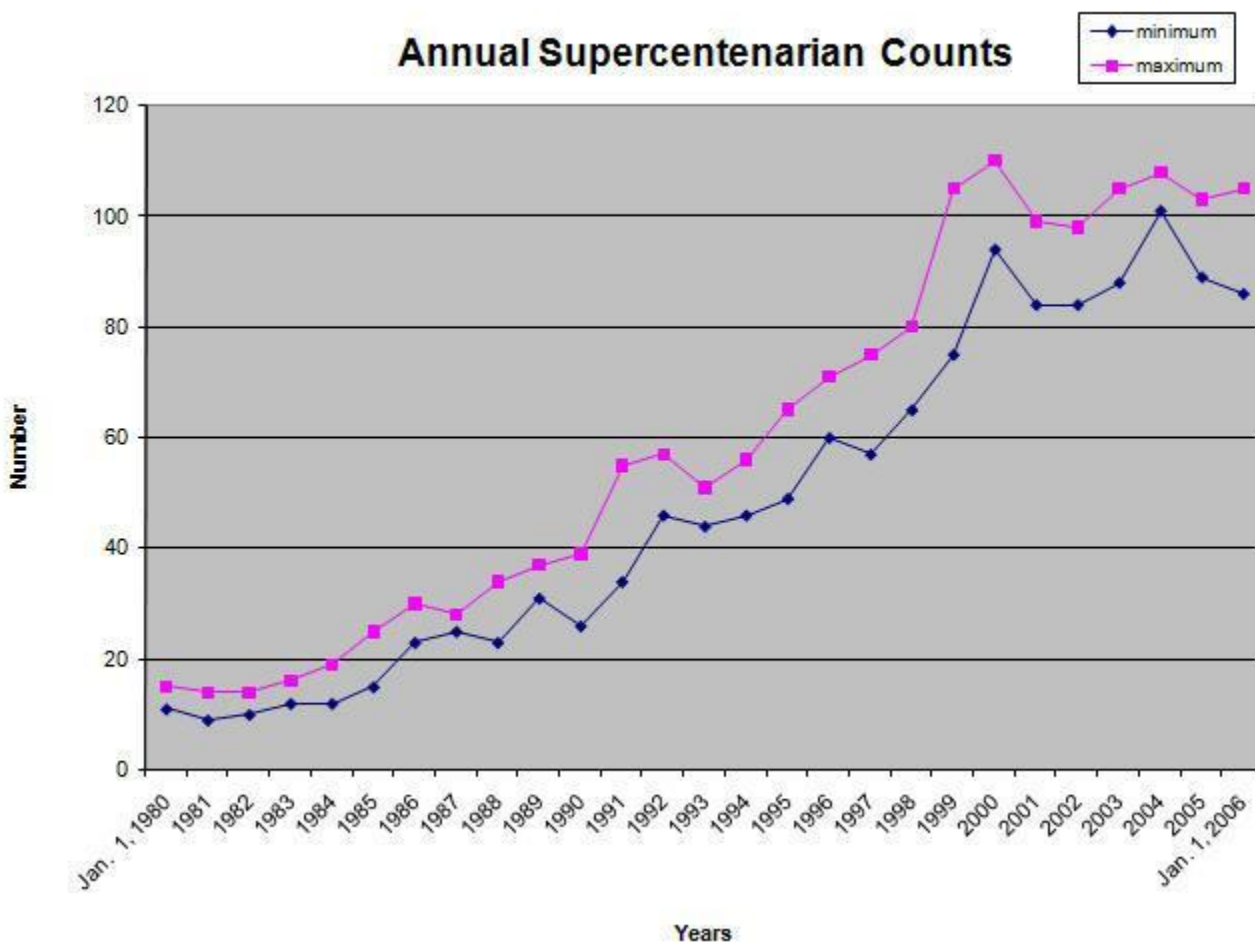


Figure 4. Annual Supercentenarian Counts

Source: Robert Young, based on GRG data, May 25, 2007).

(The slowing of the increase in numbers since 2000 may be due to the end of the Social Security Administration supercentenarian study data; when the 1890-1894 update becomes available, we can expect to see increases, instead of a flat-line pattern, as the graph will be adjusted upward).

Even more important than the results, however, Jeune's hypothesis identified that there was an unmet data need (there was virtually no demographic data on persons aged 105 and above). His hypothesis challenged demographic researchers to come up with data on

supercentenarians as a population cohort, and to prove whether supercentenarians existed before 1950 and when they emerged as a population cohort. The end result is a simple modification of his original hypothesis, replacing the word “no”: *few* supercentenarians existed before 1950, and this group only emerged as a population cohort in the 1970s.

Looking back, it seems that the Jeanne Calment case (she reached age 120 in 1995) was the primary motivator for the resurgence of interest in supercentenarians as a cohort of study: her age was far beyond the then-accepted maximum life span of about 115 years. Noted French demographer Jean-Marie Robine, who verified Calment’s age, noted that her extraordinary longevity forced demographers to rethink their theories regarding whether the maximum human life-span is fixed,¹¹¹ as well as the force of mortality at the oldest ages. Claims that the human life span was 113 or 115 had stood unchallenged for decades, with the explanation being that claims of extreme age above 115 were false. In 1951, remember, Paul Vincent had predicted a maximum life span of just 107. In 1980, James Fries had suggested age 110 as the maximum. Both were considered the skeptics then, and age 113-115 was seen as a reasonable compromise (the 1972 Encyclopedia Britannica cites age 113 as the maximum) between the skeptics and optimists who thought ages beyond 120 or 130 were possible. In retrospect, the skeptics may have been a bit too skeptical, but not by much: no claim to age 115 or older before 1990 has yet been accepted as validated by the scientific community. In other words, Jeanne Calment’s survival to age 122, and her immediate successors reaching 117, is seen by skeptics as a new phenomenon that only emerged in the 1990s. The implications are that the human life span is not biologically fixed, and thus has loosened the fixed-state model of human life span (as espoused by Georges Buffon, 1749) that has been prevalent for a quarter-millennia. However, a paradigm

¹¹¹ <http://www.sciencemag.org/cgi/content/full/279/5358/1831h?ck=nck> (accessed June 9, 2008).

shift in this area has not been complete, and the subsequent lack of any validated persons over the age of 116 since the year 1999 has resulted in a “plasticity of human longevity” hypothesis that suggests the human life span is mostly fixed, and is only modifiable through great effort. I personally favor the “incremental life-span increase” idea: it may be that most, if not all, of the apparent observed increase in the human life span over the past 25 years is attributable to simple factors such as an increase in population and lower death rates and better environmental conditions across the life-course (Wilmoth and Robine, 2003). We have seen the maximum scientifically-observed human life span increase from age 108 in 1837 to 110 in 1898, 113 in 1928, and 122 in 1997.

Supercentenarian Research today

In the past, most of the increase in human life expectancy (and by extension, life span) was due to a reduction of mortality among the young, with the benefits carried into old age. However, the idea that studying supercentenarians may identify keys to extending human life by reducing the death rates of the oldest-old is also catching on. The Gerontology Research Group (GRG) in the 1990s began tracking supercentenarians online, and by 2004 the Supercentenarian Research Foundation had emerged from the GRG with a mission to study supercentenarians on a biological, not just demographic, basis. A competing entity, the New England Supercentenarian Study, was formed in 2006 (as a subset of the New England Centenarian Study, founded in 1994) that is also engaged in supercentenarian research (disclosure: I am involved with both groups, as of this writing).

Because it stands to reason that if longevity is primarily genetic and the proportion of the variance of longevity attributed to genetics increases with age (a finding of the Danish twins study), bio-demographic researchers in the 1980s and 1990s focused on studying centenarians in

attempts to identify the keys to human longevity. However, the emergence of data on supercentenarians as a population group since the year 2000 has upped the ante, leading to even more-focused research on the very longest-lived human individuals on the planet. While I am interested in all avenues of research regarding supercentenarians (such as the variables of gender, urban/rural, the effects of air pollution, etc.), for this thesis I chose to focus on the intersection of supercentenarians and race. Aside from literature on the African American myth of longevity, research on maximum life span and race did not exist (until now). However, prior research over the past century or so has suggested the existence of a crossover effect, whereby the life expectancy disadvantage at birth eventually reverses for African Americans in old age. In this thesis, I am privileged to basically complete the “missing link” between the crossover effect, race, and the human life span. Before getting into the methodology and results, however, a little background on the crossover effect and prior research in this area is needed.

The Crossover Effect

Demographers use the term “crossover effect” to refer to when a trend in statistical data reverses on a graph. This may take many forms. When referring to death rates, the more precise term used is “mortality crossover.” Noted biodemographer S. Jay Olshansky defines a mortality crossover as “when the age-specific death rates for one subgroup of a population are either higher or lower than that observed for another subgroup during the early portion of the lifespan” (Olshansky, 1995, p.583). To distinguish from other crossover effects, in this thesis I use the term “race crossover effect” in places where the use of the word may not be clear. We can see the crossover effect demonstrated in the race mortality data from the Medicare enrollment database (see Figure 5). Although we begin to see effects as early as age 77, after age 85 the mortality rates for African Americans clearly veer to well below the rise in mortality rates for

Caucasian Americans. Most demographers have ascribed this crossover pattern to one of two main hypotheses: one, the idea of “selective survival” (Olshanky, 1995, p. 583); and two, the idea that the data are faulty (Olshanksy, 1995). However, other explanations also have been offered: that the crossover effect is related to biological factors (Corti, 1999); that it is a quirk of statistics and differential mortality rates (Liu, 1995); or is rooted in socioeconomic factors (Liang et al, 2002). Below, I briefly review these hypotheses. Because the heterogeneity hypothesis incorporates arguments from the statistical artifact, cohort/environmental effect, and biological/genetic effect arguments, I did not cover it separately below.

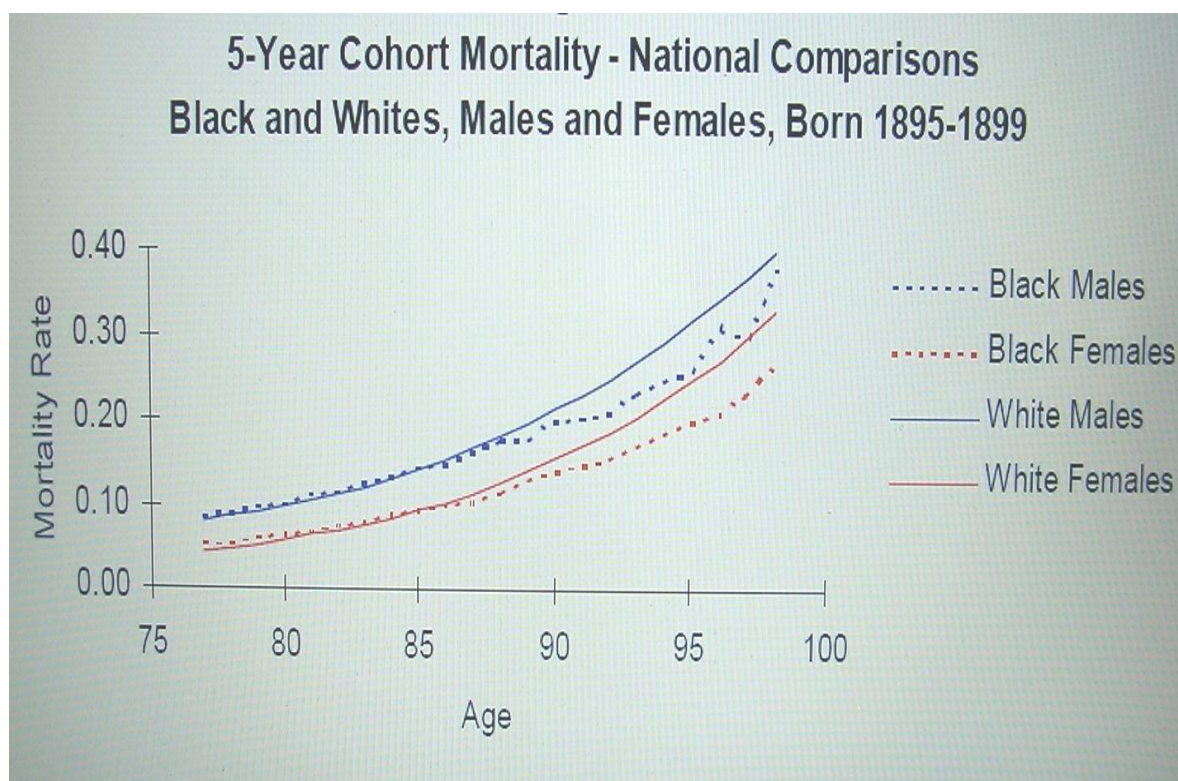


Figure 5. Illustration of the Crossover Effect for the U.S. Medicare-enrolled Population Born 1895-1899

Source: Center for Medicare and Medicaid Services

Age Misreporting?

Most literature on the crossover effect indicates that this effect is at least distorted by age misreporting, if not the primary or sole cause. The proportion of the variance of this factor on the data quality is an ongoing debate. On one side, the “minimalists” argue that age misreporting has a minimal effect on the data. Lynch et al. (2003) argued that, when the mortality data were adjusted for age misreporting, the crossover effect only moved upward two years (from age 79 to 81) and that most of the causation must lie elsewhere. Lynch et al. (2003) used data from the Berkeley Mortality Database¹¹² and Preston et al.¹¹³ Various statistical methodologies, including forward projection and extinct generation, were used, to adjust for age misreporting. Interestingly, the results showed that after adjustment, a crossover effect was still observed, but that the age it occurred was increasing across time (from 1970 to 1992). It was suggested that this was due to two factors, changes in data quality¹¹⁴ and a change in frailty, and that the greater component was the latter.¹¹⁵ The idea here is that life expectancy for African-Americans is gradually increasing, due in part to frailer members who once died early surviving longer. The hypothesized result of this change is that the shape of the mortality curve will more closely approximate that of the white population over time. In just one example, blacks once lived in segregated neighborhoods, but today many have moved into mainly white suburbs, with lower

¹¹² The Berkeley Mortality Database, established in 1997 by Dr. Wilmoth at the University of California at Berkeley, is a database that included demographic data (such as life tables) primarily on the U.S., Japan, and Sweden. See <http://www.demog.berkeley.edu/~bmd/> for more information.

¹¹³ The Berkeley Mortality Database (BMD) was used for data on whites; for data on blacks, the researchers used both the BMD and information from Preston et al. See p. 464-465 in their paper for more information.

¹¹⁴ Data quality for African-Americans is gradually improving over time.

¹¹⁵ The authors suggested that elimination of inaccurate age reporting only eliminated two years of the crossover effect, and that the majority of the effect must be due to other factors.

crime rates, healthier air, etc. The lessening of the divide between the two groups is likely having some impact on the life expectancy gap, although not enough to eliminate it.

On the other end of the debate, Preston et al. (1996, 2006) have led the charge to show that age misreporting is the primary, if not sole cause, of the crossover effect. Their seminal paper detailed a study in which they compared reported ages of a population sample (deaths during a certain period in 1985 and 1980) using census, death certificate, and Social Security age reports. Their study advanced the novel idea that age underreporting, not just overreporting, affects the death rates at the highest ages. For example, if we have three persons aged 85, but the reported deaths are 80, 85, and 90, then the sample would yield a death rate of 33% at age 85 when the true rate for the three was 100%. Preston et al. (1996) argue that most “data correction” efforts for age misreporting focus too heavily on the overreporting and may fail to correct for underreporting.¹¹⁶ The authors hedge their claim¹¹⁷ by stating that uncertainty about data quality at age 95+ and the lack of correction (age adjustment) for comparable Caucasian-American cohorts precludes a final conclusion on the subject. These authors suggest that if matching studies, instead of statistical formula manipulation methods are employed, the “crossover effect” would be eliminated from the data.

A Statistical Artifact?

Lynch et al. (2003) argue that the crossover effect is real, but is primarily a result of statistical artifact. The heterogeneity hypothesis holds that there is a population subset

¹¹⁶ This occurs, in part, because the idea that age underreporting would result in greater apparent late-life expectancy is counterintuitive and not the first connection people would think of. However, it stands to reason that if age underreporting did occur, there would be an apparent “early die-off” which would result in lower observed mortality at older ages. If someone died at 81 but was reported to be 79, their death would not be counted toward the death rate at 81, and so would result in a lower observed mortality for that age (and a higher one for age 79).

¹¹⁷ This is not to be critical, but any time a hypothesis is advanced that overturns accepted theory, it is considered politically expedient to be cautious. It seems the authors here are employing this strategy and that they expect their position to be confirmed by additional research.

differential between “frail” and “robust” populations. Since population cohorts subjected to greater early selection pressures result in a greater proportion of remaining “robust” members, comparing a Caucasian population with a greater proportion of “frail” surviving members to an African-American population with a greater percentage of remaining “robust” members results in a statistical “crossover effect” (Lynch et al., 2003). Arguing against the heterogeneity hypothesis, George (2005) and Preston and Elo (2006) suggest that cumulative disadvantage is sustained across the life course. This would mean that older African-American populations should be disadvantaged and show a greater mortality than their respective Caucasian populations. The cumulative disadvantage model, however, fails to account for the “rectangularization of the mortality curve” (Cheung et al., 2005). Both models fail to account for apparent greater rates of African-American centenarianism (i.e., a statistically greater probability of African-Americans surviving to age 100) (Preston and Elo, 2006).¹¹⁸ All researchers agree that more study is needed for the age 95+ population group (Parnell and Owens, 1999; Lynch et al., 2003; Preston and Elo, 1996, 2006).

Cohort/ Environmental Effects

The cohort study done by Corti et al. (1999) is the only one to break down reported deaths among white and black persons by causes of death. This study took a sample¹¹⁹ of 4,136

¹¹⁸ As of December 6, 2006, the three oldest living Americans were all African-American, despite the fact that the U.S. population in 1900 was only 11.6% black, according to the U.S. Census. Moreover, 9 of the 11 state age records held in the former Confederate states belonged to African-Americans at that time, despite the populations of these states being majority white (see state record tables at www.grg.org). Given the data here are already sifted for age exaggeration, the hypothesis must be that the African-American population cohorts (at least from 1865-1894, the periods under study) have been more robust. However, the maximum age record in the U.S. remains a white woman, Sarah Knauss, at 119. This suggests the African-American survival advantage at older ages is real but not completely due to biological factors (as compared to the gender gap, which is mainly due to biological factors). The heterogeneity hypothesis thus attempts to deal with this issue.

¹¹⁹ This was a “human research subjects” sample. In 1986, the subjects were interviewed to determine background factors, such as socioeconomic status. In 1994, a follow-up survey was done to determine how many in the original sample had died and what the causes of death were for both the white and black sample. The researchers suggested

persons (55% of them African-American) aged 65 and older from North Carolina in 1986 and conducted a follow-up in 1994 (eight years later). The result found a crossover effect for all-cause and coronary heart disease mortality, but not a statistically significant crossover effect for other causes of death. Such a study suggests that an underlying cause (biological, environmental, or a combination of both) explains the crossover effect, rather than mere statistical artifact or age misreporting. When the data were adjusted for socioeconomic status (SES, based on income level), the crossover effect was several times more pronounced (Corti et al., 1999). This research suggests that low income levels may be masking an even greater African-American survival advantage. The authors suggest that the causes of this advantage are not biological but cultural/environmental, specifically lower rates of smoking and obesity among older African-American adults. The suggestion is that the crossover effect will disappear if younger African-American cohorts have increased rates of smoking and obesity. Although the data were not adjusted to correct for age misreporting, the study still raises the issue of why the crossover effect seems strongest when the cause of death is coronary heart disease.

Some evidence for environmental and cultural factors affecting cohort effects can be seen in data from other nations. For example, a study from Japan found that lower-educated males experienced a crossover effect versus higher-educated males in the 80+ age range (Liang et al., 2002). That is, lesser-educated males tended to outlive their better-educated counterparts at advanced ages. The reasons for this result were not entirely clear, but the explanations given (selective survival and cohort effect) suggest an environmental/cultural cause, which tends to change over time.

that there was a difference in heart-disease death rates for the two samples, and that this was the major cause of the mortality crossover phenomenon.

Genetic Advantage Hypothesis

The fourth hypothesis, that African-Americans aged 85+ actually live longer due to a biological or genetic advantage, was not tested and only briefly mentioned in the journal articles. Popular literature suggests that an African-American longevity advantage could be linked to darker skin (melatonin provides more protection against aging and wrinkles) and thicker skin (dehydration is more common among those with more wrinkles and thinner skin). Research in this area is mainly limited to less-mainstream literature, yet it should be noted that melatonin has been shown to be beneficial in invertebrates (Reiter, Tan, Mayo, Sainz, and Lopez-Burillio, 2002). No research directly linking biological advantage to the effect in humans has been located. This remains an avenue for future research study.

Interlocking Findings and Unanswered Questions

Because the largest argument regarding the crossover effect is whether it is real or simply due to age misreporting, a review of the crossover effect in related areas is warranted. Indeed, we find that in other “advantaged/disadvantaged” population dichotomies, the crossover effect is also apparent. For example, it has been found when comparing the Navajo (disadvantaged) population to the white American (advantaged) population (Thornton, 2004). The author of the study argued that the effect was real and not caused by age misreporting. Other research by Kestenbaum et al. (1992) indicates that age misreporting is higher among all minority populations, compared to whites, in the U.S. (Kestenbaum, 1992).¹²⁰

¹²⁰ This should be expected because the system of birth registration began with the white, established population. Native American populations were not part of the white culture, and many tribes resisted assimilation for as long as possible. Even when groups, such as African-Americans, were a long-established part of the system, discrimination, together with the socioeconomic effects of lower education and health care access, meant that minority populations would take longer to have children in hospitals and to be issued birth certificates. Research by the Max Planck Institute for Demographic Research (<http://www.demogr.mpg.de/>) has indicated that age misreporting is common where document and registration systems are lax or incomplete.

Outside the U.S., research in China found a weak crossover effect (comparing Chinese data to Japanese and Swedish data), occurring around age 97 (Yi and Vaupel, 2003). Interestingly, Canadian data (Bourbeau and Lebel, 2000) found that Canadian mortality rates were lower than that of Europe and more comparable to the United States and that Canadian data quality was high up to age 99.¹²¹ This suggests that data issues alone cannot account for the entire crossover effect and greater longevity apparent among U.S., but especially U.S. minority, populations, when compared to Western Europe.¹²² Finally, a study of fruit flies (Muller, Wang, Capra, Liedo, & Carey, 1997) found that a mortality crossover caused by a single variable (protein deprivation) was strong enough to overcome the usual female survival advantage among fruit flies. Moreover, not only was a single variable able to have such an effect, but the variable had a greater differential effect on females than males (a 27% reduction in female life expectancy, compared to a 6% reduction in male life expectancy). This suggests that even when the life expectancy is bounded by expected species and gender norms, environmental impact can compound with subtle intrinsic differences to create a major life expectancy reversal, not just a minor crossover. Alternately, it may be stated that in humans, a single key change (female mortality due to childbirth) in socio-environmental conditions accounts for a large shift from nearly equal gender life expectancies to a pattern of female life expectancy advantage.

Research Questions

An overview of recent literature finds the long-held tenet of an African American/Caucasian American longevity crossover to be increasingly challenged by a greater attention to the accuracy and validity of age reporting. Despite these pressures, a critical mass of

¹²¹ That is, Canadian data for ages 100+ was considered to be of diminishing quality, the higher the age bracket. Thus, the results of the study (suggesting that Canadian longevity exceeded that of Europe) were considered to be valid at least up to age 99.

¹²² I.e., those nations that are considered to have high-quality data, which exclude Eastern European countries.

conclusive evidence disproving the existence of a mortality crossover has not been achieved. Moreover, research in related population dynamics suggests that the effect still exists, even if minimal, in other cultures and societies. Research taking a more focused approach suggests that differences may be ascribed to either statistical, environmental, or biological causes, or a combination thereof. While the last idea has proven to be an area where research has not ventured, at least some research suggests that longevity crossover can be partially explained by differential death rates among causes of death, particularly heart disease. While it seems that much research has focused on teasing out the statistical factors related to the “crossover phenomenon,” a great deal of research involving environmental, cultural, and biological causes remain areas for future scientific exploration.

A preponderance of the evidence suggests that the “crossover effect” is real and affected by many variables. After adjusting for issues of data quality, it seems likely that the effect will remain partly due to statistical and partly to environmental/cohort factors. Less certain is whether a biological cause for the crossover effect can be detected. Since statistical factors are an effect, not a cause, research should concentrate on eliminating them to ascertain remaining potential longevity advantages among the African-American oldest-old. If the remaining advantages are due to cultural, environmental, and cohort differences, these advantages can be used not only to help non-black populations in areas of deficiency,¹²³ but may be used to benefit the younger African-American population cohorts.¹²⁴ Much of this research may use the “Okinawa model”

¹²³ If whites are at a small disadvantage due to less skin protection from the sun, simply using sunscreen, staying in the shade, using lotions, and remaining well-hydrated are obvious solutions.

¹²⁴ For example, lower rates of smoking and obesity in the African-American oldest-old are advantages that appear to be disappearing, due to cultural shifts from “family meals” to “fast food” among the African-American young. While rates of obesity are lower than that of whites for African-American oldest-old, among adolescents, obesity rates for African-American and Hispanic youth are higher than that of whites: <http://www.intelihealth.com/IH/ihtIH/WSIHW000/333/20833/508387.html?d=dmTICNNNews> (accessed Nov. 1, 2006). This suggests that factors that may have contributed to past African-American advantage in the oldest-old

for further study.¹²⁵ Therefore, this study will attempt to answer the question: if we sift the data of age misreporting and account for statistical artifacts, will the cleaned data still show a longevity differential when comparing African-American supercentenarian cohorts to their white counterparts?

are shifting. Conversely, it could also be argued that the crossover effect may continue, although the cause will have a stronger statistical and lesser environmental component in the future, as higher rates of early African-American deaths could reinforce the heterogeneity of frailty effect, even as real survival advantages diminish.

¹²⁵ Okinawans traditionally have the highest life expectancy in the world, which is partly attributed to their dietary habits. However, cultural shifts due to the influx of American “fast-food” culture are threatening that status, and most experts agree that younger Okinawan cohorts are less healthy than their elder peers. See <http://www.sfgate.com/cgi-bin/article.cgi?f=/chronicle/archive/2004/04/04/MNG8S5VF5D1.DTL&type=health> (accessed Nov. 1, 2006) for an example of this issue.

CHAPTER III

METHODS

Approach

Rationale

I propose to use an historical-cohort, cross-sectional study model for investigating the race crossover effect on the U.S. supercentenarian population. The need for sampling probability will be obviated by using all known members of a population group that meet certain data intersections (i.e., they must be age 110 or older and must be African-American or Caucasian-American, and their age must be validated). Retrospective data gathered from archival data sources will be quantitatively analyzed to determine if statistically significant differences exist between African-American and Caucasian-American population subsets at the highest age bracket (110+).

Use of Social Security Data

Though valid datasets on persons 110+ generally did not exist before 1990 (early research such as the Kannisto-Thatcher database generally went to age 105) (Kannisto, 1994), several parallel efforts in the 1990s have taken place, mostly in Europe, Japan, and the U.S. Among these is the U.S. Social Security Administration's Kestenbaum Supercentenarian Study. This ongoing research study has produced the largest statistically valid supercentenarian database.¹²⁶ Since I have worked with the Social Security Administration on this study since 2000 and was one of the persons involved in both locating potential census matches and

¹²⁶ The GRG database, currently the world's largest, is somewhat affected by reporting bias, or the tendency of the news to report the deaths of the oldest supercentenarians (113 and older) while sometimes ignoring those deaths at age 110, 111, and even 112 in some instances.

formulating study procedures, I have both access to the data and an understanding of the study procedures employed. I have secured permission to use the data for this thesis from Dr. Bert Kestenbaum, Office of the Chief Actuary of the United States. Because all study participants are deceased, HIPAA regulations do not apply, but IRB review and approval is required.

Brief Overview of Social Security Procedures for the Study

The study began by gathering complete sets of every Social Security recipient that appeared to reach age 110 or older between Jan. 1, 1980 and Dec. 31, 1999.¹²⁷ The sampling method—using a whole-population sample—ensured that bias was eliminated. In reality, this was a “census.” While some cases may have been missed (as a census may miss a percentage of the population), the numbers (about 5% of the supercentenarian population)¹²⁸ are considered to be insufficient to affect the study results, especially since the non-Social Security supercentenarians are also a randomly-distributed population without regard to race or ethnicity.¹²⁹ Cases were then processed to remove “ghost” cases (i.e., persons that died before age 110, but whose deaths were not reported to Social Security). This was done by matching the cases to the listings in the National Death Index (NDI). Cases shown to be invalid were discarded. Cases whose deaths could not be verified were moved to Group 2, or unvalidated status.

¹²⁷ It should be noted that currently Phase II is investigating the 1890-1894 cohort, using the same method. This data should be available in 2009. At that point, a comparison of the race data of the different cohorts (before 1870, 1870-1874, 1875-1879, 1880-1884, 1885-1889, 1890-1894) would be advisable to see if the race crossover effect is changing over time.

¹²⁸ By comparing the number of annual Social Security deaths in the SSDI (Social Security Death Index) to the number of total U.S. deaths from the NDI (National Death Index), we can derive this calculation.

¹²⁹ Some persons never applied for Social Security, either due to being part of a similar program (such as Railroad Retirement) or having been a stay-at-home worker who never applied for benefits—this may slightly affect gender results, but is not expected to affect race results. Others may have been ineligible due to immigrant or residency status, etc. The GRG has managed to identify several additional supercentenarians that are not included in Social Security; none were older than 114 (Grace Clawson, 1887-2002, was the oldest).

Social Security applicant records (SS-5) were then scrutinized to ascertain names of the parents and place of birth of the recipient. Researchers then searched the 1880 or 1900 Census in an attempt to verify the claim in the SS-5 record. Possible matches then were sent to the University of Pennsylvania's Population Research Center¹³⁰ and then scored. A scoring system was devised that gave higher credit to cases with more "matching points." For example, if a possible matched individual was listed in the right county, that's one point. If the father's name is correct, that's a second point. Points also were assigned for names of the mother, siblings, state, matching age, etc. A scoring system was used to attempt to eliminate researcher bias. Those claims that came out with a score above a certain threshold were considered "validated." Those that were not were moved to group 2. Cases that appeared to be false were eliminated from the study.¹³¹

This sifting of the data was to eliminate age overstatement common to extremes.¹³² Results showed a disproportionately large number of African-American cases in the group 2 (unvalidated) sample, indicating that some of the apparent age advantage for African-Americans at the highest ages was indeed due to age misreporting. However, even after processing the data,

¹³⁰ <http://www.pop.upenn.edu/> (accessed Dec. 6, 2006).

¹³¹ This meant that persons that understated their age were not counted. Later research showed that at least some of the cases thrown out were in fact valid after all. Women, especially, tended to understate their age in mid-life and especially if they were an older woman married to a younger man. The oldest person who was excluded due to age understatement was only 112 years old, suggesting that inclusion of age-understated cases would not significantly affect the results.

¹³² In a given sample of 35-year-olds, most will turn out to have an accurate age. However, when the population cohort is nearing extinction, the proportion of false claims will increase, mostly because the true supercentenarians will have died off. For example, if we have four people claiming to be 110, and their real ages were 110, 110, 109, and 95, the 95-year-old would be the most likely to be the last of the four survivors. Let us assume that the four died, respectively, the same year; one year later; two years later; and five years later. The apparent ages would then be 110, 111, 112, and 115 but the real ages would be 110, 111, 111, and 100. In other words, the person who is the youngest is the most likely to be the apparent oldest when the data is not subjected to a validation process. This is the state of the American record today: the oldest person is Edna Parker, 115, but claims to age 115 and above still exist, even though they are unlikely to be true.

the group 1 sample, sifted three times for proof of death, proof of birth, and mid-life connecting information, appeared to show a larger than expected number of African Americans.¹³³ A quick glance shows African-Americans holding three of the top seven positions. Moreover, research from the GRG database shows that nearly all age record-holders for former Confederate states (states with a large African American population base, but usually still a minority in 1880) are held by African Americans.¹³⁴ Currently, two of the three oldest living Americans are African American, suggesting that the study results will continue (the first round of the study did not include persons born after 1889).

Study Population

For convenience, the sample analyzed would be the 2004 data, which includes those persons validated to have reached age 110 between January 1, 1980 and December 31, 1999, as well as the unvalidated cases from the same time period. Cases that were shown to be fraudulent were not included. In reality, the SSA study has continued with a “phase 2” that includes persons born 1890-1894, but this second phase is not yet complete. This next five-year batch of data is currently undergoing processing which is not projected for completion until 2009 or 2010 (when the last living member of the cohort dies). Given that the 1866-1889 cohorts in the U.S. are considered extinct, at least for the verified cases, these data are valid, complete, and statistically accurate. However, the main purpose of the data was to manage waste and fraud at the SSA, not analyze the variables that lead to differences in maximum observed longevity.

¹³³ The total sample of U.S. validated supercentenarians aged 110+ was 19% African-American. Considering these cohorts were born mostly between 1870 and 1890 and that the U.S. African-American population was recorded in the census at the time as between 11.6% (1890) and 13.1% (1880) (12.7% in 1870), this number is much higher than expected if the two populations lived equally long lives.

¹³⁴ U.S. records for the 11 former Confederate states and the District of Columbia show that as of December 2006 9 of 11 state records are held by African-Americans, as is the record for the District of Columbia. This suggests that the race crossover effect, when adjusted for sample size, may in fact show a maximum longevity gap. Perhaps the huge population size advantage of Northern whites is enough to keep them dominant. A further comparison of race data by state is needed before any firm conclusions may be drawn, however.

Given that the factors for data gathering set a premium on rigorous accuracy and did not include race recruitment, we can be assured that bias in the sample has been eliminated. Rather, what I am proposing is further analysis of the data for a different purpose. Clearly, that the race of the individual was recorded indicated some race interest, but the study's plan was to determine the rate of age overstatement by race. Given that after this was done, a variance by race still appeared to exist, further study is warranted. An analysis by race could rectify one area of data misreporting and lead to more study. Recent trends suggest that the health habits of the younger African-American age cohorts have declined. Thus, further research, to identify causes of race advantage, if it exists, could be helpful not just to non-black persons, but to all persons.

Finally, it should be noted that the crossover effect has been shown to exist for other race groups in the United States, and if there is an African-American longevity effect, one has to wonder if similar effects can be located for other racial groups. However, given that the supercentenarian data largely reflect an America in the 19th century that was over 98% white or black, such a study population sample is not yet feasible with U.S. data alone.

While I possess a world dataset of some 1100+ individuals (and again, more than 570 in the United States), the mixed-method approach to this data precludes the use of the entire dataset: that is, even if the individual cases may be valid, the selection methods (such as hearing about a case in the media, contacting the family, then verifying their age through documents) tend to favor those supercentenarians who are among the oldest (113 or older) and healthiest, introducing selection bias. With the Social Security Administration study, every claim to age 110 or older from 1980 to 1999 was gathered into one group database, ensuring a whole-population sample.¹³⁵ Every case was subjected to a rigorous process that attempted to either validate or

¹³⁵ Nonetheless, only about 95% of the US population is covered by Social Security; excluded were persons who received Railroad Retirement benefits (such as Grace Thaxton, 114, and Ito Kinase, 113). But again, I'm more likely

invalidate the person's age. After cases that were shown to be false were discarded, the study was left with two groups; a set (group 1) of 355 persons whose age could be verified, and a remaining set of 319 cases (group 2) whose age could not be verified but had not been disproven. Many of the group 2 cases are problem cases (such as immigrants); a further check may yield a few additional validated cases, but for this study I shall focus on the Social Security Administration's Group 1 dataset¹³⁶ of some 355 validated persons, whom they have identified from their records as having verifiably attained the age of 110 years 0 days or greater between January 1, 1980 and December 31, 1999. It should be noted that this dataset does not include the entire U.S. population, but we find¹³⁷ that in recent years, about 92-95% of all deaths recorded in the U.S. also may be matched to a Social Security record. Thus, the data produced may be taken to be a near-approximation of the U.S. supercentenarian population for the time period.

Classification system

Racial classifications used were as determined by the Social Security Administration. Racial codes used were W=white; B=black; O=other; U=unknown. Note that in some cases, persons of Hispanic origin were classified as "white." In a few cases, the race was classified as unknown (U) when the information was unavailable. Interestingly, the only two non-Caucasian, non-African American validated supercentenarians were in fact categorized as "unknown," meaning that the validated list is virtually all white or black. However, a significant number

to know about the 113+ cases from the media than those who died at 110 or 111, so adding these cases would introduce selection bias...and the whole point here is to rely on the most accurate data available, not the largest sample size possible.

¹³⁶ In the SSA study, the 'validated' cases are referred to as Group 1; those whose claim could neither be proven nor disproven were referred to as Group 2. Cases that were discarded were unfortunately unavailable. It should be noted that at least some of the cases thrown out turned out to be true; thus there is an issue of "over-sifting." For example, Berna Dupertuis lied about her age, claiming to be ten years younger in midlife (1936), but closer examination found the 1900 census, school and other records showed that she actually was 112, not 102, when she died in 2001.

¹³⁷ This can be done by dividing the total SSDI deaths for the year by the total number of NDI deaths for the year. The remaining 5-8% of deaths are persons who were not on the Social Security rolls (such as those who received Railroad Retirement benefits).

(about 15%) of the unvalidated cases were persons of other race or unknown race. This may suggest that the lack of other races is due to the difficulty of finding documentation, especially for immigrants whose birth occurred outside the USA.

Actual sample used/adjustments to whole population fit

Of the 674 cases from the SSA data, five were still listed as “living” as of December 31, 2004. Using the Social Security Death Index, I was able to locate a 2005 death record for one additional person, leaving four remaining “living” cases. In reality, these cases may be “ghost” cases: that is, the person died many years ago and the death went unreported. No subsequent news coverage has indicated that these four persons are still living (although they may be). In any case, these four cases will be excluded from the data analyses since we cannot calculate at what age they might die. In addition, it may violate HIPAA regulations to publicly identify these persons who may still be living.

I made small modifications to the data by updating the newest cases that reached validated status. All this served to do is move more real cases from the unverified list, leading to even more skewed results (the unverified list still has some real cases in it; the more real cases are removed, the worse the remaining Group 2 data appears to be). I note amongst the 14 newest cases, the death rates were at age 110: 50%; at 111: 71%; and at 112: 100%. The 14 new supercentenarian cases were all Caucasian, further strengthening the results (see next chapter) which showed a much higher mortality for Caucasian American supercentenarians than for African American supercentenarians. It is likely that a further refinement of the data will only strengthen the trends already apparent, as we have seen from the above 14 cases.

Analytic Techniques

Despite strong anecdotal suggestions that there may be an African-American advantage, so far no analysis of the available data by race has been done. Thus, I propose to use the SSA study (round 1) data from 2004 (355 validated, 319 unvalidated) for an analysis by race.

Simple Analyses

These analyses will include the following:

Whole-Cohort Analysis

Whole-cohort analysis involves a simple comparison of the African-American racial percentage of the validated and unvalidated groups to the reported racial percentage of the population in the U.S. in 1880 and 1900. This will likely show a greater-than-expected number of African American supercentenarians. That is, if 13% of the American population in 1880 was African American but 15% of the validated supercentenarians from the sample are African American, this would suggest an African American longevity advantage, at least for the population cohort studied.

Supercentenarian Mortality Tables by Age and Race

Breaking the validated group into white and black, each group can then be tabulated by age: 110, 111, 112, 113, 114, and 115+. The death rates for each age-race group can then be compared to determine if the death rates show a consistent pattern of lower mortality by race, a pattern of lower mortality at 110 but disappearing at the highest end of the age spectrum, or a mere random distribution. One could then hypothesize that if the race advantage is present at age 110 but disappears at the highest ages, then it might be due to environmental advantage, rather than genetic advantage. Note that we can already see a massive genetic advantage based on gender: this advantage is present not just at the average life expectancy, but also at the

maximum life span. Testing the data for race may find smaller but still measurable genetic differences.

Combined Race and Gender Analysis

A further cross-analysis of the data by race, age, and gender could be made. Since we know the gender of every study participant, I propose dividing the 355 validated-age persons into four groups: black male, black female, white male, and white female. The results should show if the longevity advantage includes both black males and black females, or if it is limited to one gender. The predicted outcome is that an advantage will show for both genders, but possibly be greater for black males versus white males than the advantage of black females over white females.

Two-Cohort Method

This is an analysis of the data by race and cohort. Over time, social, environmental, cultural, and cohort effects change. How the data changes over time will give some insight into its elasticity. A static-state model (little change) would support a biological or statistical hypothesis, whereas major fluctuations in the data would suggest socio-cultural-environmental effects.

The validated and unvalidated groups could be divided into two cohorts, those that turned 110 (or were alive at age 110) between January 1, 1980 and December 31, 1989; and those that turned 110 between January 1, 1990 and December 31, 1999. Each cohort then could be divided by race to determine if the race advantage fluctuates over time.

Dividing the data in two groups (early and late cohorts) is a bit tricky. Note that the living supercentenarian population cohort is constantly changing over time. While about half are age 110 at any one time, there are also supercentenarians born in prior years still living. Since a

cohort is based on the year of birth, it makes sense to group people by year of birth. Yet the SSA study chose a method of data selection that anyone who died at a verified age of 110 between January 1, 1980 and December 31, 1999 qualified.¹³⁸ This meant that if someone were born in 1867 and died in 1981 at the age of 113, they were included, since their death occurred between January 1, 1980 and December 31, 1999. However, this created a statistical problem: for the year 1889, for example, only those who died at 110 would be included, while the 1889 group who survived to January 1, 2000 would be excluded. Conversely, for the year 1867, only those still alive on January 1, 1980 would be included, while those who died in 1979 or earlier would be excluded. This would, in theory, balance itself out if the cohort was a constant population group over time. However, it was not. Since the population sample tended to grow larger over time, this would create distorted data with a higher-than-expected death rate for everyone. The solution, then, was to include not just those who died at 110 between January 1, 1980 and December 31, 1999 but also those who were living at age 110 years 0 days on December 31, 1999. As it would turn out, the earliest verified study participant was born in 1867 while the last verified study participant died in 2003. Thus, if we choose to divide the cohorts into two equal time periods, the Early Cohort group would include all persons who turned 110 between January 1, 1980 and December 31, 1999 (plus those already 110 or older on January 1, 1980, the oldest of whom was born in 1867) and the Late Cohort would include all persons who turned 110 between January 1, 1990 and December 31, 1999 (the last of whom died in 2003). Thus, it would appear at first that the time periods (1867-1879 for the Early Cohort and 1880-1889 for the Late Cohort) are unequal, but only because we forget to account for those still living.

¹³⁸ For the second phase of the study, researchers chose to go with just the birth years: the 1890-1894 population cohort was included. Second-phase results are due in 2009 at the earliest.

Complex Analyses

In order to test the hypothesis that an apparent longevity advantage could be due to statistical artifacts, a more complex analysis of the data is needed. Demographers have theorized that death rates slow down at the highest ages (mortality deceleration) and that the observed pattern of deceleration is a function of sample size. Given that the white supercentenarian population sample is much larger (299 persons) than the black supercentenarian sample (54 persons), it could be argued that the apparent “longevity advantage” of African-American supercentenarians is actually a reflection of the much-smaller sample size. In order to test this hypothesis, we can construct monthly mortality tables¹³⁹ from the existing data and then compare the observed death rates with the classical models, such as the Gompertz and Sigmoid curves (see appendix B). However, such an analysis would be not only complex but also time-consuming, and if the simple analyses show a large longevity effect, this step may not be needed. An alternative to this would be to note that although more analysis is needed, this thesis establishes the basic race-supercentenarian mortality facts, and we could leave the more complex analyses for a future paper.

Limitations

The main issue with this data set is sample size. Taken as a whole, the sample size is large enough to draw conclusions from. However, after breaking down each group first by race and then by race-age and race-gender, the individual subsets of data may not be adequate to draw conclusions. It should be noted, on the other hand, that establishing a format such as this will be useful, and that as more data is added (the sample size will enlarge with the 1890-1894 cohort

¹³⁹ An annual mortality table simply batches together everyone that dies at, say, 111 into one group. A monthly mortality table would divide those that died at 111 years 0 months from those that died at 111 years 1 month, etc.

and through a second sifting of the group 2 cases),¹⁴⁰ the margin between significant and insignificant sample sizes will shift in favor of significant, allowing for an upward extension in our mortality calculations.

The study's only ethical considerations relate to the privacy of the individual. Dealing with small population datasets presents the risk of individual identification—how many 115-year-olds are there? However, basic Social Security information for deceased individuals, such as name, birth, and death date, and even Social Security number, is currently publicly available online via search indices such as www.genealogy.com and www.ancestry.com. Thus, the study would not expose anyone's personal identity to a level of exposure greater than what is already publicly accessible. Since the information is public record, informed consent of the individuals is not necessary (or possible, since they are deceased). However, should an effort be made to double-check ages, death certificates from the National Death Index do require a justification for the study in order for researchers to have access.¹⁴¹

Human Subjects Protection

One of the issues associated with studies of very aged individuals is that, when a person's age is so extreme, it may be possible to publicly identify who that person is. For example, an autopsy was done by a noted American research institution on a "119-year-old woman." Since there has been only one verified 119-year-old American (or indeed human), it was easy to figure out who that individual was. To deal with this, HIPAA regulations generally call for non-disclosure of age and location (at the town level) of living persons aged above 89 years of age.

¹⁴⁰ The original census matches were found by hand. With today's computerized database technology, many of the remaining 335 unvalidated group 2 cases could be verified, using the same procedures for everything else, except for using computer technology to improve the resolution (i.e., much like an astronomer using a larger telescope lens to see further and more clearly in space).

¹⁴¹ See <http://www.cdc.gov/nchs/ndi.htm> for more details.

If this study included living persons, efforts would have been made to ensure their privacy. Since the individuals in this study are deceased, HIPAA (Health Insurance Portability and Accountability Act) regulations do not apply. Nonetheless, confidential data used in researching individual cases in the study will remain confidential. Dr. Kestenbaum specifically asked me not to use the data in the study to contact family members. Data that are public record may be shared, as it may also be found on public websites such as www.ancestry.com.

CHAPTER IV

FINDINGS

The data analysis tends to confirm my suspicions that the African-American longevity advantage is real. It should be noted, however, that age exaggeration remains by far the largest component of any apparent longevity difference by race. Thus, we first should compare the Group 1 (validated) and Group 2 (unvalidated) data by age and race. Looking at Table 1, we see that a majority of the Caucasian cases (68%) (299 of 439) are validated. Even for the unvalidated cases, the death rates reported, while lower than the 50-55% expected (based on the validated data), are not extremely low. For example, at age 110, the validated group had a death rate of 53%, while the rate for the unvalidated group is 46%. This suggests that there must be a substantial proportion of true cases in the unvalidated group, with most false claims coming from the older ages claimed (the death rate at age 113 is not believable: only about 31%). Note the highest age claimed, 122, is consistent with the all-time record of Jeanne Calment. Hence, we can see that, even though there is some tendency toward age inflation in the Caucasian American unvalidated data, little evidence of a longevity-myth pattern of cultural age inflation is apparent. Probably the few unvalidated extreme cases are immigrants (I do know that one came from Russia, for example) or possibly represent a remaining rural Southern culture. The myth of (white) Southern longevity is an endangered element, but we still have seen false or exaggerated claims, such as age 115, in places like West Virginia, Virginia, Tennessee, and Kentucky in the last decade.

Table 1. Age-Specific Mortality Rates for Validated and Unvalidated Caucasian American Supercentenarians: 1980-1999

Group 1: Validated Data				Group 2: Unvalidated Data			
Age	Deaths	Cumulative Total	Annual Mortality Rate	Age	Deaths	Cumulative Total	Annual Mortality Rate
126	0	0	N.A.	126	0	0	
125	0	0	N.A.	125	0	0	
124	0	0	N.A.	124	0	0	
123	0	0	N.A.	123	0	0	
122	0	0	N.A.	122	1	1	100.0%
121	0	0	N.A.	121	0	1	0.0%
120	0	0	N.A.	120	0	1	0.0%
119	1	1	100.0%	119	0	1	0.0%
118	0	1	0.0%	118	2	3	66.7%
117	0	1	0.0%	117	0	3	0.0%
116	0	1	0.0%	116	1	4	25.0%
115	3	4	75.0%	115	5	9	55.6%
114	10	14	71.4%	114	9	18	50.0%
113	20	34	58.8%	113	8	26	30.8%
112	30	64	46.9%	112	20	46	43.5%
111	76	140	54.3%	111	30	76	39.5%
110	159	299	53.2%	110	64	140	45.7%
Total	299				140		

Note: Excluded from the calculations are three cases (birth years 1882, 1886, 1889) for which no death records or reports have been located.

Contrasting with the data for the Caucasian American sample, the African American supercentenarian data for the unvalidated Group 2 show greater effects of age misreporting¹⁴² (as shown in Table 2). Only 23% (54 of 232) of the African American cases are validated¹⁴³; the highest age claimed is 125 (higher than the highest claim, 122, in the Caucasian data); the

¹⁴² A lower-than-expected mortality rate is caused by younger persons claiming to be older ages. For example, if someone is 101 but claims to be 115, the expected yearly mortality rate at age 101 is much lower than the expected rate for age 115 (about 40% versus 70%). Additionally, the data is affected by persons skipping years. For example, if we have three persons aged 100 who claim to be 115, 120, and 125, and they all die the same year, the apparent mortality rate at age 115 will be just 33% even if all three persons passed away.

¹⁴³ This suggests that, in addition to age misreporting, it was also more difficult to verify the ages of the African American claimants than it was for the Caucasian American claims. That the acceptance rate for the Caucasian American cases (68% accepted as verified, versus 30% of the African American cases accepted as verified) is more than double strongly argues against a notion that the verified data might favor African American cases. That the cleansed data still show an African American longevity advantage after this argues strongly that there are additional factors that are needed to account for the apparent African American longevity advantage, besides age misreporting.

mortality data fluctuate significantly (54% at age 110, yet only 16% at age 116). All these factors suggest that the African American Group 2 data are highly suspect. The unusually high (compared to the unvalidated data for whites) apparent death rate at age 110 (54%) may be due to the “age heaping” effect: the tendency of persons, when not knowing their age exactly, to round off to the nearest five- or ten-year interval (thus including persons who likely died at 108, 109, or even 111). For the other ages, from 111 to 117, the death rate is consistently less than expected when compared to validated data (see footnote 106 for an explanation of why this suggests age exaggeration). This dataset suggests that a good portion of the 110-year-old African American claims are not true, especially the more extreme age claims.

Table 2. Age-Specific Mortality Rates for Validated and Unvalidated African American Supercentenarians: 1980-1999

Group 1: Validated Data				Group 2: Unvalidated Data			
Age	Deaths	Cumulative Total	Annual Mortality Rate	Age	Deaths	Cumulative Total	Annual Mortality Rate
126	0	0	N.A.	126	0	0	N.A.
125	0	0	N.A.	125	1	1	100.0%
124	0	0	N.A.	124	0	1	0.0%
123	0	0	N.A.	123	0	1	0.0%
122	0	0	N.A.	122	1	2	50.0%
121	0	0	N.A.	121	0	2	0.0%
120	0	0	N.A.	120	2	4	50.0%
119	0	0	N.A.	119	2	6	33.3%
118	0	0	N.A.	118	0	6	0.0%
117	1	1	100.0%	117	4	10	40.0%
116	0	1	0.0%	116	2	12	16.7%
115	1	2	50.0%	115	3	15	20.0%
114	3	5	60.0%	114	13	28	46.4%
113	7	12	58.3%	113	10	38	26.3%
112	8	20	40.0%	112	13	51	25.5%
111	13	33	39.4%	111	30	81	37.0%
110	21	54	38.9%	110	97	178	54.5%
Total	54				178		

Thus, we can see that a larger proportion of the African American data (starting with the 232 cases) seems to be of poor quality (i.e., the age claimed is likely to have been misreported) but

the much-higher sifting rate for the African American cases serves to counteract the age misreporting effect. What will a further analysis find for the remaining 54 validated cases?

Whole-Cohort Analysis

The first analysis involved dividing the whole Group 1 validated population into two categories, white and black. I then further subdivided the data by age at death. A comparison of the data found that the percentage of the validated supercentenarian population was over 15% African American at age 110, higher than the expected 12-13% based on the 1880 and 1890 censuses. Looking at Table 3, we see that the proportion of the supercentenarian population that was African American increased steadily with each passing year of age.

Table 3. Validated Supercentenarians by Age and Race

Age	White		Black		Other		Total
	N	%	N	%	N	%	
110	299	84.2%	54	15.2%	2	0.6%	355
111	140	80.5%	33	19.0%	1	0.6%	174
112	64	75.3%	20	23.5%	1	1.2%	85
113	34	73.9%	12	26.1%	0	0.0%	46
114	14	73.7%	5	26.3%	0	0.0%	19
115	4	66.7%	2	33.3%	0	0.0%	6
116	1	50.0%	1	50.0%	0	0.0%	2
117	1	50.0%	1	50.0%	0	0.0%	2
118	1	100.0%	0	0.0%	0	0.0%	1
119	1	100.0%	0	0.0%	0	0.0%	1
120	0	N.A.	0	N.A.	0	N.A.	0

note: percent of remaining population. Number may not add to total due to rounding.

The proportion of the remaining population that is African American steadily increases from 15.2% at age 110 to 50% by age 116, even though according to the 1880 census African Americans made up only about 13.1% of the total U.S. population, and by 1890 just 11.9% of the U.S. population was African American¹⁴⁴ (the decline was due to heavy immigration from

¹⁴⁴ Had the data shown a close approximation of the actual proportion in the population, a further analysis might be called for. But the percentage of the American population that was African American in 1880 is not the same as the

Europe in the 1880s). The percentage still alive at age 110 is slightly greater than expected, but even more remarkable is that the proportion continues to increase. While it may be argued that the numbers at age 114 and above are too small to draw any firm conclusions, the results are much stronger than expected. Had the proportion started at slightly above expected at age 110 and then narrowed (to, say, 13%), the data would support the statistical artifact/convergence hypothesis. This is not the case here. Instead, the data show that not only does the longevity advantage exist at age 110, it continues to widen steadily with increasing age. Whether due to biological or environmental causes, it does appear that in this study population, the African American group had a longevity advantage. Had the trend been wildly variable, it might suggest a mere statistical fluke. Instead, the steady and inexorable increase suggests a real trend over time favoring African American supercentenarians. This suggests that, given an equal sample size, African Americans would outlive their Caucasian American counterparts, at least for the time period studied. We also can note that the crossover effect, which existed in Medicare data at ages 77 to 97, is also seen in the supercentenarian data at age 110 and above. This suggests that the crossover effect is real and continues beyond the previous upper age limits of previous studies, which have generally been around age 95 to 100.

Validated Supercentenarian Mortality by Age and Race

Next I used the cumulative numbers from the whole-cohort analysis to calculate the mortality rates for African American and Caucasian American supercentenarians. The results (Figure 6) show that the death rate was significantly lower for African Americans at every age except for age 113, when the death rates were almost the same (about 58% for each), before again separating widely. This is quite surprising and may suggest that the mortality differentials

percentage of births in 1880. Yet given this was a high-water mark for the post-Civil War era (by 1950 the percentage was down to 10%), we can roughly expect the supercentenarian numbers to be around 12 percent, hypothetically. That they were significantly higher than that suggests a real longevity advantage.

are multicausal. A convergence of the trend lines at age 113 might be attributable to the statistical artifact hypothesis (as espoused by Liu, 1995) while a re-separation of the trends at ages 114 and 115, on the other hand, would suggest a biological or environmental factor. Note that we can combine the first analysis with the second. If we adjust the data for population size difference by setting the African American population at age 110 (N=54) equal to 299 (the size of the Caucasian American population) and then apply the African American mortality rates seen in Figure 5, we can see even more clearly the African American longevity advantage. From 50% of the hypothetical population at age 110, by age 116, 83% of the remaining population would be African American (see Table 4). This, however, presumes that the observed mortality rates by race would stay the same for a larger population, which may not be the case. The real point here is to show just how dominant the African-American longevity advantage is, once we remove the handicap of a smaller starting population base.

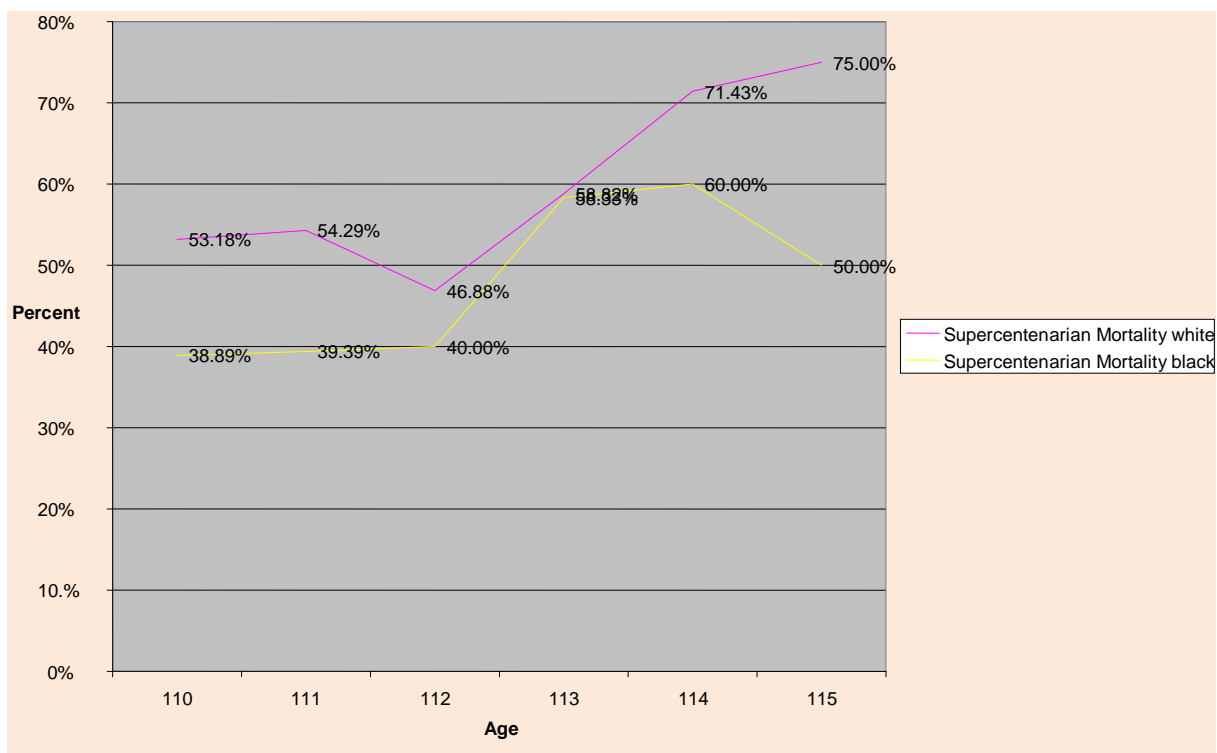


Figure 6. Annual Supercentenarian Mortality by Race

Table 4. Age-Specific Survivors of Hypothetical Racial Cohorts of Equal Size

Age	White		Black		Totals
	N	%	N	%	
110	299	50%	299	50%	598
111	140	43.3%	183	56.7%	323
112	64	36.6%	111	63.4%	175
113	34	33.7%	67	66.3%	101
114	14	33.3%	28	66.7%	42
115	4	26.7%	11	73.3%	15
116	1	16.7%	5	83.3%	6

Figure 7 (Cumulative Supercentenarian Totals) shows the actual data, unadjusted for population size. While even here it is apparent the slope of the mortality decline is less for the African American group, due to the large initial population advantage, the Caucasian American group appears in this graph to be doing quite well. Note the numbers are cumulative: that is, of 299 initial white supercentenarians, 140 were still living at their 111th birthday. Thus the 140 is a subset of the 299 persons. Looking at it another way, there were 159 deaths at age 110 (299-140), 76 deaths at age 111 (140-64), etc.

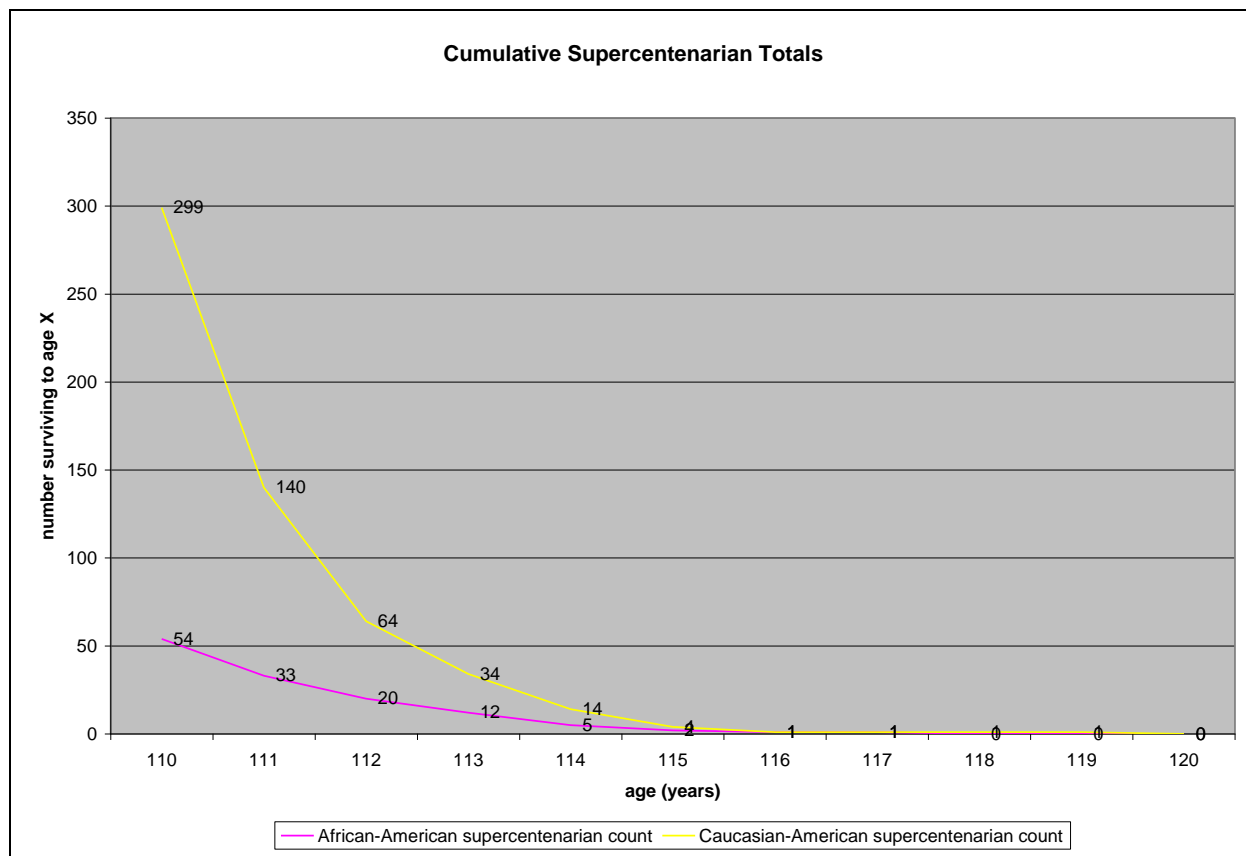


Figure 7. Cumulative Supercentenarian Totals by Age and Race

Validated Supercentenarian Life Expectancy by Age and Race

While it appears from the prior data on supercentenarian mortality rates by age and race that there is a continuing longevity advantage for African American supercentenarians versus their Caucasian American counterparts, this advantage is only inferred from the mortality data; it is not quantified. Also, the “annual mortality rate” methodology meant that if someone died at 111.9 years and someone else died at 111.2 years, their age was in effect rounded down to 111.0 for both persons. It stood to reason that there might be an African American life expectancy advantage, but if the advantage was less than one year, it might not show up in data where the ages of each individual was rounded downward to their lowest completed year. Therefore, I decided to add a life expectancy calculation as well. This was accomplished by first using the

actual birth and death dates to compute a year in “age and days” format. For example, if Person X was born December 10, 1884, and died January 29, 1997, their “age and days” listing would be “112 years, 50 days old.” I then divided the day count by either 365 or 366 days (accounting for leap year) and rounded the decimal result to the nearest hundred. In this hypothetical case, Person X’s decimal age would be 112.14 years ($50/365=.14+112$).

Calculations were done for all 299 Caucasian American and 54 African American cases. I then summed up the age totals (or persons who made it to 110, 111, 112, etc.) and divided by the number of survivors to year X. The result is Table 5 (see below).

Table 5. Validated Supercentenarian Life Expectancy by Age and Race

LIFE EXPECTANCY BY RACE AT AGE X (YEARS)				
			Difference	
Age	Black	White	(Years)	(Months)
110	111.89	111.31	0.58	6.96
111	112.79	112.29	0.50	6.00
112	113.54	113.30	0.24	2.88
113	114.27	114.10	0.17	2.04
114	115.36	115.01	0.35	4.20
115	116.78	116.41	0.37	4.44

From the results, we see that at age 110, the life expectancy for African American supercentenarians is 0.58 years (6.96 months) greater at age 110 than for their Caucasian American counterparts. This life expectancy advantage narrows from age 110 to 113 (reaching a low of 0.17 years or 2 months at the 113th-birthday point) but extends again to 0.37 years (or 4.4 months) by age 115. From this, we can see that the life expectancy advantage is real but significantly less than the gender effect, which at 5-7 years may be 10-14 times as great as the above-demonstrated “race effect.” However, the narrowing then widening of the gap may suggest that the causative factors are multiple: a heterogeneity hypothesis would explain the advantage from age 110 to 113, while a relative maximum hypothesis (see Chapter 5) could

explain the advantage from age 113 to 115. Alternately, there may not be enough data to draw a firm conclusion other than a life expectancy gap based on the factor of race has been demonstrated at age 110 and above. Future replication of analysis and testing may shed light on the proportions of the variance attributed to each cause.

Validated Supercentenarian Race and Gender Cross-Analysis

From the previous analyses, it appears that there is an African American longevity advantage. However, another question is whether this advantage is the same for both sexes. If we divide the 353 validated supercentenarians (excluding the two “other”) by race and gender (black male, black female, white male, white female) and analyze the mortality-rate data, a trend is not immediately evident (see Table 6). Focusing on the core ages of 110-113, among males, the mortality rate was the same for black and white males for ages 111 and 112, but lower for black males at ages 110 and 113. For female supercentenarians, the mortality rate was lower for black females in three of the four core ages (110, 111, 112), with a slight reversal at age 113. Note that the mortality rate for white females exceeded that of males in three of four ages, and the rate for black females exceeded that of males in three of four ages. This is postulated to be due to the rectangularization effect: because females are more numerous, we see a more substantial mortality rate. For the males, we see the mortality deceleration common to the “tails” phenomenon, or the tendency of the death rates to slow for when the population size nears extinction. Note, for example, we see the mortality rate for black females slow after a peak at age 113, with a single outlier at age 117; for white females we see a peak at age 114 (likely due to a larger sample size) and then a slowing-down, with a single outlier at age 119. Overall, it appears the mortality rate is lower for African Americans, regardless of gender, but this year-by-year format does not permit us to see the cumulative effects of year-on-year compounding.

Table 6. Supercentenarian Mortality by Race and Gender

Age	White Females	White Males	Black Females	Black Males
120	N.A.	N.A.	N.A.	N.A.
119	-100.0%	N.A.	N.A.	N.A.
118	0.00%	N.A.	N.A.	N.A.
117	0.00%	N.A.	-100.0%	N.A.
116	0.00%	N.A.	0.00%	N.A.
115	-66.7%	-100.0%	-50.0%	N.A.
114	-76.9%	0.00%	-50.0%	-100.0%
113	-56.7%	-75.0%	-60.0%	-50.0%
112	-48.3%	-33.3%	-41.2%	-33.3%
111	-54.7%	-50.0%	-37.0%	-50.0%
110	-53.3%	-52.0%	-40.0%	-33.3%

However, if we look at the data another way, using a proportional graph (Figure 8), it becomes immediately obvious that the proportion of the African American females in the population increased steadily with age. But what about males? For this question I tried a third method: Table 7 shows the proportion of the remaining population by race and gender for each age. From this, we can see that the African American male proportion of the supercentenarian population more than doubled, from 2.6% at age 110 to 5.3% at age 114. Note, in addition, that from Table 8 it appears that the African American proportion of the male supercentenarian population is much higher than expected at the start (over 26%) and increases to 50% by age 114.

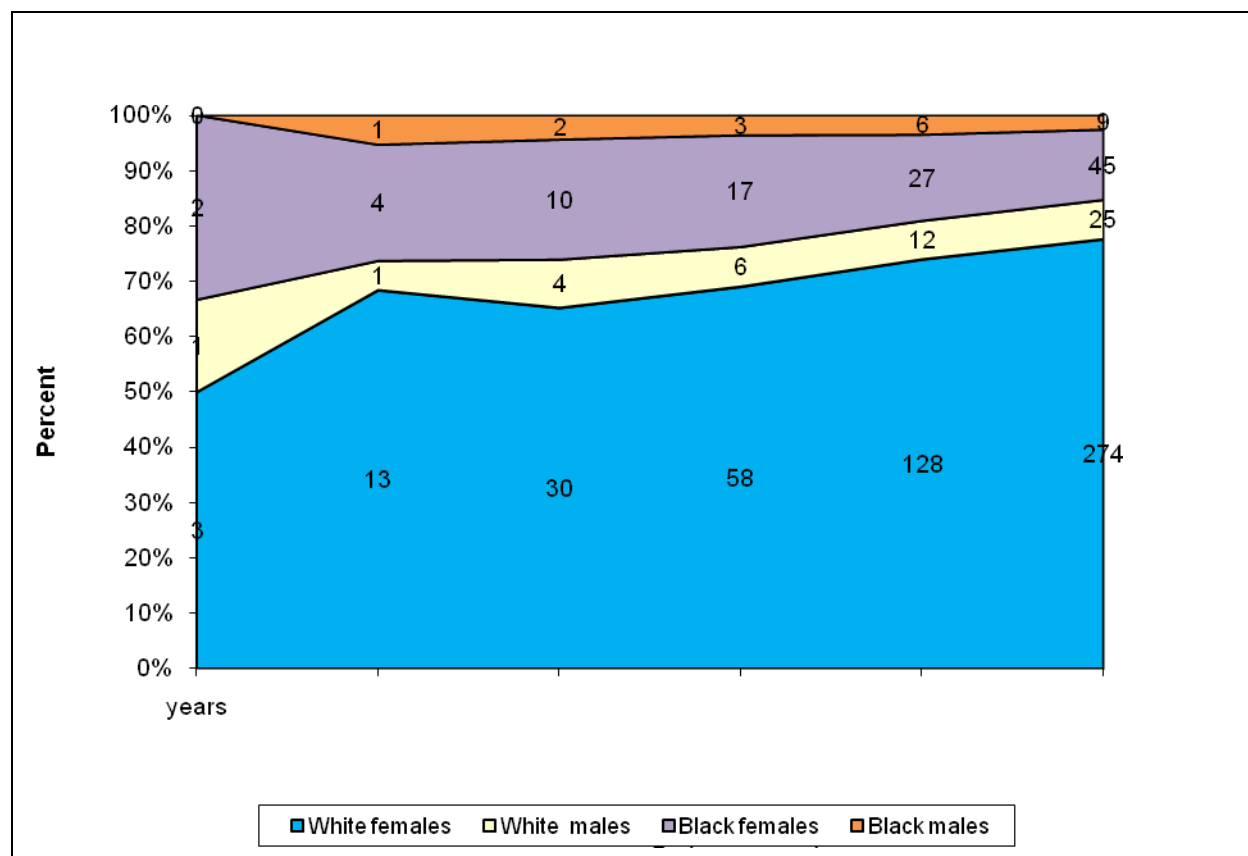


Figure 8. Supercentenarian Population by Proportion of Race and Gender

Table 7. Number and Proportion of Validated Supercentenarians By Race and Gender

Age	Total Population	Whites				Blacks			
		Females		Males		Females		Males	
		N	%	N	%	N	%	N	%
120	0	0	N.A.	0	N.A.	0	N.A.	0	N.A.
119	1	1	100.0%	0	0.0%	0	0.0%	0	0.0%
118	1	1	100.0%	0	0.0%	0	0.0%	0	0.0%
117	2	1	50.0%	0	0.0%	1	50.0%	0	0.0%
116	2	1	50.0%	0	0.0%	1	50.0%	0	0.0%
115	6	3	50.0%	1	16.7%	2	33.3%	0	0.0%
114	19	13	68.4%	1	5.3%	4	21.1%	1	5.3%
113	46	30	65.2%	4	8.7%	10	21.7%	2	4.4%
112	84	58	69.1%	6	7.1%	17	20.2%	3	3.6%
111	173	128	74.0%	12	6.9%	27	15.6%	6	3.5%
110	353	274	77.6%	25	7.1%	45	12.8%	9	2.6%

Table 8. Male Supercentenarians by Proportion of Race

Age	White Males		Black males		Totals
	N	%	N	%	
115	1	100.0%	0	0.0%	1
114	1	50.0%	1	50.0%	2
113	4	66.7%	2	33.3%	6
112	6	66.7%	3	33.3%	9
111	12	66.7%	6	33.3%	18
110	25	73.5%	9	26.5%	34

Looking at Table 9 we see that the African American advantage among females starts at a lower threshold (barely above the expected 12-13%) but rises moderately afterward, until black women constitute 40% of the surviving population at age 115. Note that the statistical artifact hypothesis would posit that the white female supercentenarian proportion is propped up at age 110 due to greater rectangularization of the mortality curve.¹⁴⁵ We do not see this on the male side, mainly because “frail” males generally do not tend to survive to this age. Since only the healthiest males are able to reach age 110, there is less rectangularization of the mortality curve.

¹⁴⁵ In other words, frailer white females who might have died at an earlier age (given greater selection pressures) are instead surviving to age 110, but die off at a faster rate than those in good shape. We do not see this pattern with the male data at this age (but perhaps we would see this with the age 105-109 group). Note again that 90% of supercentenarians are female, so we do not see this pattern as much with males. In other words, most of the males are already deceased before age 110, leaving only a few strong survivors. This accords with the heterogeneity hypothesis.

Table 9. Female Supercentenarians by Proportion of Race

Age	White Females		Black Females		Totals
	N	%	N	%	
115	3	60.0%	2	40.0%	5
114	13	76.5%	4	23.5%	17
113	30	75.0%	10	25.0%	40
112	58	77.3%	17	22.7%	75
111	128	82.6%	27	17.4%	155
110	274	85.9%	45	14.1%	319

Two-Cohort Analysis

Finally, I analyzed the data for potential cohort effects. I divided the data groups into “early” (1867-1879) and “late” (1880-1889) groups by race. I will briefly mention again that these two cohorts, while at first glance qualitatively different, are in fact exactly equal in time: the early group is comprised of those who turned 110 between January 1, 1980 and December 31, 1989, plus those already aged 110 or older on January 1, 1980 (the earliest being born in 1867 or three years earlier than the oldest person in the defined cohort). The late group is comprised of those who turned 110 between January 1, 1990 and December 31, 1999, some of whom died January 1, 2000 or later (the latest dying in 2003 or three years later).

Looking at Tables 10 and 11, the first thing I noticed is that the number of supercentenarians increased substantially for both whites (from 93 to 206, up 121.5%) and blacks (from 18 to 36, up 100%). Analyzing the data another way, African Americans made up 16.2% of the early group and 14.9% of the later group. While at first this may suggest that the African American longevity advantage decreased from those born in primarily the 1870s to those born in the 1880s, we need also to consider the population changes during the 1880s: heavy immigration of white persons from Europe reduced the African American proportion of the

population during the 1880s. A decline from 16.2% to 14.9% is an 8.0% decline, but the total African American percentage of the U.S. population dropped even more from 1880 to 1890 (from 13.1% to 11.9%, a decline of 9.2%). Thus, in relative terms, the ratio of counted verified black supercentenarians to expected went up very slightly from 24% more for the early group (16.2 divided by 13.1 equals 1.24) to 25% more for the later group (14.9 divided by 11.9 equals 1.25). At the very least, this suggests that the overall cohort effect changes over a decade did not significantly alter the total advantage ratio. Note also that the issue of a possible African American undercount in the census affecting the ratio (if we assume, for example, that the 1880 census “should” be 15% African American) is irrelevant: since the SSA data are based on census-matched cases using the 1880 or 1900 censuses (all the African American cases were census-matched cases), any underrepresentation in the census counts then could not explain the difference, since the SSA verified African American supercentenarian population count also would be underestimated by the same ratio. If anything, the greater difficulty in finding census matches for the African American SSA cases (than for the Caucasian American SSA cases) suggests that the true proportion of African American supercentenarians should be greater than the findings in this study. Since the study errs on the side of caution, study methodology cannot explain the results.

However, such numbers are based on the total baseline population at 110 years 0 days. Breaking down the data by year, we find parallel trends. Observing the mortality rates by year, we see that the rates for the white supercentenarians appear to have improved slightly overall for the later group, suggesting that there may be minor gains in longevity (for the 1880s cohort versus the 1870s cohort) here. Note the highest age went from 115 to 119, while the death rate improved at ages 110, 111, and 112. At age 113 and above, an improvement is not evident.

Similarly, the African American group showed a reduction in mortality at age 110 and 111, the same rate at age 112, and an increase at age 113 and above. This suggests that the African American supercentenarian population, while experiencing small longevity gains as well, did not see improvements at the higher ages. This may be due to the rectangularization of mortality effect, which as noted from previous data appears to be making inroads into the black female numbers. With the black males, we still see a founder-effect pattern (much like the population pyramids of developing nations).

Table 10. A Comparison of the Mortality Rates of Early and Late Caucasian American Supercentenarian cohorts

Caucasian-American Cohorts							
Age	Early (1867-1879)			Age	Late (1880-1889)		
	Deaths at Age	Cumulative Total	%		Deaths at Age	Cumulative Total	%
120	0	0	N.A.	120	0	0	N.A.
119	0	0	N.A.	119	1	1	-100.0%
118	0	0	N.A.	118	0	1	0.00%
117	0	0	N.A.	117	0	1	0.00%
116	0	0	N.A.	116	0	1	0.00%
115	1	1	-100.0%	115	2	3	-66.7%
114	3	4	-75.0%	114	7	10	-70.0%
113	5	9	-55.6%	113	15	25	-60.0%
112	8	17	-47.2%	112	22	47	-46.8%
111	25	42	-59.5%	111	51	98	-52.0%
110	51	93	-54.8%	110	108	206	-52.4%

Table 11. A Comparison of the Mortality Rates of Early and Late African American Supercentenarian cohorts

African-American Cohorts							
Age	Early (1867-1879)			Age	Late (1880-1889)		
	Deaths at Age	Cumulative Total	%		Deats at Age	Cumulative Total	%
120	0	0	N.A.	120	0	0	N.A.
119	0	0	N.A.	119	0	0	N.A.
118	0	0	N.A.	118	0	0	N.A.
117	1	1	-100.0%	117	0	0	N.A.
116	0	1	0.00%	116	0	0	N.A.
115	0	1	0.00%	115	1	1	-100.0%
114	1	2	-50.0%	114	2	3	-66.7%
113	1	3	-33.3%	113	6	9	-66.7%
112	2	5	-40.0%	112	6	15	-40.0%
111	4	9	-44.4%	111	10	25	-40.0%
110	9	18	-50.0%	110	11	36	-30.6%

Overall, the two-cohort analysis seems to show that the African American longevity advantage at age 110 and above continues, from the earlier to the later cohort, with ratios well over 20% higher than expected for both periods. However, we also saw parallel improvements in both groups: the black and white supercentenarian population groups experienced rapid increases in numbers, and both groups experienced a reduction in mortality among the “younger” supercentenarians (aged 110-112). The rates for age 113 and above did not show much difference for either race group.

Conclusion

Most of the tables and charts tend to confirm the observation of an African American longevity advantage, and that advantage is positively correlated with increasing age. The advantage appears for both genders but is stronger for African males. Utilizing the heterogeneity

hypothesis and statistical artifact hypothesis, the results accord exactly with expectation: The most rectangularization (or highest mortality rates) is for white females; the least rectangularization is for black males. Alternately, both black males and females do better than expected. Gender is by far the major effect, as the race/gender group analysis shown in Figure 7 demonstrates. Yet we also can conclude that race is a secondary effect. The longevity advantage appears to be stronger for the “younger” supercentenarian age group (110-112), which argues against the “age misreporting” hypothesis. Conversely, a longevity advantage is less certain at age 113, which argues for a statistical artifact or heterogeneity hypothesis. Yet the continuing advantage across early and late cohorts may argue for a biological hypothesis. The only thing clear is that there is a definite racial advantage in the mortality rates for African American supercentenarians versus Caucasian American supercentenarians. The life expectancy tables clearly showed that for at least the cohorts born between 1867 and 1889, African Americans who reached age 110 between January 1, 1980 and December 31, 1999 in the United States could expect to live 2-7 months longer than their Caucasian American counterparts, and this advantage held across gender. This data establishes the “what” in regards to whether an advantage based on the race factor exists and can be quantified—the answer is “yes.” It does not, however, answer the question of “why,” or what is the cause of these results. For some ideas about “why,” we turn to Chapter 5.

CHAPTER V

DISCUSSION

Analysis of the data in Chapter 4 established that, at least for the 1866-1889 birth cohort of American supercentenarians studied, African Americans enjoy a definite longevity advantage. What the analysis does not tell us, however, is why. The data establishes that although age misreporting is the number one cause of erroneous data at the highest ages, when the data are cleaned, there remains a still-significant proportion of African American longevity advantage unaccounted for. Other hypotheses, as mentioned before, might account for the difference. These include three main explanations: statistical, socio-cultural/environmental, and biological. While not testing for these three in this thesis, I do offer some tentative background information to serve as suggested avenues of further study.

The simplest explanation, and perhaps the most pertinent to genetic researchers, is the argument that the longevity advantage has a biological cause and is thus inherited. However, this explanation is also the most controversial, as it goes against the conventional sociological wisdom that “race is socially constructed” and may not even exist as a biological entity. One way to support the most controversial conclusion is to attempt to first rule out other explanations, such as environmental/cultural/social factors or statistical factors. Thus, it stands to reason that follow-up research should first test for other causes and correlations. For example, the data above could be divided into early-period cohort (1866-1879) and late-period cohort (1880-1889) to see if the results are stronger for one period or another. If the longevity advantage is due to social, environmental, or cultural factors, we would expect the data to not align very well, as these

factors tend to be temporary and change over time. Conversely, if human longevity is primarily biological and there are small longevity variations by race, then we would expect to see the data staying roughly the same over time.

In this chapter I will examine some of the social factors that may be correlated with African American longevity advantage. First and foremost is the idea that African Americans live longer due to religious effects. Indeed, earlier research on race, religion, and the crossover effect found that at least part of the variation was attributed to race (Dupre, 2006). Based on this research and this thesis, it follows that we should see the same results among the supercentenarian population.

However, as Xian Liu, the proponent of a statistical hypothesis to account for the advantage, has pointed out, if we assume that the biological basis for longevity is the same across races and there are differences in the socio-cultural factors, we can expect that the advantage would exist at 110 but close by 113, when the remaining population numbers near cohort extinction. We found some partial evidence for this in the fact that the lower African American mortality rate gap closes to equalize at age 113. However, above 113 the gap widens again. It may be that the data result is simply a fluke. Or, it may be that another factor begins to weigh in again. If maximum human longevity is controlled by biological factors and these vary somewhat among/between races, then that could account for a resurgence of the longevity advantage at ages 114 and above. On the other hand, mortality rates above 113 are based on such small populations that we probably should not place too much confidence in the numbers.

Another argument is that the longevity advantage is a false correlation, caused by other variations which can be accounted for statistically. For example, research has already shown that children born to mothers under 25 tend to live longer (Gavrilov and Gavrilova, 2007), and

African Americans are more likely to give birth at a young age¹⁴⁶ even more-so 120 or more years ago. Yet if this has any effect at all, it is likely only a small component of the advantage. Other factors, such as climate, also could come into play. Other research has found a slight advantage to living in warmer climates¹⁴⁷ and a disproportionate percentage of the African American population lived in the U.S. South some 120 years ago. However, again this effect, if any, is likely very minor. When differences are so minute and causation overlaps, it may be difficult to determine what proportion of the variance is attributable to each cause. Below, I revisit the arguments that seem most relevant, giving an overview of the statistical artifact and religious effect hypotheses and then touching on other arguments, including biological. A second round of the SSA study likely will come available in 2009, and by then the size of the study population will have increased, suggesting more opportunities for follow-up study in these areas.

The Statistical Artifact Hypothesis

Analysis of the data indicates that the longevity advantage for African-Americans still exists at age 110, narrows by age 113, and then widens again. Why this may be is open to more study. One of the reasons, certainly, is that of statistical artifact. Factors such as differences in population sample size and mortality rates at the highest ages could account for some or all of the longevity advantage (Wilmoth & Robine, 2003). The Caucasian American population has experienced greater rectangularization of the mortality curve, allowing more “weaker” persons to reach age 110, while only the strongest African-Americans, having faced greater selection pressures, will have reached this age. In theory, most selection pressure factors disappear when a cohort reaches extinction (the point at which the last living member of that cohort dies). Based

¹⁴⁶ From <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1064078>: “Overall, the proportion of African-American women was higher for the younger NC-born women (i.e. those eligible for the birthweight analysis) than for the full CBCS or for younger CBCS participants (born on or after 1 January 1948)” (accessed June 18, 2008).

¹⁴⁷ <http://longevity-science.org/Early-Life-Predictors-2003.pdf> (accessed June 18, 2008).

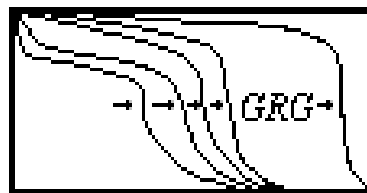
on sample size issues, the world cohort extinction age is generally 114-116, while that for the U.S. is about 113-114 (still the highest in the world for an individual nation; for a small nation like Norway, the average age at death of the oldest living person born in a given year or five-year period is still less than 110).

The “Less is More” Hypothesis

Xian Liu and Matthew Witten’s paper, “A biologically based explanation for mortality crossover in human populations” (1995), is the “smoking gun” that seems to be the main answer to the question of why African Americans would have a shorter life expectancy but a longevity advantage at the highest ages. The theory of cumulative disadvantage posits that disadvantages accrue over the life course and their effects are continual. Some have suggested that disadvantaged groups will have lower life expectancies, due to the effects of their disadvantage (for example, the poor tend to eat a less-healthy diet and are less likely to have health insurance). It follows that homeless persons, under extreme environmental pressures (lack of food, shelter, etc), age faster and live shorter lives than the general population. Yet what about people with relatively minor but continual socio-cultural disadvantages? Noting again the life expectancy in the USA of African Americans (73) does not compare well to that of whites (78) but is far, far ahead of that in a place such as Zimbabwe (about 40). Clearly, the African American life expectancy experience in the USA must be closer to that of whites than to that of Zimbabweans.

How can the seemingly incompatible theories of cumulative disadvantage and race crossover be reconciled, if both are true? The answer may be in statistics. Plainly put, Liu and Witten argue that “the existence of a genetically predetermined maximum life span imposes the

condition that the two subgroup mortality rates must cross”. Basically, this is the



“rectangularization of the mortality curve” argument:

A reduction of deaths at an earlier age for whites leads to a higher death rate for whites at older ages. If death be delayed due to environmental or situational advantage, but in late life genetic factors are predominant, then a crossover effect will exist even if the two subgroup lifespans are equal. Taken another way, we must recognize that if we have two population groups, where one is advantaged and one is disadvantaged, the initial advantage will cause a gap in the data.

However, over time the “advantaged” group’s luck runs out, in part due to the law of diminishing returns. Meanwhile, the more disadvantaged group continues to get stronger, because their weakest members already dropped out, leaving a survivor group (heterogeneity hypothesis).

All this sounds familiar, but Liu takes the argument further. Interestingly, Liu and Witten’s calculations show that, in comparing the mortality rates of two groups (one advantaged, one disadvantaged), the “differentiation is observed to widen as the population approaches 60 years of age; thereafter it gradually decreases, eventually to the convergence of the two survival curves.” While different results may come with different death rates, this shows that the mortality gap due to the effects of cumulative disadvantage does in fact grow wider over time, before its effects diminish. Thus, if we were to study the effects of cumulative disadvantage from age 30 to 60, the gap would widen over time, but above age 60 the gap would narrow. This has social policy implications. Using the life-course perspective, the disadvantaged group is most adversely affected in middle age. It should be noted, however, that the convergence or crossover

¹⁴⁸ Taken from <http://www.grg.org/> (accessed June 5, 2008).

of the death rates does not mean that the disadvantage disappears. Instead, it means the remaining advantaged population is weaker (because more frail persons have survived). This is called the heterogeneity of frailty hypothesis.

Interestingly, Liu and Witten try a second scenario, which posits that there is no genetically predetermined maximum life span. Their data analysis would suggest a “die-off” of the disadvantaged group by age 110. Yet, among the African-American population, we see a continual existence of the population above age 110 (currently, Gertrude Baines, aged 114, is the oldest living verified African-American). This suggests that there is in fact a maximum life span (scenario one is more akin to reality). Their “crossover” at age 109 is little more than a statistical artifact. A third scenario is more akin to the aging of non-human animals such as tortoises and fish and so is not discussed in detail here.

To review, in the first scenario, an assumption of an equal maximum life span (120 for each group) among two population subgroups, where one group is advantaged and one is disadvantaged, automatically results in a crossover effect. In a second scenario, where there is an assumption of unequal maximum life span (120 for the advantaged group, 110 for the disadvantaged group), a crossover effect exists, but only at the extreme end (age 109); it is a mere statistical artifact. A third scenario, using a constant hazard ratio, is more akin to deaths among some animal species and so is not relevant to humans. A fourth scenario was not discussed: what if the disadvantaged group had a maximum longevity advantage? It seems that, as good as this article is, at least one angle was not explored, leaving the door open for future analysis.

Liu and Witten noted that (in 1995) “it is currently a widely held belief that environmentally advantaged persons (e.g., persons with high socioeconomic status) live longer

than their disadvantaged counterparts” and that “subgroup mortality differences are often viewed as constantly proportional over the entire course of human life.” Their seminal work basically puts this idea to rest using statistics alone, paving the way for accepting that the crossover effect is actually a function of cumulative disadvantage, much the same way a pruned tree will grow faster than an unaltered one. The caveat is that the negative early effects must be only of moderate proportion: clearly, the Jewish population in Auschwitz had a very short life expectancy (akin to cutting a tree down, not pruning it). As Liu and Witten put it, “Whether substantial differences in hazard rates can translate into strong differences in survival depends upon the magnitude of the survival rates.”

The Religious Effect Hypothesis

It seems that most of the newspapers covering supercentenarians favor the idea that religious attendance and faith in God are associated with longevity, but is there a racial component as well? M. E. Dupre has, fortunately, already done research which suggests that a portion of the crossover effect can be attributed to a religious effect; even within the African American community, frequent church attenders lived longer (Dupre et al., 2006). A within-group variation such as this suggests a social origin and thus cannot be attributed to biological factors. We have heard that black churches are more “colorful,” with more singing, and more physical movement, than traditional white churches. I have seen firsthand that Bettie Wilson was still grooving to gospel singing at age 115 (see figure 9).

Is it possible that one aspect of the African-American longevity advantage after age 80 is due to a greater socialization in church, including the positive psychosocial effects of self-esteem, lowered stress, and social support? We need to remember that, tracing to the slave days, Sunday

and church were often the only times blacks could get off work. This evolved into a strategy to avoid working for the master by having all-day church service.



Figure 9. Bettie Wilson, 1890-2006, lived to 115 years 153 days old and was married to a pastor for 72 years. She attributed her long life to God and “living right.” Photo courtesy of the Memphis Commercial Appeal.

This idea is even encapsulated in a gospel song, “Ain’t Got Time to Die,”¹⁴⁹ which states:

Lord, I keep so busy praisin’ my Jesus
 Keep so busy praisin’ my Jesus
 Keep so busy praisin’ my Jesus
 Ain’t got time
 ‘Cause when I’m healin’ de sick
 When I’m healin’ de sick
 When I’m healin’ de sick
 ‘Cause it takes all o’ ma time
 All o’ ma time

¹⁴⁹ http://www.negrospirituals.com/news-song/ain_t_got_time_to_die.htm (accessed May 1, 2008).

To praise my Lord
 If I don't praise Him de rocks gonter cry out
 Glory an' honor
 Lord, I keep so busy workin' fer de Kingdom
 Keep so busy workin' fer de Kingdom...
 Ain't got time to die
 'Cause when I'm feedin de po'...
 I'm workin' fer de Kingdom...
 Ain't got time to die
 Lord, I keep so busy servin' my Master
 Keep so busy servin' my Master
 Ain't got time to die
 'Cause when I'm givin' my all...
 I'm servin' my Master...
 Ain't got time to die

This one song encapsulates all that the African-American myth of longevity is: a desire to live a long time (“ain’t got time to die”), especially long enough to live to see the day things will be better for African Americans (“I never did think I’d see the day” is a common expression, used to refer to things such as a black man being nominated for president); a passive resistance to the white system of oppression, including deception (such as falsifying one’s age); but ultimately it is about giving credit to God (praise, glory, honor) for their long life. The thinly-veiled message here is that the slaves were too busy serving their Heavenly Master, God, to serve their earthly master, the white man, who wanted them to work on Sunday. African-American religious tradition is thus not simply a belief in God; it has been for many a way of life and an escape from the harsh social reality of the dominant culture. But does it really contribute to longevity? It seems that this might contribute to the African-American myth of longevity, but are there scientifically measurable benefits?

The answer appears to be yes—and no. In 2006, we find the first attempt to link the race crossover effect to the effects of religion (Dupre, Fransese, & Parrado, 2006). The results are mostly what might be expected, although with a few caveats: religion does appear to be a factor

associated with longevity and race, but church attendance was only associated with longevity for women (page 141). Interestingly, the study found a race crossover for both African-American men and women, which suggests that religion could account for only part of the crossover effect.

Getting into the “meat” of the journal article, Dupre notes that “numerous studies have shown a link between religious involvement and mortality,” that “religious affiliation and attendance are greater among blacks than among whites,” and finally that “the health benefits of religious participation are particularly strong for blacks” (page 141). We see that although there is a “religion effect” advantage for whites who attend church frequently (seven years more than infrequent or nonattenders), the religion effect is doubled to fourteen years for African-Americans (page 142). Is this due to an additional factor, race, or due to a greater intensity of the African American spiritual experience? It seems the effect is less for men than for women (142): the religion effect changed the crossover age for women by ten years but had no effect on the male data. The final conclusion was that the crossover effect exists (141) and that the religion effect appears to be a strong component of it, but not the only variable.

We see that the race crossover for black women occurs at age 80 for women who attend church once a week or more but not until 90 for women who never attend. This ten-year gap suggests that the statistical crossover occurs at age 90, but the added bonus of church attendance means that African-American women who attend church regularly begin to outlive their white counterparts a decade earlier. From this we can conclude that the factors involved in the crossover effect must be multiple.

The Biological Superiority Hypothesis

Having considered both the Liu and Dupre hypotheses, both authors added a strong case that statistical artifact and religious effect (part of a greater socio-environmental model) could

account for part of the crossover effect. Neither was particularly successful, however, in accounting for even a majority of the effect. Liu's statistics-only model predicted a maximum age of 110 for the oldest African-American, while Dupre's religious effect only moved the age of crossover up by about two years and could not account for a male crossover. Having considered the arguments of age misreporting, statistical artifact, and religious effect, it is now time to consider that, perhaps, biological differences could account for some of the variation.

A word of caution, again: some people have misused the biological argument to suggest such silly ideas that African Americans think differently than whites do, using a different part of the brain, and that they can't sit still in classrooms (Rev. Jeremiah Wright)¹⁵⁰ Let me state that I do not ascribe to such "theories." We must recognize that we are all human and more alike than different: even the Neanderthal, considered to be a separate species in the same genus (*homo*), shares 99.5% of the DNA of modern humans, despite more than 400,000 years of divergent evolution.¹⁵¹ Any race-based genetic differences due to group isolation within *homo sapiens* would be only on the order of perhaps 70,000 years at most of unique evolution, enough for minor group differentiation (called "genetic drift") but not enough for speciation. Alternately, note that humans are said to share 98% of the same genome with chimpanzees, yet the oldest chimp on record is 75 years old (currently still living); the oldest human on record reached age 122...almost 63% older. So far, the oldest verified Caucasian-American (Sarah Knauss) was 119, while the African-American record is 117. Thus, there is no evidence for an ultimate maximum longevity of one race over another. The question is still open, however, concerning a "relative maximum" longevity advantage.

¹⁵⁰ <http://www.city-journal.org/2008/eon0429hm.html> (accessed June 16, 2008).

¹⁵¹ <http://chronicle.uchicago.edu/061207/neanderthals.shtml> (accessed June 16, 2008).

Relative Maximum Longevity

However, the argument could be made for “relative maximum” longevity. In the same way that sports teams can be said to have “depth” (the L.A. Lakers) but may not have the greatest individual scorer (Le Bron James), so we can understand that when we see, currently, that five of the top eleven oldest living Americans (as of June 5, 2008) are African-American (45%), much greater than the expected 13%, it seems that this is more than just a fluke. Note that the SSA study data only covered those born in the period 1866-1889. It did not include those such as Elizabeth Bolden (1890-2006) or Bettie Wilson (1890-2006) or Gertrude Baines (1894-present). It does not cover the time in 2006 when three of the four oldest living Americans were African-American (and again in March 2008, when two of the top three were African American). In early 2008, three of the four oldest living persons in the state of Michigan were African American (the oldest being Daisey Bailey, figure 11). Even though the maximum ages reached are not surpassing the all-time records, we must still notice an inordinate number of African American supercentenarians compared to their share of the population.

It should be noted that this is the case, despite the greater difficulty of validating African American claims. While the claims of Rebecca Lanier to be 116 (probably 102) or Ruby Muhammad to be 111 (probably 101) appear to be false, cases such as Mary Davis of New York (said to be 113) have yet to yield their secrets. Given that at least some of the unverified claims are probably true and that it has been more difficult to verify the age of African American claimants, it stands to reason that if we were an omniscient being and had all the answers, the proportion of African American supercentenarians would be even higher than the Gerontology Research Group data currently show. The greater difficulty in finding the cases has led to fewer

African American cases in the age 110-111 range (but we see attention come to them around age 112), while I get e-mails from Caucasian supercentenarian families as soon as their 110th birthday story hits the news...and often sooner. Since the USA lacks a central registry of supercentenarians (some nations, such as the Netherlands, Germany, and others track their oldest citizens) and cases normally must be gathered through the media, it is harder to get an unbiased dataset. Thus, the SSA study dataset is unique in that it provided a complete attempt to consider every claim in the Social Security database for the period covered (excluding only about the 5% of the U.S. population that was not enrolled).

If African American supercentenarians do live longer, on average, than their Caucasian American counterparts, can biology explain this? Perhaps it can. The first thing we need to consider is that humans are mammals, and all mammals appear to have a species-specific maximum life span. The record for the lab mouse, for example, is 4.98 years, and despite the offering of \$1 million with the Methuselah mouse prize, no scientist has yet been able to demonstrate that a lab mouse has reached the age of five years. The record for the oldest dog has been 29 years for over fifty years. However, the oldest cat record, 36 in 1957, is now 38: that 6% increase in fifty years compares to an 8% increase in the human record (from 113 to 122). Thus, some maximum lifespan increase is possible, but the increases are generally logarithmic.

All this means that the maximum life spans of humans are mostly controlled through biology. We need to understand that humans, as by far the longest-living primates, evolved over time to favor those living longer (the “grandmother effect”). Note the current oldest gorilla, Jenny, is 55¹⁵² while the oldest chimpanzee, Cheetah, is 75.¹⁵³ Chimpanzees are our closest

¹⁵² <http://www.msnbc.msn.com/id/24539602/> (accessed June 5, 2008).

¹⁵³ http://www.news.com.au/entertainment/story/0,10221,21542569-7485,00.html?from=public_rss (accessed June 5, 2008).

relative, and they have evolved longer life spans than the gorilla. Humans, in turn, have evolved longer life spans than the chimpanzee.

Survival of the Fittest Argument

What causes evolution to favor longer life spans? Without getting into too much detail, the “survival of the fittest” principle holds: the genetically weak die off first, while the fittest tend to survive and pass on their genes. However, some of that “natural” selection is due to different selection pressures. In a coddled environment, the genetically weak can survive (a “bubble boy” being an extreme example). It therefore follows that greater selection pressures will favor an intensified evolutionary push that favors the most fit, while lesser selection pressures will allow weaker members of the species to continue to survive.

The question arises, then: Have African Americans faced greater selection pressures? The answer appears to be yes, over both the long term and in recent history. Taking the macro-evolutionist approach, over the last 50,000 years the African race group has faced intense selection pressures on 206 sites on the human genome, compared to just 188 for the Indo-European race group and 185 for the East Asian race group—a difference of 9.6% over Caucasians and 11.4% over East Asians (Wade, June 2007). Approximating the African American group to the African group and the Caucasian American group to the Indo-European group, we can thus hypothesize that greater selection pressures, and thus faster evolution, may have led to more adaptations that favor longevity for the African and African American groups.¹⁵⁴

¹⁵⁴ Yet some would argue why we have not seen the same results in the African continent that we do in America. I would revisit the cutting a tree down versus pruning argument; the current life expectancies in most African nations are far too low to produce more than a few supercentenarians, and even if they existed, the state of recordkeeping there some 100+ years ago was such that most people’s birth record did not exist.

In addition, there is another genetic argument—the population bottleneck theory¹⁵⁵—which argues for the existence of different racial groups.¹⁵⁶ Most human evolutionists today agree that greater genetic diversity leads to greater health of a population group¹⁵⁷ (we see acute concern for inbred endangered species, such as the Javan elephant or Javan rhinoceros). In some instances, isolation on an island has led to island dwarfism. It may be paradoxical to note that, even though the Indo-European group has evolved less over the last 50,000 years, it is also less genetically diverse. Due to having migrated greater distances and becoming isolated (especially during the Ice Age), there was less genetic exchange and hence more inbreeding, which may have led to more genetic diseases such as cystic fibrosis or spina bifida. We can thus infer that the Indo—European group should be less genetically fit overall.

Finally, there is an argument for “microevolution.” Micro-evolutionists have demonstrated that butterflies can evolve rapidly, with a major change in sex ratio from one to 39 percent male in just one year.¹⁵⁸ Whether this can translate to humans or mammals may be too early to tell. However, it has been anecdotally noted that African Americans in the United States first faced the selection pressures of being captured in Africa, surviving the slave ship journey to the United States (and other locations), and finally, selective breeding. That is, often the most-healthy African American males were selected to be the “stud” that would then be mated with the healthy females; less-healthy slaves would be discouraged from breeding.

Of course, if conditions are too harsh, the benefits reverse: massive die-off can lead to less diversity in the long run, as does forced breeding. Note that Liu’s statistics suggested a 10%

¹⁵⁵ <http://www.genetics.org/cgi/content/full/155/4/1981> (accessed June 18, 2008).

¹⁵⁶ <http://news.bbc.co.uk/2/hi/science/nature/7358868.stm> (accessed June 18, 2008).

¹⁵⁷ <http://query.nytimes.com/gst/fullpage.html?res=9B0DEFDE123EF935A15756C0A961948260> (accessed June 18, 2008).

¹⁵⁸ <http://www.sciam.com/article.cfm?id=but-madam-butterfly-where&ref=rss> (accessed June 16, 2008).

greater pressure produced the best crossover results (and this number is close to the noted 9.6% difference). It has been noted that slave conditions in Brazil were so harsh as to lead to negative population growth (slaves had to be restocked), whereas in the USA, as bad as conditions were, there was a positive population growth (perhaps because the clause in the Constitution forbidding the importing of slaves after 1808 encouraged efforts to manage the ones already here).

We then have many hypotheses that could support the notion that a raced-based longevity advantage could be biologically-based. What about the details, however? What particular areas of study might show an advantage?

Race and skin

When people consider “vital” human organs, they think of the heart, the brain, the liver. Often forgotten is the largest human organ—the skin. Only when someone suffers severe burns in a fire (or when we over-tan ourselves) do we realize how important the skin is. The skin protects the human body from micro-pathogens, seals in moisture (we are 65% water), helps to regulate our internal body temperature (sweat glands), and protects our internal organs. Note that a bad sunburn is enough to allow for infection, fever, and a lowered immune system response.

Is there a racial advantage for African Americans regarding their skin? It is well-known that darker skin has more melanin, offering more protection from the sun’s harmful UV rays. But this factor alone should account for only a small advantage in lower skin-cancer rates. Perhaps skin color is too superficial. One thing I have noticed with African American supercentenarians, however, is that their skin is often less-wrinkled and thicker than the skin of their Caucasian

American counterparts. There is even a saying in the black community, “Black don’t crack.”¹⁵⁹ This has been offered as a reason for African Americans looking young for their age. Note also that research by the New England Centenarian Study showed that people who look young for their age live longer (citation needed). Greater elasticity and/or thickness could really explain a lot. Many super-elderly people die from dehydration, and skin that is less wrinkled has less surface area for evaporation. Less-wrinkled, thicker skin is also less likely to bruise and better protects the internal organs. Do African Americans really have thicker, less wrinkled skin, though? I have thus far not been able to find any reference material on this, and it thus appears to remain an area of potential future study.

Athletic Ability Argument

I do note that if Africans have evolved 10% more genes overall, there should be other genetic differences as well. We see that the record holders in sprint events are particularly dominated by persons of African ancestry:

¹⁵⁹ This reference associates “Black don’t crack” with older African Americans looking good for their age: http://www.bet.com/News/Features/WHM08_BlackDontCrackFabCelebsNewsFlipbooks.htm (accessed June 5, 2008).



Figure 10. Usain Bolt of Jamaica sets the world record in the 100 meter dash (9.72 seconds), May 31, 2008.¹⁶⁰

The dominance is not just over Indo-Europeans but over East Asians as well. With the occasional exception (such as 400-meter sprinter Jeremy Wariner), we often see world sprint events dominated by those of African origin. Note in Figure 10, blacks took not just first, second, and third—no non-Africans can be seen on the track. If the life course and cumulative advantage perspectives are true, being healthier or stronger early in life should mean that one has greater maximum potential to live a long time (whether or not that person lives the lifestyle needed to reach that potential is another matter).

But so far, no research has demonstrated that the ability to run fast is greater for one race of people than another due to genetics. This is something that, perhaps due to political correctness, has not been studied. It is also true that in ancient times the ability to run fast was important to escape from wild animals but also other humans. That is no longer the case, so testing for some genetic advantage like this may not be warranted. On the other hand, we all would like to slow the aging process, and many would like to live longer. If even a small

¹⁶⁰Source: http://www.radiojamaica.com/images/stories/bolt_osaka.jpg (accessed June 5, 2008).

advantage could be identified, it may be beneficial in combating aging. It may be that testing for a race-based biological effect on humans could lead to identifying the genes associated with longevity, and thus be beneficial for our understanding .

Age of the Birth Mother

One more angle must be considered in the biological-advantage hypothesis: it could be a hybrid of genetics and social environment. Recent research has found a strong association between living to 100 and the age of the mother (Gavrilova & Gavrilov, 2007). Centenarians were more likely to be born to mothers under 25 or over 37. The U-curve suggests two genetic factors here: one, young, healthy women would give birth to healthier children, and since human DNA evolves even within our own body (epigenetics), a young person's DNA is more likely to have undamaged DNA than an old person's. However, after a sharp drop-off we see a partial comeback after age 37. This could be explained because the less fertile would have stopped giving birth by this age, and research has shown that women over 40 who give birth (natural births, not modern fertility interventions) tend to live longer and are possibly slower-aging individuals. Thus, age of the birth mother is associated with biological advantage.

When it comes to age of the birth mother and race, statistics show that African Americans tend to have their first child at a younger age than their white counterparts, with the difference particularly stronger a century ago. In perhaps a most interesting case, Bettie Wilson (1890-2006) was born the 12th and last child to a 45-year-old slave woman in 1890. Yet she also gave birth at age 19, and her son is still living at age 97. In another case, 112-year-old Susan Lynn (1888-2001) gave birth at age 12, to a child who lived to 96.

In sum, there are plenty of hypotheses regarding age, race, and biology that remain to be adequately tested. Perhaps future research will finally bring us answers.

Areas of Further Study

Several other factors may correlate with African-American longevity. Below, I briefly review a few that may be particularly pertinent.

African-American Longevity and Home-Based Care

It has been interesting to note that African Americans tend to be cared for more at home than Caucasian Americans. While race and health status data on supercentenarians does not yet exist, a study of the centenarians in the U.S. Census, 1990, found that “ While whites appear to have lower disability levels at the younger-old ages, this was not the case among those aged 80 and above” (Krach & Velkoff, 1999). Moreover, while over 50% of white centenarians lived in a nursing home, less than 30% of African Americans did (figure 8, Krach & Velkoff, 1999).

While I did not investigate, or even find, a paper linking home-care rates with the crossover effect, this would seem to be a fruitful avenue of future research.

African-American Longevity and Physical Activity

Another conclusion that needs to be stated is that, while a disadvantaged group eventually will have a late-life period of catching up, the mortality disparity is greatest in early-middle age, when the weaker members of the disadvantaged group tend to die off. It also means that the theory of cumulative disadvantage and the life course perspective are in fact relevant to mortality; we only see a mortality reversal among the oldest-old. Thus, both theories were found to be valid and did not contradict each other. There is one converse conclusion that may be drawn: hard work and exercise and staying active instead of “retiring” is positively correlated with longevity (such as Daisey Bailey—see Figure 11).



Figure 11. Daisey Bailey of Detroit, Michigan, age 112, who carried logs for a living

Ironically, African-Americans in the past were active of necessity (through physical labor); it seems that at present, the younger cohorts have rebelled against this by intentionally avoiding exercise and physical activity. Currently, African-Americans have the highest rates of obesity among women¹⁶¹ and a new culture of sedentariness that includes taking the elevator to the second floor may be a factor in that. Meanwhile, the previously inactive (where retirement meant staying at home or going golfing) white elderly population is gradually giving way to a more-active lifestyle model. All of this means that any longevity benefits previously seen could disappear due to cohort effects and different group life-course trajectories. Thus, African-American longevity among the oldest-old should not be misinterpreted or misconstrued to

¹⁶¹ <http://www.cdc.gov/nchs/data/hus/hus07.pdf#074> (accessed June 16, 2008); also <http://www.cdc.gov/nchs/data/databriefs/db01.pdf> (accessed June 16, 2008).

endorse their disadvantaged status or the ability to “get by” with less money. Instead, we should celebrate their spirit of survival and endorse the idea of keeping physically active and socially active (as African-Americans have traditionally been more socially active in church). It remains to be seen if non-church social functions can and will have the same effects that church attendance has had.

Race Crossover effect continues to age 113

Previous studies have demonstrated the crossover effect to age 99. This research extends the crossover effect to age 113. At this point, the data become less clear (see Figure 6, Annual Supercentenarian Mortality by Race); the mortality rates for African American and white supercentenarians are roughly equivalent at 113, but at age 114 and 115 the African American rate is again less than that of whites. The sample size is too small for these data to be reliable. It also should be noted that the “mortality deceleration” hypothesis suggests a lower death rate for a very small sample size. Hence, it could be argued that the real crossover effect ends at age 113, and its apparent re-emergence could be a statistical apparition due to divergent cohort-sample numbers. This could be an area of future research.

African-American Longevity and Religion

Do the effects of religious/spiritual beliefs in the African-American community provide a longevity benefit greater than that for whites? While research has already shown that there is a religious effect on longevity, further research is needed to show whether the religious effect varies by particular religion or spiritual type. While we need to be mindful that African American religious beliefs are not monolithic and come in many varieties (King et al, 2005), it is also true that the oldest-old African American population is more likely to be members of traditional African American churches (such as African Methodist Episcopal). Traditional

African American church services often have more active participation (more singing, more movement) which alone would suggest a positive health benefit versus the staid, old-line white Protestant services, where participation is often regulated and limited to sitting quietly in church pews. In addition, African American beliefs include attitudes that are less likely to favor assisted-suicide and more likely to favor continued medical treatment for an extremely aged individual. Elizabeth Bolden, for example, had a stroke at 113 and then had a feeding tube installed. She lived to 116. Daphne Brann (a 110-year-old white lady) on the other hand, though a former minister herself, had a heart attack at 110. Doctors “did nothing” because she had lived “long enough.” This, despite the fact that she still could walk before the heart attack (albeit with a cane) and had voted in the last election.

At Bettie Wilson’s 115th birthday party, she, though in a wheelchair, managed to sing along to Negro spirituals. This included waving her hands through the air. At 114, she still read the newspaper with glasses. She remained at home (rather than going to a nursing facility), being taken care of by a great-granddaughter. “Mame Bettie,” as they called her, remained mentally sharp and stayed physically active (though confined to a wheelchair) until almost the end. This active approach to “living right,” as she called it, included many positives (physical, mental, spiritual) that likely contributed to her extraordinary longevity.

New Social Security Database

The SSA study is doing a similar examination of data for the 1890-1894 population cohort. Will the race results be the same (supporting the initial findings) or different? While the initial SSA study of supercentenarians was a quite large sample, enough for subgroup data on race (white and black), when breaking the data down into binary combinations (such as black males) the numbers provided were quite small. It could be argued, even though the data was a

whole-population count, that the results were due to chance distribution, rather than an actual longevity advantage. One way to test this hypothesis is to see if the longevity advantage seen in the supercentenarian population cohort born between 1865 and 1889 will be repeated. The SSA is already investigating the 1890-1894 cohort using similar techniques,¹⁶² and the results, expected in 2009 or shortly afterward, are expected to have a population cohort of more than 100 supercentenarians. An analysis of the new data might find that the longevity advantage seen earlier continues, or that it does not. If not, it could be argued that the initial effect was temporary. However, anecdotal evidence favors a continuing African-American longevity advantage. If we check the latest Gerontology Research Group list¹⁶³, as of March 1, 2008, it contained a total of 30 U.S.-born validated living supercentenarians, of which 8 (26.7%) were African-American (much higher than the expected rate of 12% based on the 1900 census). Additionally, three of the top five oldest Americans were African-American (Arbella Ewing, 113; Gertrude Baines, 113; Beatrice Farve, 112) as was the oldest living male (George Francis, age 111). This, despite the fact that African-American cases are more difficult to verify and we also had a disproportionate number of outstanding African-American claims (such as Mary Davis, claims 113). Some of this was due to a greater age misreporting: preliminary analysis indicates that Rebecca Lanier, who claims age 114, is really 101; Virginia Call, who claims 114, is really 110; Susie Middleton, who claims 112, is really 110; and Ruby Muhammad, who claims 110, is really 100. But none of these cases was on the GRG list, so we can say that it appears the African-American longevity advantage seen in the 1865-1889 cohorts continues in the 1890s generation.

¹⁶² There are some minor differences in processing; cases are more likely to be investigated before being thrown out as they were in the initial study.

¹⁶³ See <http://www.grg.org/Adams/E.HTM> (accessed June 5, 2008). This list is updated quite often and so may not be the version cited above.

Concluding Thoughts

The Problem of Race

It seems that, for many, the issue of “race” is still a problem—and not only as an issue of discrimination. It seems that for many, the best way to “solve” the problems of race is to ignore it, pretend it doesn’t exist. Yet this misses the point: recognition of “diversity” is pushed by some, yet in that “diversity” we are “all the same”---two unreconcilable positions being pushed, often, by the same people. I note that when the New York Times recently did a story on genetics and “race,” they chose another word—“population group.” If retiring “race” as a four-letter word will solve the problem, I’m all for it. For many, the problem seems that the old black-and-white model should give way to shades of gray. Many persons don’t neatly fit into one racial category. It may be easy to start with “white, black, red, yellow”—but what about people from the Andaman Islands? Very dark-skinned, and Indo – European? More importantly, what about “mixed-race” children—should we go with the old model of “if you have one ounce of black blood, you are black?” I say no. We need a better discussion of the issues of racial differences, and we need to think of this more in scientific terms. In fact, one solution is that we need a more complicated model: if we consider humans a genetic “mosaic,” then the more appropriate question may be, not “what race are you?” but “What is your genetic profile?”

May I suggest that a greater educational cross-fertilization between sociologists and demographers would resolve many apparent contradictions, including the repeated but failed attempt to eliminate the crossover effect through correction of age misreporting. Is African

American longevity a myth? Yes, and no. Both answers are correct. As I said earlier, double entendre intended. Yes, we must recognize that age misreporting is still a significant factor. No, it is not the only factor.

Status of African-American Supercentenarians Today

Currently, as of this writing (June 6, 2008), of the 11 living validated Americans aged 112 or older, 5 (45%) are African American (much higher than the expected 12%, based on the African-American proportion of the U.S. population in the 1900 census), including the oldest living American male. This, despite the fact that this does not include the unvalidated claims, which are disproportionately African-American (such as Carrie Berrian of Georgia, claims 113; Mary Davis of New York, claims 113; Rebecca Lanier of Ohio, claims 116; Richard Washington of South Carolina, claims 115, or even the current “oldest American claimant”: Pearl Gartrell of Florida claims to be 120). Yet the oldest living verified person is a white woman, Edna Parker, 115. All this suggests that the racial supercentenarian trends documented in this thesis for the 1866-1889 population cohorts have continued for those born in the 1890s. It is likely that a majority of the racial variation in supercentenarian numbers (using unsifted data) is due to age misreporting. Suggestions have been made (based on possible census-linked matches) that Rebecca Lanier, “116,” is really 103, for example; that Ruby Muhammad, who claims to be 111, is just 101 years old; that Richard Washington, who claims 115, is 110; that Virginia Calls, who claims 114, is just 110; that Susan Middleton, who claims 112, is 110, etc). Yet if we exclude all of these cases, using only data verified through early-life documentation, we still find the rate of African Americans aged 112 or older to be 2 ½ times the expected rate. Thus the current data is telling the same story. The question of “what” is answered. The question of “why” remains.

Extreme Longevity Tracking: Past, Present, and Future

By bridging the past to the present in the niche field of extreme longevity tracking, this paper recovers the long-forgotten foundations of research in the field: e.g., who remembered that Thomas Emley Young began the tradition of keeping lists of verified centenarians in 1899? By daring to analyze the Social Security Administration data on supercentenarians and race, this thesis takes the next step for those who had long suggested a race-mortality crossover effect. While not answering the question of “why,” this paper seeks an answer to the question of “what” concerning race differences in mortality among supercentenarians and adds a new chapter to a long tradition, while suggesting future avenues of investigation. My hope for this study is not simply to keep the traditions of extreme-longevity research alive, but to expand them in new interdisciplinary directions. We can put humans on the moon, but so far science has not yet been able to accurately determine a person’s age through scientific testing. I found this almost appalling, and part of my interest in the field has to do with my sense that gerontology in general, and extreme longevity in particular, remain woefully understudied, but possess great potential for future research expansion. After all, what can be a greater accomplishment for humanity than extending the human life span, which would allow less investment in the re-education of replacement generations. However, we must first establish how long humans really live before we can begin to test for whether life can be extended. If anything, I must see myself as lucky for having come along at the “right” moment, just as “America” was ripe for “discovery” by Columbus in 1492; though not lost to the American Indians and having been visited by the Vikings, discovering America was, for Columbus, part of a Western “Age of Discovery” of expanding knowledge through exploration, and that he got there “first” among the other competing explorers might just have to do with his pluck (he was turned down by the King of

Portugal and Spain several times before the answer for financing was “yes”). In the historians’ debate of whether “man makes history or history makes man,” the answer may be both: while we are a product of our civilization, it is incumbent upon individuals to advance a new idea or reclaim an old one, even if not the prevailing thought at the time. Although Alfred Wegener’s ideas of continental drift had been dismissed by the scholars of the day (around 1915), who could not fathom a way for the continents to move, it would turn out that he was on the whole correct. By the 1960s, science shifted in favor of Wegener’s ideas and away from the old order (a static-state model of continents staying in one place), though diehards like Sir Harold Jeffreys (1891-1989) remained unconvinced. The problem was that Wegener was “right for the wrong reason”: continents do not “drift” over the ocean floor, but with the ocean floor as one; he was right about the “what” but not the “how.” I, too, am suggesting some ideas that may be controversial to some (such as the idea that there may be minor differences in maximum longevity and these differences can be partially accounted for by “race”). I hope that, as with Columbus and Wegener, even if my conclusions are not entirely correct, they will, on the whole, prove near the mark and that others eventually will come around to my positions. I do note a recent pendulum swing toward the idea of genetic differences based on group ancestry and isolation; replacing the word “race” with “haplogroup” or an other genetic-based term might be a closer model for my real theories on longevity and race. However, we must acknowledge that the data exists in the social construct of the day and that the word used officially in the Social Security data for group differences is “race.” Thus we might say that “race” is a social construct, but longevity differences based on “race” may have, at least partly, a biological origin.

Even the issue of determining the age of a single individual remains controversial.

Though one day, a scientific methodology for accurately assessing whether someone who claims

to be 115 really is that age or not can be expected, it still remains a tremendous area of growth even in the realm of paper or electronic data recordkeeping. The analyses presented in this thesis are a first-ever look at supercentenarians and race, mostly because the particular study from which the data came started only in the year 2000, with preliminary data released in 2002, and no prior data are available. Indeed, the idea of studying supercentenarians as a population, and not just as individuals, emerged only in the last twenty years. The teamwork and dedication of a small group of international scientists and volunteers who have helped to make this idea a reality has been amazing. To all those who have helped me along the way, I dedicate this thesis to you, and I hope that others will follow in my footsteps. For the true value of research is best measured by whether other researchers find it relevant; a trail that is blazed but is lost due to disuse does not have the value of that which is kept active. Thus Christopher Columbus's discovery was made more important than Leif Eriksson's discovery of the same continent. Yet just as the story of Leif Eriksson and the Vikings was recovered to history, so likewise I hope this thesis also will aid the recovery of the almost-forgotten works of those who had blazed the trail of research into extreme longevity. And I offer apologies: for those scarce works that I was not able to recover, I leave to the next researcher.

THE END

REFERENCES

- Ajibo, F. (2006, October 25, 2006). Nigeria's Oldest Man: He's 140 and Still Going Strong. *Daily Sun*. Abuja, Nigeria.
- Asahi News Service, Japanese Expert Debunks Idea of "Village of 100-Year-Olds." (1987, April 6, 1987). Retrieved June 2, 2008 using Lexis-Nexis Academic.
- Benson, A.L. (1909, May 16, 1909). Learning the Length of Life...Many New Facts Brought to Light: Curious Investigations Recently Made by Various Experts Indicate Future Progress in Pursuit of Longevity. *New York Times*.
- Best, J. (2002). Review [untitled] (Vol. 31, pp. 529-530): American Sociological Association.
- Bourbeau, R. & Lebel, A. (2000). Mortality Statistics for the Oldest-Old: An Evaluation of Canadian Data. *Demographic Research*, 2, 2, 1-36.
- Bowerman, W.G. (1939). Centenarians. *Transactions of the Actuarial Society of America*, 40, 102, 360-378.
- Christensen, K., McGue, M., Yashin, A., Iachine, I., Holm, N.V., & Vaupel, J.W. (2000). Genetic and Environmental Influences on Functional Abilities in Danish Twins Aged 75 Years and Older. *Journals of Gerontology A: Biological Sciences and Medical Sciences*, 55(8), M446-452.
- Corti, M.C.; Guralnik, J.M.; Ferucci, L.; Izmirlian, G.; Leveille, S.G.; Pahor, M.; Cohen, H.; Pieper, C.; & Havlik, R.J. (1999). Evidence for a black-white crossover in all-cause and coronary heart disease mortality in an older population: the North Carolina EPESE. *American Journal of Public Health*, 89, 308-314.
- Darwin, C. (1871). *The Descent of Man, and Selection in Relation to Sex*. London: John Murray.
- Davis, M. (2001). *Late Victorian Holocausts: El Nino Famines and the Making of the Third World*. London and New York: Verso.
- Douglas, K. (2006, March 11, 2006). Are We Still Evolving? *New Scientist*, 30.
- Dupre, M.E., Franzese, Alexis T. & Parrado, E.A.. (2006). Religious Attendance and Mortality: Implications for the Black-White Mortality Crossover*. *Demography*, 43(1), 141-164. Retrieved April 29, 2008, from ABI/INFORM Global database. (Document ID: 1011231691).
- Foner, N. (1985). *Old and Frail and Everywhere Unequal*. Garrison NY: The Hastings Center.
- Galang, M. Evelina & Tabios, Eileen. *Screaming Monkeys: Critiques of Asian-American Images*. Minneapolis: Coffee House Press, 2003.

- Gavrilova N.S., & Gavrilov, L.A. Search for Predictors of Exceptional Human Longevity: Using Computerized Genealogies and Internet Resources for Human Longevity Studies. *North American Actuarial Journal*, 2007, 11(1): 49-67.
- George, L.K. (2005). Socioeconomic status and health across the life course: progress and prospects. *The Journals of Gerontology, series B, Psychological Sciences- Social Sciences*, 60, S135-S139.
- Gossett, T. F. (1963). *Race: The History of an Idea in America*. Dallas, Texas: Southern Methodist University.
- VB Hjelmborg, J., Iachine, I., Skytthe, A., Vaupel, J.W., McGue, M., Koskenvuo, M., et al. (2006). Genetic Influence on Human Lifespan and Longevity. *Human Genetics*, 119(3), 312-321.
- Jeune, B., & Vaupel, J.W. (eds). (1995). *Exceptional Longevity: From Prehistory to the Present*. Odense, Denmark: Odense University Press.
- Jeune, B., & Vaupel, J.W. (eds). (1999). *Validation of Exceptional Longevity*. Odense, Denmark: Odense University Press.
- Lee, W. (1987). *Life-Study of Genesis* (Vol. II). Anaheim, California: Living Stream Ministry
- Kain, L. (1898). 1898: Man's Span of Life. *North American Review*, 166, 466-474.
- Kannisto, V. *Development of Oldest-Old Mortality, 1950-1990: Evidence from 28 Developed Countries*. Odense University Press, Odense, 1994; ISBN: 87 7838 015 4. Note that the Kannisto-Thatcher Database is available online at <http://www.demografie.de/databases/ktdb/introduction.htm> (accessed Apr. 11, 2008).
- Kestenbaum, B. (1992). A Description of the Extreme Aged Population Base on Improved Medicare Enrollment Data. *Demography*, 29, 565-580.
- King, S., Burgess, E., Akinyela, M., Counts-Spriggs, M., & Parker, N. (2005, July). Your Body Is God's Temple.. *Research on Aging*, 27(4), 420-446.
- Krach, C.A., & Velkoff, V.A. (1999). *Centenarians in the United States*. Washington, D.C.: U.S. Bureau of the Census. An online link can be found at <http://www.census.gov/prod/99pubs/p23-199.pdf> (accessed June 16, 2008).
- Liang, J.; Bennett, J.; Krause, N.; Kobayashi, E.; Kim, H.; Brown, J. W.; Akiyama, H.; Sugisawa, H.; and Jain, A. (2002). Old age mortality in Japan: does the socioeconomic gradient interact with gender and age? *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences*. 57B, 5, S294-S307.

- Liu, X., Witten, M. (1995). A biologically based explanation for mortality crossover in human populations. *The Gerontologist*, 35(5), 609. Retrieved April 11, 2008, from Research Library database. (Document ID: 7718020).
- Lynch, S.M.; Brown, J.S.; & Harmsen, K.G. (2003). Black-white differences in mortality compression and deceleration and the mortality crossover reconsidered. *Research on Aging*, 25, 456-483.
- Metchnikoff, E. & Mitchell, P.C. (1903). *The nature of man: studies in optimistic philosophy*. G.P. Putnam's sons.
- Muller, H-G.; Wang, J-L.; Capra, W.B.; Liedo, P.; & Carey, J. (1997). Early mortality surge in protein-deprived females causes reversal of sex differential of life expectancy in Mediterranean fruit flies. *Proceedings of the National Academy of Sciences*, 94, 2762-2765.
- Myers, R.J. (1966). Validity of Centenarian Data in the 1960 Census. *Demography*, 3(2), 470-476.
- Olshanksy, S. J. (1995). Introduction: New Developments in Mortality. *Gerontologist*, 35(5), 583.
- Parnell, A.M.; & Owens, C.R. (1999). Evaluation of U.S. mortality patterns at older ages using the Medicare enrollment database. *Demographic Research*, 1, 2, 1-31.
- Perls, T.T.; Wilmoth, J.; Levenson, R.; Drinkwater, M.; Cohen, M.; Bogan, H.; et al. (2002). Life-long sustained mortality advantage of siblings of centenarians. *Population Biology*, 99, pp. 8442-8447.
- Preston, S.H.; Elo, I.T.; Rosenwaike, I.; & Hill, M. (1996). African-American mortality at older ages: results of a matching study. *Demography*, 33, 193-209.
- Preston, S. H.; & Elo, I. T. (2006). Black Mortality at Very Old Ages in Official U.S. Life Tables: A Skeptical Appraisal. *Population and Development Review*, 32, 3, 557-565.
- Reiter, R. J.; Tan, D. X.; Mayo, J.C.; Sainz, R.M.; and Lopez-Burillo, S. (2002). Melatonin, Longevity, and Health in the Aged: An Assessment. *Free Radical Research*, 36, 12, 1323-1329.
- Rosenwaike, I.; & Stone, L. F. (2003). Verification of the Ages of Supercentenarians in the United States: Results of a Matching Study. *Demography*, 40, 4, 727-739.
- Sorensen, E. (2001, February 11, 2001). Race Gene Does Not Exist, Say Scientists. *Seattle Times*.
- Sparks, C.S., & Jantz, R. L. (2002). A Reassessment of Human Cranial Plasticity: Boas Revisited. 99(23), 14636-14639.

- Stone, L. F. (2003) Studies in the demography of supercentenarians in the United States. Ph.D. dissertation, University of Pennsylvania, United States -- Pennsylvania. Retrieved April 16, 2008, from ProQuest Digital Dissertations database. (Publication No. AAT 3109224).
- Thompson, L. (1986, July 9, 1986). 132 Years Old? Not Likely, the Experts Say. *Washington Post*.
- Thoms, W. J. (1873). *Human Longevity: Its Facts and Its Fictions* (first ed.). London: John Murray.
- Thornton, R. (2004). The Navajo-U.S. population mortality crossover since the mid-20th century. *Population Research and Policy Review*, 23, 291-308.
- Wade, N. (2002, October 8, 2002). A New Look at Old Data May Discredit a Theory on Race. *New York Times*.
- Wade, N. (2007, June 26, 2007). Humans Have Spread Globally, and Evolved Locally. *New York Times*.
- Wade, N. (2007, December 11, 2007). Selection Spurred Recent Evolution, Researchers Say. *New York Times*.
- Wilmoth, J., & Robine, J.-M. (2003). The World Trend in Maximum Life Span. *Population and Development Review*, 29(s1), 239-257.
- Yi, Z. and Vaupel, J. W. (2003). Oldest-Old Mortality in China. *Demographic Research*, 8, 7, 215-244.
- Young, T.E. (1899). *On Centenarians and the Duration of the Human Race: A Fresh and Authentic Enquiry*. London: Charles and Edwin Layton.

APPENDICES

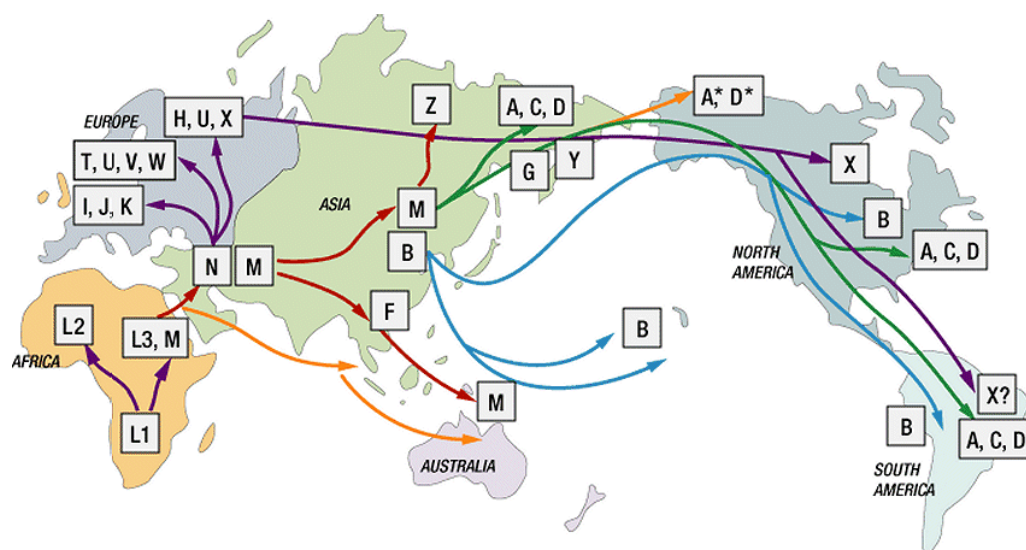
Appendix A: Genetics and Human Migration

This information is provided to give background information on the genetic differentiation and migration of humans, which is pertinent to the discussion of the biological origins of the concept of “race”

The following maps and charts are taken from

http://worldfamilies.net/migration_map_wfn.gif

unless otherwise cited and are presented here for background informational purposes only; I do not represent this as my own work.



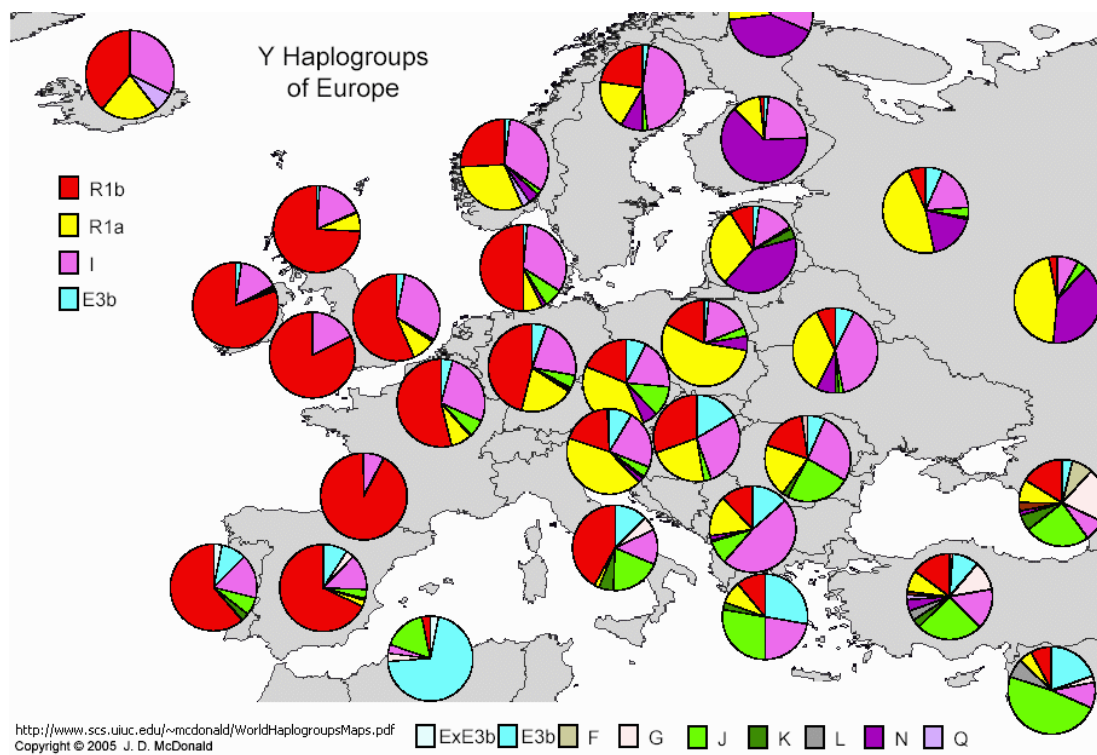
EXPANSION TIMES (years ago)	
Africa	120,000 - 150,000
Out of Africa	55,000 - 75,000
Asia	40,000 - 70,000
Australia/PNG	40,000 - 60,000
Europe	35,000 - 50,000
Americas	15,000 - 35,000
Na-Dene/Esk/Aleuts	8,000 - 10,000

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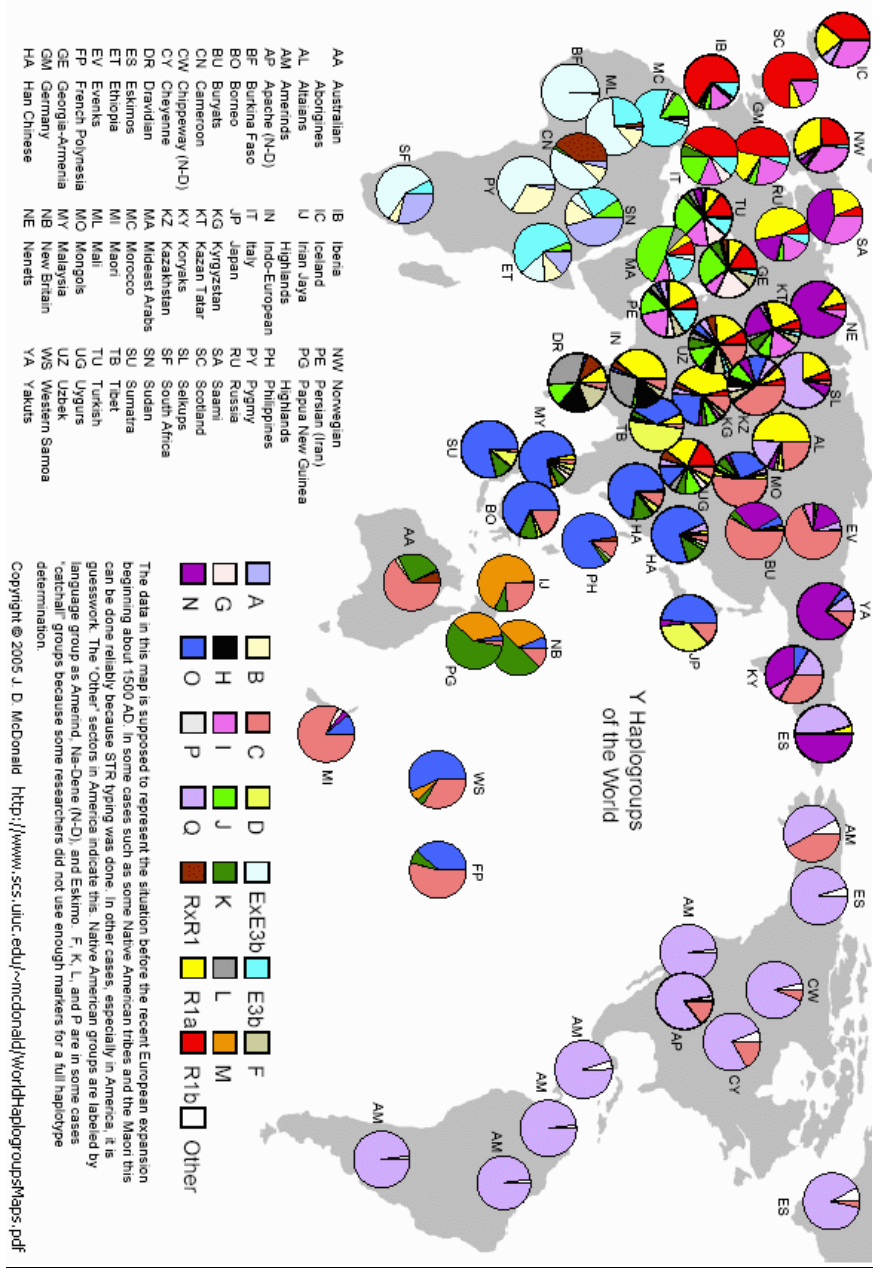


We all come from the same family tree...that is, if we go back just 160,000 years we all share at least one mother in common (out of millions).

<http://www.geocities.com/littlednaproject/Y-MAP.GIF>



<http://nitro.biosci.arizona.edu/courses/EEB195-2007/Lecture08/pics/W-MAP.GIF>



- AA Australian
- AB Aborigines
- AL Albatians
- AM Amerinds
- AP Apache (N-D)
- BF Burkina Faso
- BO Borneo
- BU Burundi
- CN Cameroon
- CW Chiapwey (N-D)
- CY Cheyenne
- DR Dravidian
- ES Eskimos
- ET Ethiopis
- EV Events
- FP French Polynesia
- GE Georgia-Armenia
- GM Germany
- HA Han Chinese
- IB Iberia
- IC Iceland
- IJ Iran Jaya
- IN Indo-European Highlands
- IT Italy
- JP Japan
- KG Kyrgyzstan
- KT Kazan Tatar
- KY Korays
- KZ Kazakhstan
- MA Maasai/Arabs
- MC Morocco
- MI Maori
- ML Mali
- MO Mongols
- MY Malaysia
- NB New Britain
- NE Nenets
- NW Norwegian
- PE Persian (Iran)
- PG Papua New Guinea
- PH Philippines
- PY Pygmy
- RU Russia
- SA Saami
- SC Scotland
- SI Selkups
- SF South Africa
- SU Sudan
- TB Tibet
- TU Turkish
- UG Uygurs
- UZ Uzbek
- WS Western Samoa
- YA Yakuts

- A
- B
- C
- D
- EXE3b
- E3b
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P
- Q
- RXR1
- R1a
- R1b
- Other

From the New York Times (June 26, 2007 and Dec 11, 2007):

Genetic Differentiation in Modern Humans

Researchers studying human population structure have discovered five main genetic clusters, which largely correspond to major geographic regions. The map shows the average genetic makeup of 52 modern human populations.

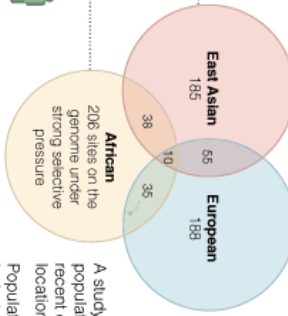
- MODERN GENETIC CLUSTERS**
- Africa
 - Eurasia
 - East Asia
 - Oceania
 - America

For example, the average genome of the Uygur people is:

- 52% East Asian
- 46% Eurasian
- 2% Other races

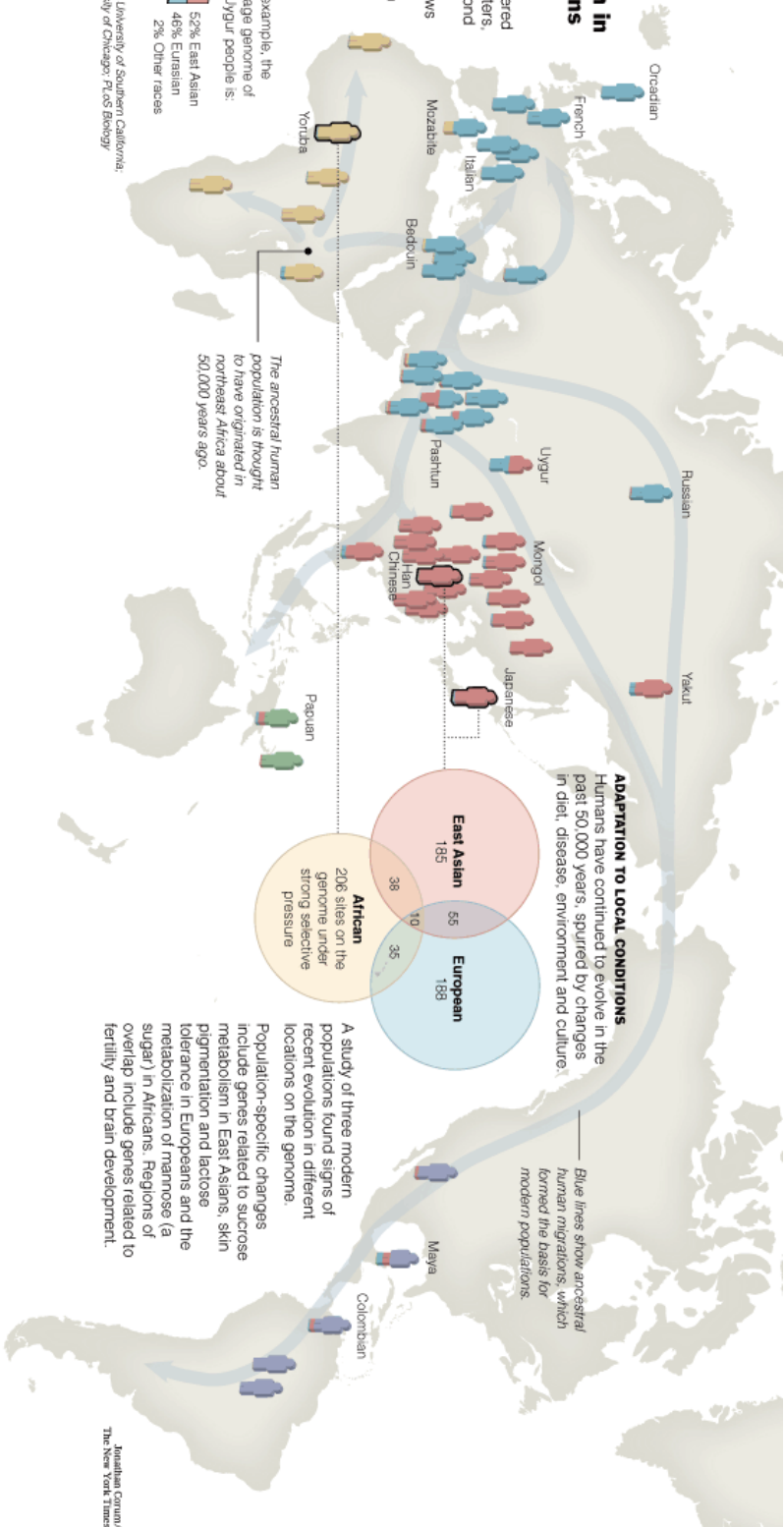
The ancestral human population is thought to have originated in northeast Africa about 50,000 years ago.

ADAPTATION TO LOCAL CONDITIONS
 Humans have continued to evolve in the past 50,000 years, spurred by changes in diet, disease, environment and culture.



A study of three modern populations found signs of recent evolution in different locations on the genome. Population-specific changes include genes related to sucrose metabolism in East Asians, skin pigmentation and lactose tolerance in Europeans and the metabolism of mannose (a sugar) in Africans. Regions of overlap include genes related to fertility and brain development.

Blue lines show ancestral human migrations, which formed the basis for modern populations.



Sources: Noah A. Rosenberg, University of Southern California; Jonathan K. Pritchard, University of Chicago; PLoS Biology

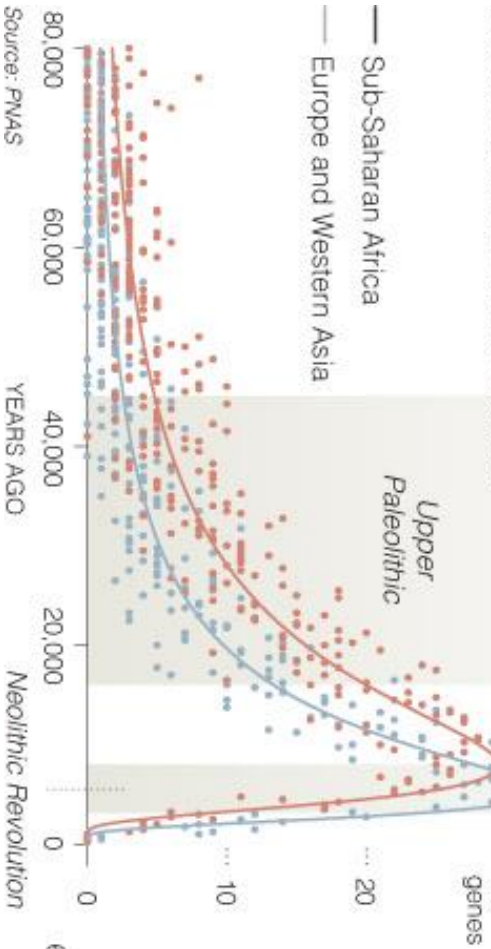
Jessie Chan/ The New York Times

A Speedier Timeline

Researchers analyzing the human genome concluded that the rate of human evolution began to accelerate about 40,000 years ago, and continued to rise until at least 10,000 years ago.

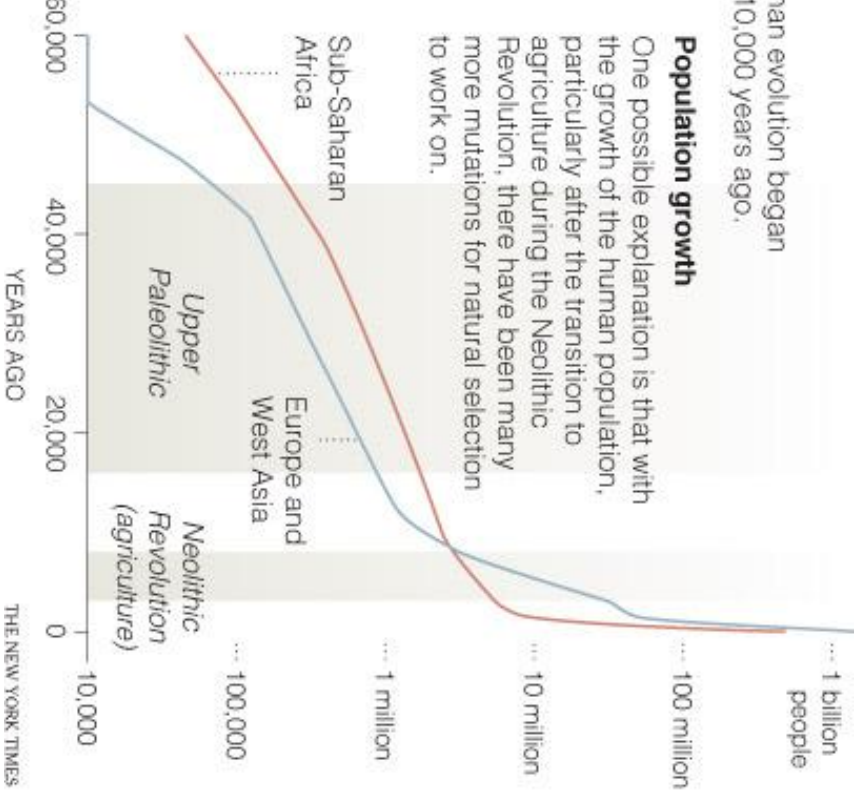
Strongly selected genes

Below, each dot represents the number of genes under strong selective pressure over 10 human generations (250 years). The rate of selection might continue to the present day, but current data are not adequate to pick up recent selection.



Population growth

One possible explanation is that with the growth of the human population, particularly after the transition to agriculture during the Neolithic Revolution, there have been many more mutations for natural selection to work on.



Source: PNAS

THE NEW YORK TIMES

Appendix B: Mathematical Survivor Curves at the Highest Ages

This information is provided to give background information on the statistical mapping of human mortality rates, with a particular view towards the survivor curve

Mortality Deceleration.

Background information:

http://longevity-science.org/Mortality_Deceleration.html

Gompertz Curve. The Gompertz curve model predicts that “growth” is slowest at the “start and end of a time period”.¹⁶⁴

<http://mathworld.wolfram.com/GompertzCurve.html>

Applied Mathematics > Business > Actuarial Mathematics >
Applied Mathematics > Population Dynamics >

Gompertz Curve

The function defined by

$$y = a b^{c^x}.$$

It is used in actuarial science for specifying a simplified mortality law (Kenney and Keeping 1962, p. 241). Using $s(x)$ as the probability that a newborn will achieve age x , the Gompertz law is

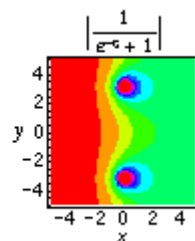
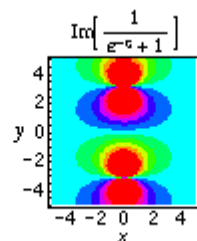
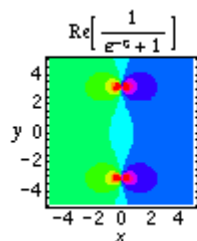
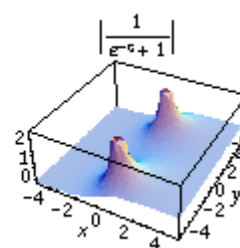
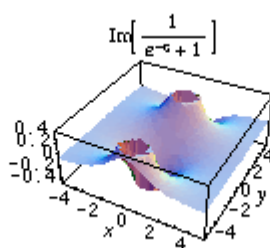
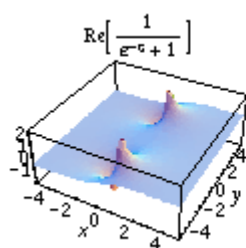
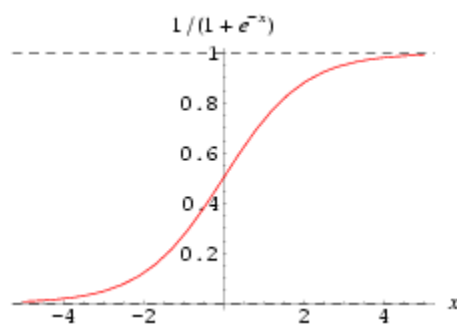
$$s(x) = \exp[-m(c^x - 1)],$$

for $c > 1$, $x \geq 0$ (Gompertz 1832).

¹⁶⁴ http://en.wikipedia.org/wiki/Gompertz_curve

Sigmoid Function

Sigmoid Function



Suggested Further Reading

Fluer-Lobban, C. (2005). *Race and Racism: An Introduction*. Walnut Creek, California: Rowman Altamira

“Ending the Mortality Table”

http://library.soa.org/library-pdf/m-li05-1_ix.pdf

Irma T. Elo, Cassio M. Turra, Bert Kestenbaum, and B. Renee ...

Bert Kestenbaum, Social Security Administration. B. Reneé Ferguson, Social ...
Kestenbaum B. and B.R. Ferguson. 2002. "Mortality of the Extreme Aged in the ...
muse.jhu.edu/journals/demography/v041/41.1elo.html - [Similar pages](#)

Mortality of Centenarians: A Study Based on the Social Security ...

File Format: PDF/Adobe Acrobat - [View as HTML](#)

cohorts born after 1890, mortality over age 110 years is affected by data ... (Kestenbaum, Ferguson, 2002). In our study more recent 1891 birth cohort ...

paa2005.princeton.edu/download.aspx?submissionId=51387 - [Similar pages](#)

[PDF]

NUMBER OF CENTENARIANS IN THE UNITED STATES 01/01/1990, 01/01/2000 ...

File Format: PDF/Adobe Acrobat - [View as HTML](#)

of the very old (Kestenbaum and Ferguson, 2002). ... 110+. 105. 0.3. Total, all ages ...

Kestenbaum, Bertram and B. Reneé Ferguson. 2002. ...

paa2005.princeton.edu/download.aspx?submissionId=50718 - [Similar pages](#)

<http://www.nytimes.com/2007/12/11/science/11gene.html?ref=science>