

# We Live Too Short and Die Too Long

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*How to Achieve and Enjoy Your  
Natural 100-Year-Plus Life Span*

Revised Edition

WALTER M. BORTZ II, M.D.

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We Live Too Short and Die Too Long: How to Achieve and Enjoy Your Natural 100-Year-Plus Life Span, Revised Edition

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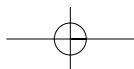
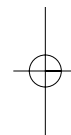
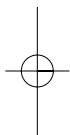
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# *Contents*

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Foreword vii

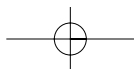
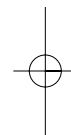
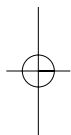
- 1 *One Million Hours* 1
  - 2 *Why Things Grow Old* 19
  - 3 *The Failure of Medicine* 41
  - 4 *Prevention's Problems* 63
  - 5 *Aging is a Self-Fulfilling Prophecy* 85
  - 6 *Use it or Lose it* 107
  - 7 *Snow on the Roof, Fire in the Furnace* 135
  - 8 *New Tricks and Old Dogs* 153
  - 9 *What Man Lives By: Exercise, Diet and Sleep* 181
  - 10 *Self-Efficacy* 215
  - 11 *The Last Passage* 237
  - 12 *The Greening of Graying* 255
- Index 275



# *Acknowledgments*

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The sources for this book are many. Family, patients, colleagues, friends, and teachers have all provided rich background for the syntheses that I have sought. Unique assistance has been infused by Linda Perigo Moore, whose abilities gave light to my density, and by Toni Burbank, who was an early shepherd.



## Foreword

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This is a book about aging. It will challenge everything you ever thought about the subject.

First, *We Live Too Short and Die Too Long* will challenge the boundaries you probably place on the human life span. Exactly how *long* do you expect to live? The life insurance industry bets that for most Americans it will be about 78 years. But you're an optimist, right? So you'll plan on beating the odds and reaching your nineties. I contend, as do other scientists who have studied the dynamics of human life, that both of these estimates are far too short. Several lines of evidence clearly place the human life span at a remarkable 120 years.

I will detail my case in the chapters that follow; but for now, the most convincing facts may be those which are the most simple. In Asan, Japan Shigechiyo died on February 21, 1986, in his 121st year. Madame Jeanne Calment of Arles, France died on August 7, 1997, well into her 123rd year. Such longevity provides an inescapable inference—what is possible for one is possible for others.

That's quite a leap from the time of the first Caesar, when human life expectancy was 25 years, or from the beginning of the twentieth century, when the average American lived to the age of 49. Traditionally, this increase in life span has been explained by factors such as decreased infant death mortality, eradication of communicable disease, and improvements in both nutrition and public hygiene. These most certainly are significant developments, but they only skirt the periphery of a more fundamental act. We live longer because we are *designed* to live longer. And when we control anomalies such as disease, trauma, behavioral maladaptation, and self-destruction, the natural order of our life prevails.

Expanding our definition of longevity means expansion of terms such as *middle age* and *old age*. For example, if you are now 40 and a member of that bold, exceptional generation known as the baby boomers, you've been told by much of the media that you are reaching

midlife. I challenge this contention. With prudence of prevention and health maintenance, you should think of yourself as a much younger life stage—capable of living far longer, and in a far more healthy status, than did your forbears. In essence, the opportunity to experience these additional years can be thought of as a “gift of found lifetime.”

Still, some may fear this gift because of misconceptions regarding the physical nature of the aging human body. This is the second and perhaps most important way in which my book will challenge you.

Imagine now that you have reached the magic centenarian mark. How do you envision the quality of your life? Are you climbing a tree or a mountain; or living numb in a nursing home praying for death? I believe the fear of being old and infirm is what keeps us from being old and healthy. My hypothesis comes as a physician who for decades has watched with astonishment as his patients actively avoided all manner of preventative health care. As our knowledge of aging rapidly advances, such a tragedy is unnecessary, wrong, and inappropriate. I am not speaking now of medical technology, for I do not believe the miracle is with us today. This is because much of what passes as age change is really not due to age at all—but to disuse. Put a broken leg in a cast and in a few short weeks it will wither and appear as a leg many decades older. Similarly, all of our bodily functions—digestive, cardiovascular, respiratory, sexual, and mental—are highly keyed to use. “Use it or lose it” is far more profound than its colloquial tone suggests. Thus, the length of life is determined much by its content. Will you—will we—be a liability or a resource? The issue becomes not just how long or how well, but how long *and* how well. Quality of life and length of life cohere.

Others have described life span as a bell-shaped curve, growing to fullness and richness, only to decline into age and dependency. I deplore the decremental model, preferring instead to think of life as a “square-edged existence”—passionate and forceful to the end. We may achieve the square-edged existence only when we appreciate this remarkable final stage just as we have learned the joys of every other stage of life. A child takes his first steps, and we are exalted. The stages of later life can and must obtain the same status in the human experience.

A dominant source for my thesis on aging comes from my father, a physician before me, whose vision and wisdom perpetually reveal themselves to me—particularly as I sense that I have just derived a new and precious insight, only to discover that Father *had preempted*

*my discovery by decades. In his book, Creative Aging*, he defined man as a Converter of Energy, an Intellectual Catalyst, an Emotional Dynamo, and a Spiritual Wanderer.

Such description, to me, was inspired and encompassing.

Aging is neither disease nor villain—that which must be cured or vanquished. Aging is a part of our natural growth process.

My father, when asked, “Dr. Bortz, how do you prevent aging?” replied, “I’m not interested in arrested development.”

Such an intrinsic and developmental process is in communion with the anthropological history of our species and the physical laws of our universe. When we can view aging from this perspective, it is no longer something to fear or avoid. Our responsibility, upon receiving the gift of found lifetime, is then to acquire the most and the best that aging can offer.

“But what of the body?” you may persist. “Even if the spirit is bold, the body will falter.”

Mark Twain, in *Letters from The Earth*, wrote, “Man seems to be a rickety poor sort of thing. He is always undergoing repairs. A machine that was as unreliable as he would have no market.”

I intend to explore these flaws in the human condition—our foreshortened life span and our protracted demise. My examination will search out evidence drawn from hosts of sources. I will present to you only the best of the research—both those discoveries which have served as historic benchmarks and those which are just now on the outer frontiers of our medical understanding.

Using anthropologic and thermophysical concepts, as well as examples from my clinical experiences, I intend to trace the logic of our natural life span. For example, one perspective comes from my research in Africa into physical exercise as an evolutionary force. Over four million years ago the biologic transition from the shelter of the jungle canopy to the open savanna was the most important journey of our existence. I propose that the plain was a new ecologic niche for which we had much preadaptation. What set us apart from competing species and allowed us to endure with otherwise modest physical endowments was the unique ability to run long distances in the heat. “Persistence hunting,” as it has come to be called, was—and is—our innate ability to run down food (in early times, the plains antelope) simply by keeping it moving in the midday sun. Such long, hard running is an activity most of civilization has forgotten. Our biologic selves have not.

x *We Live Too Short and Die Too Long*

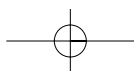
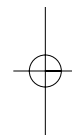
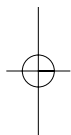
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As I have said, this is a book about aging. More important, it is a book about living. The story of one is the story of both. It will prove to you that you are capable of living to the ripe old age of 120. It will explain why many of us will not. And it will show the rest of us how to do it.

Others have experienced their Golden Age or their Industrial Age. We have entered the “Age Age.”

We cannot paint our Mona Lisa and leave  
the last third of the canvas blank.  
We cannot build our house and leave off the roof.  
We cannot run our race and stop before the final lap.  
We cannot have dinner without dessert.  
We cannot sing our Battle Hymn without the  
“Glory, Glory, Hallelujah.”  
We should sing all our song.

W. M. B.



## 1

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*One Million Hours*

To know how to grow old is the masterwork  
of wisdom, and one of the most difficult  
chapters in the great art of living.

HENRI AMIEL

Old age is entirely new. There has never been anything like it before—at least to any substantial degree. It is the ultimate epidemic. There have been occasional old people before, but not like this. In 1900, there were 123,000 persons in America over 85 years of age. Now there are 3 million. By 2050, some estimates predict there will be as many as 50 million. That's 16 percent of the population, compared to 1 percent now. Talk about a "megatrend"! In that same year, all of my four children will be over the age of 85. I will be 120.

If I had been born in 1830 instead of 1930 I would have been dead for 30 years, but instead I am still running marathons.

How can this be? Let me begin by considering a machine—the perfect machine. Its cogs and pulleys are meshed to ultimate efficiency. Its struts and joints are sturdy. Its utility is manifest; its fuel is plentiful; its maintenance is negligible; its cost of production is minimal; its raw materials are abundant. It is friendly, versatile, and adaptable, and its operation is perpetual—or, failing that, its final disruption is abrupt.

Measured against such a design, the human body rates poorly. True, production costs are low, delightfully so; and maintenance and fuel costs are manageable. In its early years it is capable of wondrous efficiency. But a manufacturer would balk at the expense of a body's

## 2 *We Live Too Short and Die Too Long*

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repair. It rusts out before its projected useful life is spent, and its final breakdown costs too much and takes far too long. The report of an industrial consultant would conclude that the human machine doesn't last as long as it is designed to last, and that its terminal operation is characterized by expensive decay and intolerable inefficiencies. The consultant would wonder whether these defects are secondary to blueprint errors (nature) or to environmental mishaps (nurture).

### **The Age Age**

More than one historic epoch has been labeled a "watershed moment." Each was a cohesion of population dynamics and environmental challenge which provided a change in the course of human history. Each altered the mechanisms and direction of evolution. They are the monuments of punctuated equilibrium. Historians seem to take delight in identifying certain parts of our species' calendar by "age labels." We have had the Stone Age, the Bronze Age, several Ice Ages, the Agricultural Revolution (which Dr. Richard Leakey claims represents the single most significant event in human history), and the Industrial Revolution. With some pride and justification, the historians have already labeled our current epoch the Space Age. However, with equal propriety, appropriateness, and sense of history our time can be called the Age Age. This definition of our contemporary era derives its force from two elements: first the sheer number of old people alive today, and second, and more important, the fact that we have for the first time a soundly based idea of how long we are meant to live, and the forces which disrupt this logical extent.

In the past, death appeared randomly, as an unexpected event, like a dish breaking in the dishwasher. Until now, growing old was an accident, a survival based upon chance rather than design. Everything was foreshortened. As a child I regarded my 70 year old grandparents as extremely old—now, 70 years later, the seventies are increasingly acknowledged as part of middle age. For the aboriginal being—as well as for the animal—old age was the unlikely result of having survived myriad hostile encounters with unknown hazards and unexpected events. Daily existence was precarious. No one knew how many tomorrows there were to be or how to define a coherent life pattern. Such ignorance bred fear; and this accounts for much of what we see today as a starkly negative imagery concerning aging.

It is time for us to change. Present knowledge has expanded sufficiently for us to glimpse our entirety—to estimate the ultimate potential of the human life span.

## What is the Human Life Span?

An animal may grow old in the wild, but not often. Accidents and predators keep the old members few. Evolutionary theory would predict that the onset of age and protracted weakness would not serve the survival of the species. History's great killers—famine, pestilence, lust, and war, the four horsemen of the Apocalypse—are largely controlled. New killers—arteriosclerosis, cancer, and automobile accidents—emerge. But if all external influences were eradicated, how long would it take for our machine to self-destruct? In the past, most people died young. Now most people have the chance to grow old. In 1960, there were 3,000 centenarians counted in the United States. Now there are 71,000. There will be 114,000 in 2010, 241,000 in 2020, 1 million Americans over the age of 100 in the year 2050, and 1.8 million in 2080. Kenneth Manton, a scholar and demographer of aging at Duke University, calculated that 1 percent of male boys born in 1975 can expect to reach the age of 105, and 1 percent of female babies born that same year will live to 110.

My own clinical experience reflects this trend. I have cared for several dozen patients over 100. I have had the opportunity to care for one person who was 108 when he died. I have cared for thousands of persons in their nineties. Before her death at nearly 95, my mother still went to baseball games and traveled independently.

## How Old is Old?

For how long is our machine designed to run? *The Guinness Book of World Records* observes, "... no single subject is more obscured by vanity, deceit, falsehood, and deliberate fraud than the extremes of human longevity. Extreme claims are generally made in behalf of the very aged rather than by them."

A few years ago our attention was drawn to three population groups, one in Hunza (a region in northern Pakistan), one in southern Russia, and one in Ecuador.

An article in *National Geographic* by Dr. Alex Leaf, of the Massachusetts General Hospital, told of these peoples—many of

#### 4 *We Live Too Short and Die Too Long*

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whom were said to be living healthy, active existences until age 130 and beyond. Shirlibaba Muslimov of the Russian republic of Azerbaijan was said to have died at the age of 168. Commissar Stalin, a Georgian, supported the claims. The state bureaucracy hastened to advertise this endorsement for the virtues of communist living. The story had a lovely, bucolic Shangri-La flavor to it. Unfortunately, it wasn't true. Careful examination of these groups has revealed that the longevity of these persons was due to exaggeration rather than to some particular invulnerability or salutary lifestyle. Zhores Medvedev, an expatriate Russian gerontologist, did much to debunk the legend by revealing the inaccuracy of the records and the incompatibility of the observed events with the reported ages. It was noteworthy that all of the "old" Russians were men who had likely taken their fathers' names in order to avoid conscription.

In 1979, Richard Mazess and Sylvia Forman, of the University of Wisconsin, studied reports of extreme aging among the native population in Ecuador. The scientists worked meticulously to construct genealogical lineages and precise dates, but ultimately found no one over the age of 86.

The explanation: the Ecuadorians achieved heightened status by claiming to be very old.

One of the most celebrated oldsters of all time was Old Tom Parr of Shropshire, England. His headstone in Westminster Abbey gives his dates as 1482–1635 and notes that he lived in the reigns of ten kings. However, the attribution of Parr's age actually came from a confounding with another Tom Parr, two generations younger.

Social Security records in our own country indicate that Charlie Smith was born in Africa in 1842 and was still alive in 1980. More recent documents, however, revealed that this too was an overstatement. Mr. Smith was only 101, not 138.

The mythical Shangri-La remains undiscovered. The "supergerons" weren't.

Documentation of true age is a relatively new practice, even in civilized countries. For example, there were no written records in Russia before 1932. Most age records must be deduced from corollary events and likelihoods thereby constructed. On a recent trip to Borneo I sought out evidences of those of long life. A few centenarians were claimed, usually dating their age and activities from the time of the Japanese invasion in 1941. I was fascinated to learn, however, of a Dayak who recalls the eruption of Mt. Krakatoa, in 1883!

## How Long Are We Actually Living?

Today, most of us live to approximately 78 years of age—slightly longer than the biblically predicted three score and ten. Meanwhile, scholars continue to search for proof of our upper limits. My Stanford Medical School colleagues James Fries and Lawrence Crapo published a fine, thoughtful book called *Vitality and Aging*, in which they muster evidence which indicates to them that our life expectancy is 85 years. This wouldn't give us much extra time to shoot for. More recent actuarial data seem to indicate that many of us are approaching or exceeding this projected end point. Concurrently, Dr. George Sacher has observed that there is a correlation between the life span of a number of animal species and their body and brain weights. Smaller animals with smaller brains have proportionately shorter lives than do larger animals with larger brains. Using this approach, he has calculated that mankind's maximum life span is approximately 90 years. In fact, both estimates are too low.

In an article from *The Aging Society*, Paul Siegel and Cynthia Taeuber (citing data from the Census Bureau) wrote: "If the average annual rates of decrease in age specific death rates recorded in the years since 1968 continue to prevail in the coming 65 years (to 2050), the average life expectation would approximate 100 in that year."

## How Long Are We Meant to Live?

Dr. Robert Butler, first director of the National Institute on Aging and long recognized as a master in the field of gerontology, has said, "We haven't found any biologic reason not to live to 110.

"I'll go a bit further. It is my best estimate that our biogenetic maximum life span is 120 years—approximately 1 million hours. This means that at birth we have the capacity to live that long—presuming that nothing happens to us in the meantime. The lines of evidence that lead to this conclusion are several, and while no single one can constitute definitive proof, taken together they achieve a high level of probability. Such reasoning is termed the Principle of Invariance. If it rains for seven days straight, it is likely that it is the rainy season. One or another rainy day doesn't imply this; but when a whole week is wet, the conclusion is inescapable. Using this principle, I find five lines of evidence to support my thesis. These are: observational data, biostatistical maneuvers, the correlations between longevity and

## 6 *We Live Too Short and Die Too Long*

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skeletal maturation, studies regarding the decline of vital organ function, and research into the longevity of cells in controlled environments.

### ***Observational Data***

The first reason to state that 120 years is our longest life span lies in the fact that some of us are living that long. *The Guinness Book of Records* indicates that Madame Calment set the pace. Her dates were February 21, 1875-August 4, 1997.

Their earlier edition listed Shigechiyo Isumi of Asan, Japan, as the oldest person, having lived from June 29, 1865, until February 21, 1986 (120 years, 237 days). I have corresponded with his physician, Dr. Yoshinobu Moriya, who reported that Mr. Isumi was healthy until the end of December 1985. "He was willing to shake hands with many visitors, especially with young ladies. Many thought that this custom was a moment [sic] for his longevity," the doctor said. Mr. Isumi also moderately drank a local sugar cane wine. His death was listed as being due to pneumonia, and heart and kidney insufficiency.

After these records a 116 year old female from Ecuador and a 114 year old man from Puerto Rico are listed as the world's oldest persons as of April 2006.

### ***Biostatistical Maneuvers***

Thousands of people are crowding upward; and as worldwide birth records improve, others of long life will be identified. It must be emphasized that these long lives are being achieved despite the continued presence of major health hazards such as environmental pollution, an excess of fat intake, and sedentary life styles. The Japanese have the world's longest life expectancy despite a very high incidence of stroke; and this brings us to a second line of reasoning. In a statistical projection, the California State Department of Health constructed a scenario in which it was presumed that one or another of our major killers had been eliminated. The results were quite revealing. For example, when such a hypothetical prevention of arteriosclerosis is applied, the average female achieves an expected life of 100 years. The figure of 120 is consistent with this projection.

Kenneth Manton, of Duke University has constructed other such projections. By analyzing extensive U.S. Census data he calculated that in 1982 the "life endurance" of American white females was 114 years and still rising.

In *The Medusa and the Snail*, Dr. Lewis Thomas wrote, “Mankind will someday be able to think his way around the finite list of major diseases that now close off life prematurely or cause prolonged incapacitation and pain. In short, we will someday be a disease free species.” Having risen to such an exalted and extended state of grace, Thomas goes on to ask, “Then what? How can you finish life honorably and die honestly without a disease?”

If our research scientists can provide us with the master protocol to eliminate disease—the ultimate vaccine—it seems to me that 120 years is the logical end point. This presumes, of course, the lack of self-destruction and of accidents—but most of those are preventable as well.

### ***Longevity and Skeletal Maturation***

George Buffon, a noted French biologist who predated Charles Darwin, observed a close relationship between the time of skeletal maturity and life span across a broad range of animal species. The intense relationship between growth and life will be elaborated upon later; but in general terms; large animals live longer than small ones. Specifically, when Buffon made his study, he recognized that animals tended to live six times the period needed to complete their growth. When one notes that skeletal maturity is reached in humans at approximately 20 years, the maximum projected life span of 120 years is affirmed.

More recently, Richard Cutler, of the Gerontology Research Center of the National Institutes of Health in Baltimore, has calculated the mean lifetime potential (MLP) of a number of animal species. He finds that longevity is related to the rate of development, length of reproductive period, maximum caloric consumption, and brain size. The MLP varies 50fold over the animal range, from 3 years in the house mouse to 20 years for the dog, 70 years for the elephant, and 100 years for the whale. Cutler calculates that with this refinement he can estimate mankind’s MLP at 110 years.

Importantly, the rate of aging in different species is also found to correlate with the MLP. For example, the loss of immune competence (or reactivity) in man and the mouse is inversely proportional to the MLP. Our capacity to reject foreign skin grafts also seems related to how long we can live. The older we become, the less able are our tissues to generate antibodies to offending agents. Physical vigor, resistance to disease, and numerous other functional markers are

## 8 *We Live Too Short and Die Too Long*

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similarly related to MLP and (also according to Cutler) can be used to estimate man's MLP as being 110 years.

How long an animal lives also correlates with the observed decline in vital organ function, which brings us to the fourth line of reasoning.

### ***Decline of Vital Organ Function***

All organs and all vital functions show a gradual reduction in capacity with the passage of time. The noted gerontologist Nathan Shock of Baltimore, Maryland, enlightened our awareness of this fact. These declines in function occur in the absence of disease and can be construed as true "age changes." However, these changes are very slow and generally are in the range of a one-half to one percent decline per year after the age of 30. If one presumes 100 percent function at age 30, one notes that these changes do not theoretically become functionally important until past the age of 100. We know that most individuals operate perfectly adequately at 30 percent of maximum. In fact, it is at the approximate point of 30 percent function that most individuals begin to experience symptoms (such as shortness of breath) which would lead them to seek the aid of a doctor. My point is that for most individuals, much good function still remains at 100 years. A constant reminder of this occurs when an autopsy is performed to determine the cause of death. Presently most deaths are the result of a sharply localized problem: a hemorrhage, a block in a critical artery by a clot or a chunk of cholesterol, or a strategically placed tumor. The rest of the body is still intact and has not had the opportunity to live out its allotted time. In effect, no one has been shown to have died of "old age." It is not a justifiable death certificate diagnosis—no matter at what age the person dies. In summary, as the decline in vital body function is plotted against time, none becomes limiting to life until 110 or 120 years.

### ***The Longevity of Cells in Controlled Environments***

Leonard Hayflick, good friend and brilliant scientist, has given students of aging the single most critical observation in gerontologic research. Until 1974 it was thought that individual cells, when grown artificially in a synthetic culture medium, were capable of indefinite life—the cells would continue dividing ad infinitum. The reference experiments were those of surgeon and Nobel laureate Alexis Carrell, who incubated chick embryo cells in tissue culture medium. He observed that these cells kept dividing interminably, leading to the suggestion that aging, at the cellular level, did not occur. If the

whole is no more than the sum of its parts, the Carrell observation lent hope to the immortalists' claims. The experiment was terminated after 34 years; and unfortunately, the experiments were flawed and unreproducible. The seeming eternal life of the normal cells was due to contamination of the culture media. (Cancer cells, on the other hand, do seem to have a limitless capacity to divide and reproduce. And this paradox deepens both our awe of the mystery and our determination to find its key.)

Hayflick contributed to this disproof. He found that DNA can replace itself only a certain number of times and that this number is species specific. How long a species lives correlates with the number of cell doublings, reflecting again Buffon's intuition some 100 years ago.

As Hayflick took nests of human fibroblast cells (those found in connective tissue such as cartilage), clearly only a specific number of cell divisions occurred before the cells started to show signs of aging and stopped dividing. They died after about fifty divisions. If we graph the maximum life span versus the number of all cell divisions, from the mouse to the Galapagos turtle, man's MLP (maximum lifetime potential) would be 115 to 120 years. Cells taken from 90 year old subjects still have further (ten to fifteen) doublings. Cells taken from older donors showed correspondingly fewer divisions before senescence and death set in. When one takes the number of total cell divisions and multiplies it by the cell life of each cell, one calculates roughly 120 years as the theoretical maximum cell life of cultured human cells.

Hayflick observed, as others have before, that when tissue from older animals was grafted onto younger animals, the cells from the grafts died before the younger animals did. Hayflick personally resists making this predictive calculation, reasoning that what happens in tissue culture need not apply to the whole organism. However, I must champion a different interpretation. When his evidence is placed in context with other, very different avenues of observation, and all are found to be internally consistent—then I would argue, by the Principle of Invariance, that the point is made!

These five separate lines of evidence constitute strong evidence that our endowed birthright, or maximum life potential, is 120 years.

According to Edward Devey, of Yale, the Romans preempted this estimate by 2,000 years. From their ancient writings, Devey concluded, "Ten times twelve solar years was the term fixed for the life

## 10 *We Live Too Short and Die Too Long*

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of man beyond which the gods themselves had no power to prolong it. The Fates narrowed the span to thrice thirty years, and fortune abridged even this period by a variety of chances against which the protection of the gods was implored.”

I have devoted my personal and professional energies to the study of aging. While pursuing this endeavor, the point which astonishes me most is that we—supposedly the most inquisitive and learned species on the planet—seem collectively uninterested in clearly establishing how long we are intended to live.

To have such a goal, to achieve some ready sight point on our horizon, seems critical if—as the Oracle of Delphi and others before and since have beseeched us—we are to know ourselves. We vitally need to understand every human capacity, but most certainly how long it is that we should live. Expectation is a vital dynamic of human existence, and unless we have some blueprint to guide us, we surely will not achieve the potential with which aeons of evolutionary experiences have vested us.

### **What is the Next Step?**

Bernard Strehler, noted gerontologist at the University of Southern California, predicted that unless the aging process differs in some mysterious and unforeseen way from the puzzles man has faced in the past, it is essentially inevitable that he will, before long, understand what causes us to age. Understanding carries with it the vital implication that we can begin to design a lifetime strategy for optimal aging. We can write a meaningful lifetime script. We will become both sculptor and marble. We will be the designer and the design. As the unknown is erased, the fears and myths of aging will fade.

Mark Novak stated, “In the past religion or philosophy provided the context for discussing old age, but today these systems of explanation have lost their explanatory power. In their place we have turned to science for an understanding of aging.”

Thus, our next step may be to rid ourselves of the past.

### **Old Ideas About Aging**

Throughout history, interest and involvement in the phenomenon of aging has been sparse. From Greek and Roman times, philosophers, alchemists, and other stray sorts periodically sallied forth on the mis-

sion to explore the significance of aging. All retired with fatalism and ignorance. Analytic insights have been constricted, mystical, and wishful.

For example, religious dogma has dealt endlessly with the phenomenon of death, but little with age. Aging as a religious theme has been invested generally with the notion that old age is a punishment for sins, original or otherwise. We have been made to fear the unknowns of death disintegration. Depending upon the sin content of our earthly existence, hell, purgatory, or heaven has been offered as our ultimate path. Given this premise, gerontophobia was logical. Catastrophes such as the plagues which swept the world during times past were viewed as theological events. Although most creeds generally include belief in immortality as an essential ingredient of faith, our yearnings for it have never seemed to carry much conviction. Our instincts for indulgence and self-destruction seem more deeply ingrained than are our hopes for longer lives. Alex Comfort wrote, "Public concern for longevity does not extend to making oneself uncomfortable."

We seem to avoid the subject as much as we can. The youth cult is not a twentieth century fixation. We have always exalted the young; aging has always been a taboo. Proust wrote that we tend to deal with aging only in abstract. Robert Butler, first director of the National Institute on Aging, says that we deal with aging like the Victorians dealt with sex. Erica Jong calls age an embarrassment.

Aging as a part of life has rarely attracted artistic or literary attention. Old age is underrepresented in cultural expression. The Picture of Dorian Gray, On Golden Pond, Cocoon, and Golden Girls are noteworthy exceptions. Shakespeare presented King Lear as that "ruin'd piece of nature." Aging is not good box office. A recent article by Walter Goodman in *The New York Times* suggested that characters generally treat old age in "the comical-sentimental mode, easy to swallow, like the coated drugs that some old people live on." Grandparents are usually presented as "doting and somewhat disconnected"—like a different species.

## **The Doctors Who Peddle Youth**

My profession has contributed to the malaise in that the scientific study of aging has often been the province of charlatans and hucksters. Every imaginable incantation, potion, and surgical maneuver

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## 12 *We Live Too Short and Die Too Long*

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has been proposed in the name of rejuvenation. Much of this arose in the context of perpetuating or recapturing sexual capacities—potency for the male, physical attractiveness and secondary sexual characteristics for the female. Sex and ideas of aging are intimately mixed.

One such example concerns the legendary oldster Tom Parr. His autopsy, performed by the great anatomist and surgeon William Harvey, made particular mention of Parr's "well developed and heavy testicles." For years this observation, along with the inaccuracy of Parr's life span, has been taken as incontestable proof that there exists a relationship between longevity and the internal secretion of endocrine glands, in particular the sex glands. Around 1400 BC, the Indian physician Susutra recommended that his patients eat the reproductive glands of young tigers to overcome impotency.

One thing the youth doctors have never lacked is creativity. On June 1, 1889, Professor Charles Eduoard Brown-Sequard, pupil of the godfather of physiology, Claude Bernard, addressed the Societe de Biologie in Paris. Brown-Sequard was then 72 years of age. He described his personal rejuvenation (i.e., regaining his potency) after having injected himself with fluid extracted from crushed dog testicles. The reaction was intense. Soon physicians worldwide were injecting patients with extracts from various animals' organs and glands. One such imitation therapy was the work of the renowned Serge Voronoff, an expatriate Siberian physician, who in 1900 felt that only monkey glands made effective stimulants. Monkeys became scarce shortly thereafter. Today the absurd notion that pulverized rhinoceros horn is an aphrodisiac has nearly doomed this noble beast,

In the United States, John Romulus Brinkley of Milford, Kansas, developed a technique for inserting whole goat testes into human scrota. It is estimated that from 1915 to 1942 he grafted 16,000 goat testicles.

The most incredible link in this chain of pseudoscience was yet to come. Back in Europe, a Swiss surgeon, Paul Niehans of Vevey, entered the field of rejuvenation. Niehans had studied with Voronoff, who had since fallen from esteem among his colleagues. Nonetheless, early in his career Niehans had grafted parathyroid gland tissue into a patient with parathyroid deficiency. The patient made an excellent recovery, thus baffling every conventional corrective remedy and prompting the amazing career which followed.

In 1948, Niehans began using cells from lamb fetuses for the purpose of rejuvenation. Before dying at the age of 86, Niehans had treated 40,000 patients, many of whom were world renowned. Winston Churchill, Gloria Swanson, and Somerset Maugham were among the most notable. Probably the most famous case was that of Pope Pius XII, who at age 78 summoned Niehans to Rome. The Pontiff was believed to be dying of gastric problems or some obscure kindred disorder, and upon two separate occasions Niehans guided him to recovery. The ranks of the faithful grew.

In April 1987 I visited the Niehans Cellular Therapy Clinic in Vevey. It was maintained by his daughter, having previously split from the proprietor of the original clinic several miles away. The present facility is located in an elegant hotel on the banks of Lake Geneva and provides a glorious view of the Alps. The charge for the basic package of seven days, six nights was then 6,600 Swiss francs (approximately \$3,000). The cellular therapy could be supplemented with "bioenergetic treatments" such as acupuncture (of the traditional Chinese, electric, and laser varieties), shiatsu (a Japanese treatment also known as acupressure), injections of procaine (a local anesthetic), and aromatherapy (consisting of massage and compresses with vegetable and plant essences). These cost extra.

An Internet search reveals that the clinic still thrives. In fact, it received the award in Monte Carlo of the "best health spa." Its prices depend on which pamperings are selected, but may reach tens of thousands of dollars.

Currently most of the clinic's patients come from the Middle East and Central America.

I did not take the treatment.

The most famous of recent wizards was Ana Aslan of Budapest. Her potion of Gervital, vitamin H3, is composed nearly exclusively of novocaine (the common local anesthetic) and small amounts of benzoic acid and potassium metadisulphate. Among her patients Aslan numbered Nikita Khrushchev, Charles de Gaulle, and Ho Chi Minh. A recent full page newspaper ad was headlined, *Doctor's Rumanian Youth Restoration Formulas Seem to Defeat Aging*. Another sound bite reads, "Possibly the most exciting remedial discovery for mankind since the principles of hygiene were reluctantly accepted by the medical profession." But hurry, because "supplies are limited." Unfortunately, neither Aslan's nor Niehans's patients have been shown to live to extraordinary old age—the oldest of Niehans' followers is 92.

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## 14 *We Live Too Short and Die Too Long*

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There is a reason, however, why youth doctors should make a difference. This difference is rooted in the placebo effect. As I will explore later, aging is to a major extent a quality of the mind, and as such is susceptible to a large degree of mental imprinting.

The situation is readymade. The eager and susceptible come humbly seeking a gift of nature, the restoration or extension of youth. They are met by a strong, promising figure who holds out the possibility of new vitalities, recapture of lost opportunities, and revisit of yesterday's horizons. The tactic is invested with sufficient hierarchical mystique to tempt and convince. Conviction is a major part of cure, and every controlled hard science research project must factor in the reality of the placebo effect. The effect is at its most potent under just these circumstances. And as someone once wisely observed, no hometowners have ever been cured at Lourdes.

It is unfortunate that there are no sound studies of glandular therapy, Gerovital, or anything else which claims rejuvenation. One would presume that if the partisans of these immensely successful commercial enterprises were truly committed to the products and ideas they promulgate, they would seek confirmation of the effects in the scientific community by performing double-blind studies in which neither the subject nor the experimenter knows which is the real test compound. Sadly, the absence of such efforts implies that the youth practitioner cares more for the preservation of the mystique and its attendant rewards than for the assertion of real truth.

If the myriad anecdotes of the wonders of the youth doctors were valid, such examples would account for more than the placebo effect, which causes sugar pills to work 10 to 20 percent of the time (for whatever condition they are prescribed) merely because of the strength of positive thinking. Those who attend today's health and beauty spas do so in an effort to find a second adolescence, a second puberty. The multibillion-dollar cosmetic industry feeds on their lust for rejuvenation.

### **Where is the Hand of Hard Science?**

Pseudoscientific approaches are the heritage of aging research because sound science has been slow to address the issue of aging. The word *geriatrics*—the medical aspects of aging—was first coined by Dr. D. G. Nascher in 1914. The National Institute on Aging was founded as recently as 1974. The American Geriatrics Society was

founded in 1942, the Gerontologic Society of America a short time later. To put this timetable in perspective—the American Medical Association was founded in 1843.

Still, geriatrics is part of the curriculum in only a minority of our nation's medical schools. The first professorship of geriatrics was established at Cornell in 1978; the first department in a medical school, at Mt. Sinai in 1983. Geriatrics has no honored traditions. Everyone in the field is still a pioneer.

Until now, the issue of aging has not had significant impact on American social and political policy. When I recently traveled to Africa, I observed a different experience. Repeated inquiries of "How are you handling the old people?" were greeted by blank unresponsiveness. It seemed an irrelevant question. It wasn't that there weren't any old people (10 percent of the Kalahari bushmen are over 70 years of age), but they were not perceived as being a group set apart. Not a "them or us" situation—only "us."

But for the Western world the emergence of the compelling demography listed at the beginning of this chapter creates an awareness and urgency which Anne Somers of Rutgers University has appropriately termed the "Aging Imperative." We face this imperative ill armed, without a satisfactory database or adequate social philosophy upon which we can create policy. This policy is not just for "them," the aged, but for all of us. It affects decisions at every level of involvement—personal, community, national. Arnold Toynbee remarked, "A society's quality and durability can best be measured by the respect and care given to its elder citizens." We now have the opportunity—the mandate—to discharge this responsibility intelligently and ethically. As the popular cartoon character Pogo might say, "I have met the elderly and they are us."

## A More Productive Outlook

An issue of *Daedalus*, the publication of the American Association of Arts and Sciences, was entitled "The Aging Society." It consisted of a series of excellent essays compiled by Alan Pifer and Lydia Bronte of the Carnegie Foundation. Its main message was that we are living an historic moment—a moment when a new, third age of life is appearing. Until the present there were only two ages, youth and adulthood—youth consisting of the years from birth to 20 years, adulthood lasting from the ages of 20 to 65 or so. Youth was characterized by growth,

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## 16 *We Live Too Short and Die Too Long*

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learning, and maturing. Adulthood involved productivity, reproduction, and youth care. At approximately 65 years, we died—erratically, but with high probability. Survivors past 65 were rare, but during the late nineteenth century they became common enough for Prince Otto Von Bismarck, chancellor of the German Empire, to propose a social security system for that individual who unexpectedly lived beyond the second age of life. Five decades later, our nation followed suit, instituting our own social security system to help support those few who didn't die according to the predicted schedule. Medicare followed in 1965 to heal the ailing survivors.

We now identify the falseness of this model. Not only are a few of us living beyond age 65, tens of millions are. There are 100 million Chinese over 65. Also on the Asian continent, 54 million Indians and 26 million Russians live past this benchmark. Here in America, 35 million people are older than 65—that's more than the entire population of Canada. Calculate the number of those who reached age 65 during the past 100 years and you would have a sum equal to the number of people over age 65 who existed on the planet for all of previous history. By the year 2035, one in every four Americans will be over 65. The average family will have four generations.

### **The Third Age—A New Life Segment**

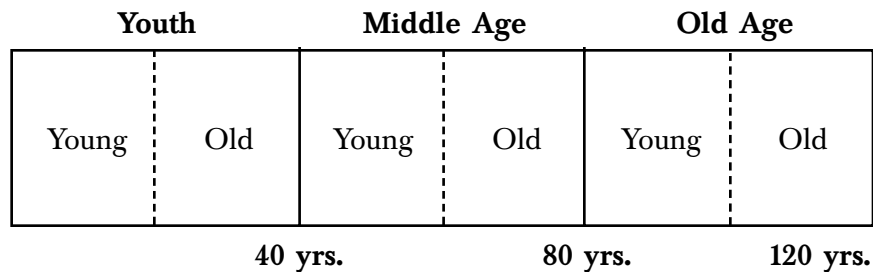
We have most recently inherited a new life segment—the third age. This new phenomenon has burst upon us bringing with it new decades of opportunity, and (somewhat ominously) the potential for profligate waste. We are not prepared.

In part this is because the new third age lacks definition—biologic, psychological, sociologic, economic, and political. We have no encyclopedias, textbooks, experiments, or models to guide us to our new age. The chances for interage conflict are real. The younger generations do not defer to the older simply because they are older—some equity of resource allocation is sought. We are ill armed to confront the novel challenges. We lack a conceptual framework as to what our new years can and should represent. In effect, we are in the position of defining our new, complete life. Until now everything has been an artifact. We confront the potentials of our full lives for the first time in the history of our kind. This, now, is one of the most significant epochs of the human species.

Our first challenge is to recognize our 120-year natural lifetime and redefine its subsegments. There are three segments of life: youth, middle age, and old age. Youth is 0 to 40 years, middle age is 40 to 80, and old age 80 to 120. Each major segment is then halved to produce the following segments:

GRAPH:

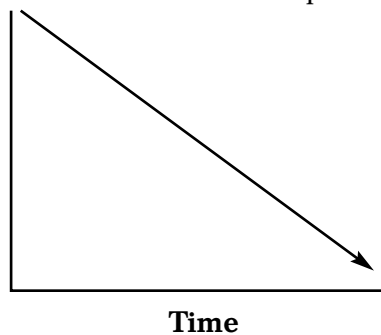
1. Youth
  - young (020)
  - old (2040)
2. Middle Age
  - young (4060)
  - old (6080)
3. Old Age
  - young (80100)
  - old (100120)



No one should die until old, old age—over 100 years. Any earlier deaths are premature. As I recently passed my 77th birthday, it is like a golfer on the 12th hole.

If we plotted the longevity of plates in the dishwasher as an exercise in random statistics, we would see a survival slope as follows:

**Number  
of Plates**



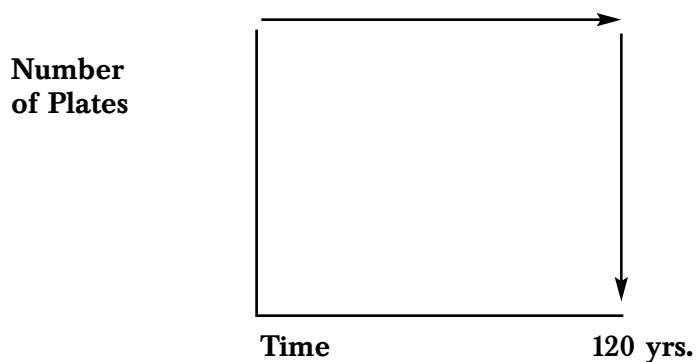
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## 18 *We Live Too Short and Die Too Long*

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Until recently, human longevity curves have resembled this same “triangular” pattern—not much different from projections of the “life span” of a set of dinner plates.

Clearly our present goal should look very different. Ideally, each of us wants to live to our full design—the “rectangular” life span curve.



As we look at recent demographic data, we see that we are approaching the idealized rectangularized curve: more of us are living longer; but since 77 is the median year for death in America, most of us are still dying in old middle age. If we are dying at age 77 and have a potential of 120 years, we are faced with a current shortfall of 43 years! Our machine is only partway through its work time.

We die too soon.

# *Index*

## **A**

- Aaron, Henry, 43
- ABA model, 87–88
- Abler, Dore, 220
- Abram, Morris, 246–247
- Acetylcholine
  - absence, impact, 91
  - impact, 177
- Active euthanasia
  - procedures, 247–248
  - support, 248
- Active life expectancy, 131
- Activity. *See* Inactivity
  - benefit, 193–194
  - impact. *See* Sleep
  - prolongation, 182
  - usefulness. *See* Physical activity
- Adams, David, 136
- Adams, James, 160
- Adams, John, 177
- Adrenal glands, stimulation, 110
- Adulthood, generative responsibility, 218
- Adverse outcomes, impact, 111
- Age
  - changes, 8
  - coping, 219–221
  - energy/matter/time, equation, 21–22
  - heat loss, impact, 27
  - impact. *See* Brain
  - prediction, 104–106
  - prophecy, fulfilling
    - families. impact, 94–95
    - society, impact, 95–97
  - rationing, 245
  - relationship. *See* Oxygen volume
  - success, steps, 271–272
  - vitamin pill, impact, 30–31
- Age Age, 2–3, 20
  - epoch, 256
  - justification, 133
  - knowledge, 249
- Age Constitution, 259–260
- Age Corps, 260
- Aged, definition, 261–262
- Age labels, 2
- Age-related sleep disorders, 211–214
- Aging. *See* Precocious aging; Productive aging; Responsible aging; Successful aging
  - breakdowns/inertia, 206
  - cause, understanding, 10
  - community, relationship, 265–266
  - cultural expression, underrepresentation, 11
  - deceleration, cooling (impact), 29
  - defining, 20
  - examination, 86–87
  - fear, 64, 83–84
  - female sexuality, relationship, 148–150
  - governmental impact, 261–265
  - hard science, impact, 14–15
  - high-tech solution, 127–128
  - impact. *See* Learning; Memory
  - absence, 15
  - male sexuality, relationship, 142–145
  - message, failure, 87–88
  - negative imagery, 88

276 *We Live Too Short and Die Too Long*

- old ideas, 10–11
- plasticity, 223
- process, alteration, 36–37
- productive outlook, 15–16
- prophecy, fulfilling
  - families, impact, 94–95
  - society, impact, 95–97
- prophets, impact, 123–125
- reasons, 19
- relationship. *See* Aging; Death; Sex
- responsibility, 270–271
- retardation, 205
- self-fulfilling prophecy, 83
- sexuality, relationship, 135
- significance, loss, 97
- strategy, 259–260
- success, elements, 216
- temperatures, variation (impact), 28–29
- Aging brain, 165–180
- Aging humans, implications, 101–102
- Aging Society, The, 5, 257
- Agricultural Revolution, 184
  - impact, 115
- Alcohol, excess, 142
- Alcoholic drinks, daily restriction, 67
- Alderman, Edwin, 124
- Alertness ratings, 179
- Alzheimer, Alois, 88
- Alzheimer's disease (AD), 88–89, 269
  - diagnosis, elimination, 90
  - factors, 91–92
  - nursing home population, percentage, 89
  - origins, possibilities, 91–92
  - pain, levels, 93–94
  - performance, deterioration, 92
  - personal approach, 89–91
  - progression, 93–94
  - self-doubt, 176
  - silent epidemic, 88
  - treatment, 90–91
- Amala, primitive behavior, 163–164
- American Association of Retired Persons (AARP), 261
- Amiel, Henri, 1, 19
- Anatomy of an Illness* (Cousins), 220
- Andres, Ruben, 199
- Anesthetics, curative ability, 57
- Anger, reduction, 272
- Annual physical exam, technique, 81–82
- Antibiotics
  - curative ability, 57
  - impact, 57–58
- Antidepressants, impact, 129
- Antioxidants, 206
- Apocalypse (horsemen/riders), 3, 48
- Appestat, 200
- Arterio-sclerotic heart disease, impact, 82
- Asher, Richard, 125
- Aslan, Ana, 13
- Aspirin myocardial infarction study (AMIS), 103–104
- Astrand, Olaf, 192
- Athletes. *See* Master athletes
  - non-athletes, mental reaction times (comparison), 169
- Atkins, Peter W., 24, 27
- Atlas, Donald, 230
- At risk driver, 229
- Australian Aboriginal, The* (Basedow), 100
- Autonomous existence, 227
- Avorn, Jerry, 225, 245
- B**
- Back to Methuselah* (Shaw), 168
- Bacon, Roger, 27
- Bailey, Bill, 27
- Baltes, Paul, 173
- Bandura, Albert, 220, 223

- Bannister, Roger, 236  
 Barchas, Jack, 157, 167  
*Barnaby Ridge* (Dickens), 172  
 Barth, Eric, 159  
 Baruch, Bernard, 166  
 Basedow, Herbert, 100  
 Bashore, Theodore, 174  
 Bawden, Nina, 85  
 Beach, Frank, 143  
 Beard, Belle Boone, 231  
 Behavior  
     characteristics, 188–189  
     influence, ability. *See* Root  
         behavior  
 Belief system  
     presence. *See* Humans  
     strengths, 98–99  
 Benham, Ed, 232  
 Berkman, Lisa, 268  
 Bernard, Claude, 12  
 Berwick, Don, 43  
 Biochemistry, 197–198  
 Bioenergetic treatments, 13  
 Biologic clock, 208–210  
     phase advancement, 212  
 Biologic outcome, emotional pre-  
     diction (impact), 97–101  
 Blair, Steven, 186–187, 189  
 Blood  
     glycerine/DMSO replacement,  
         28  
     pressure, 188  
         side effects. *See* High blood  
             pressure  
         vessel system, deterioration, 123  
 Blythe, Edward, 109, 116  
 Body function, physical exercise  
     (restorative effects), 132  
 Body weight, average, 67  
 Bones, thinness, 125–126  
 Booth, Frank, 131  
 Bortz hypothesis, 83–84  
 Bortz II, Walter M., 61  
     American Geriatrics Society  
         president, 105  
 Boskin, Michael, 263  
 Bottiger, Lars, 194  
 Bowen, Otis, 261  
 Brain. *See* Aging brain  
     aging, decline (evidence),  
         169–170  
     anatomy, decrements (record-  
         ing), 170  
     biology, review, 175–176  
     chemicals, reduction, 129  
     complexity, 175  
     computer, analogy, 157–158  
     death, 248  
     embryonic development, 158  
     environment, impact, 164  
     function  
         decline, age (impact), 169–172  
         increase, physical exercise  
             (impact), 174–176  
     growth, 158–159  
         testosterone, impact, 161  
     loss  
         disuse/disease, impact, 176  
         intellect (areas, involvement),  
             176  
     moldability, 164  
     plasticity, 167, 170  
     power, 157  
     protein synthesis,  
         puromycin/cyclosporin  
             (impact), 168  
     relationship. *See* Disuse  
     resource, importance, 153–165  
     size, 154–155  
     stimulation, 175  
     response, 168–169  
     tricks, 172–173  
     usefulness, 153  
 Brain dead, declaration, 240  
 Brain development, 158–159, 175  
     continuation, process, 159  
     deprivation, relationship,  
         162–163

278 *We Live Too Short and Die Too Long*

- extremities, 160–162
- Breakfast, regularity, 67
- Brecher, Edward, 139
- Breslow, Lester, 66–67, 187
- Bretschneider, Judy, 140
- Brief History of Time, A* (Hawking), 22
- Brinkley, John Romulus, 12
- Brody, Harold, 169
- Bronte, Lydia, 15–16
- Brooks, Marvin B., 142
- Brown-Dequard, Charles Eduoard, 12
- Bruce Jenner Protocol, 190
- Bruner, Jerome, 153
- Buffon, George, 7, 9, 31, 34
- Burnout, 21
- Burns, Benedict D., 166
- Burns, George, 237
- Bushmen (Kalahari)
  - eating habits, 112, 272
  - mileage, coverage, 113
- Butler, Robert, 5, 11, 257
- bereavement estimates, 101
- C**
- Cabot, Richard, 197
- Cain, Jim, 234
- Cajal, Raymon y, 166–167
- Callahan, Daniel, 48, 244–246, 261–262
- Calment, Madame (life span), 6
- Caloric intake, reduction (impact). *See* Life
- Calories, ingestion, 126
- Calories Don't Count*, 199
- Cancer
  - impact, 51–53
  - relationship. *See* Exercise
  - side effects, 128
  - survival, 52
- Cannon, Walter, 99–100
- Capture myopathy, 113
- Cardiovascular conditioning, 191, 192
- Cardiovascular vulnerability, 130
- Career/money, preoccupation, 142–144
- Caring, importance, 103
- Carrell, Alexis, 8–9
- Carstensen, Laura, 172
- Catastrophes, 11
- Catecholamines
  - impact. *See* Depression
  - reduction, 129
- Cazalis, Henry, 49
- Celebration of Life* (Cousins), 37
- Cells, doubling, 9
- Cells, longevity. *See* Controlled environments
- Cellular therapy, 13
- Centenarians
  - characteristics, 231
  - Social Security Administration interviews, 230
  - success, 230–232
- Challenges, acceptance, 272
- Chang, Wang Ching, 235
- Channing House, 151
- Childbearing, delay (social trends), 138
- Cholesterol, 188
  - amount, determination, 202
  - control, 202
  - formation, 208–209
  - impact, 201–202
  - quality, 202–203
- Choline, impact, 91
- Christian Scientists,
  - behavior/beliefs, 98–99
- Chronic conditions, impact, 182
- Church of the Seventh Day
  - Adventist members, life span, 58
- Cicero, Marcus Tullius, 184
- Circulatory changes, aging (impact), 124
- City of Joy, The* (Lapierre), 240
- Clark, Etta, 234–235
- Clinton Health Care Plan Proposal

- (1993), impact, 61  
 Cloning, concept, 37  
 Clotability, increase, 124–125  
*Cloud, The* (Shelley), 271  
 Clough, Arthur Hugh, 247  
 Cognitive function, 178  
 Cognitive loss, experience, 175  
 Collier, Timothy, 175  
 Colon, cancer, 189  
 Colton, Charles, 177  
*Coming of Age, The* (de Beauvoir), 228  
 Community, relationship. *See* Aging  
 Computer, analogy. *See* Brain  
 Computerized axial tomography (CAT), usage, 156  
*Conceptual Blockbusting* (Adams), 160  
 Conditioning. *See* Cardiovascular conditioning  
 Confidence. *See* False confidence  
 Conforming, convention, 116  
 Confucius, 207–208, 271  
 Connelly, Martin, 257  
 Constant energy flow, 26  
 Continuous learning, case, 166–169  
 Control, importance, 222–223  
 Controlled environments, cells (longevity), 8–10  
 Coolidge, Mr./Mrs. Calvin, 143  
 Coolidge Effect, 143  
 Coping, importance, 220  
 Coronary arteries (expansion), exercise (impact), 124  
 Cottman, Carl, 175  
 Counter-entropic capacity, 31  
 Counter-entropy, 35  
 Cousins, Norman, 37–38, 220, 238, 265  
   pessimism, comment, 97  
 Coverage, denials, 263  
 Crapo, Lawrence, 5  
*Creative Aging* (Bortz), 228  
 Crenshaw, Theresa, 149  
 Critical care unit (CCU), responsibility, 49–51  
 Cross-linkage super-oxidation, 30  
 Cryolongevity, 28  
 Cure  
   agents, 57  
   illusion, 57–61  
   orientation, 64, 70–77  
 Currrens, James, 123–124  
 Cutler, Richard, 7  
 Cutler, Winnifred, 135–136  
 Cybernetics, 157–158  
 Cyclic AMP (cAMP), addition, 168  
 Cycling, energy flow (impact), 26  
 Cycling Theorem, 26–27  
**D**  
 Daily activities, 195  
 Damrosch, Walter, 230  
 Darwin, Charles, 7, 109, 116, 185, 220  
 Davidson, Julian, 136, 148  
*Dealing with Memory Changes as You Grow Older* (Gose/Levi), 178  
 Death  
   aging, relationship, 35–37  
   branch point, 270  
   certificates, examination, 213  
   concept. *See* Ideal death  
   coping, 249–252  
   defining, 239–242  
   face, 238–239  
   facilitation, question. *See* Natural death  
   factors, 102–104  
   last passage, 237  
   rates, 186  
   production, 102  
   response, 86–87  
   shock, 102  
 de Beauvoir, Simone, 228  
 Debusk, Robert, 236  
 Deep sleep, increase, 208  
 Deficiencies, incidence, 203  
 De Leon, Ponce (fountain of youth search), 19  
 Demar, Clarence (autopsy findings),

280 *We Live Too Short and Die Too Long*

- 123–124
- Dement, William, 211
- Dementia, result/cause, 91
- Demographic shifts, 266
- Deoxyribonucleic acid (DNA), wear/tear (signs), 30–31
- Depression, 130
- acting out, 96–97
  - catecholamines, impact, 129–130
  - impact, 171–172
  - prevalence, 151
- Deprivation, relationship. *See* Brain development
- de Reynier, Eric, 234
- Descartes, Rene, 117
- Devey, Edward, 9–10
- DeVries, Herbert, 122
- de Wachter, M.A.M., 248
- Diabetes, 130. *See also* Old age diabetes
- epidemic, cause, 127
  - impact. *See* Impotence response, 73
  - side effects, 128
- Diabetes Danger* (Bortz II), 61
- Diamond, Jared, 65
- Diamond, Marian, 160, 166, 170
- Dickens, Charles, 172
- Diderot, Denis, 199
- Diet
- amount, 200–201
  - dogma, 198
  - food, selection, 203–204
  - importance, 181
  - restrictions, 206
  - selection, 198–200
  - usage, 197–206
- Discomfort, minimization, 182
- Disease
- classical medical model, differentiation, 110
  - detection, 182–183
  - prevention, 56
- Disengagement approach, 226–227
- Disruptive behavior, 224
- Disuse
- aging, relationship, 119
  - brain, relationship, 128–129
  - debilitation, 267
  - depression, relationship, 129–130
  - destructive force, 109
  - impact. *See* Brain; Intellectual decline
  - interest, 111
  - phenomena, interest, 117–118
  - relationship. *See* Fuel supply space (frontiers), impact, 118–120
- Disuse Syndrome, 130–131
- Dolphin, brain size, 154
- Donne, John, 107, 253
- Don't Forget* (Lapp), 178
- Dorman, Samuel Shaw, 113
- Down's syndrome (mongolism), genetic problem, 92
- Dreams, impact, 207
- Drug use, prevalence, 151
- Dubos, Rene, 71, 181, 238, 250
- Dustman, Robert, 174
- Dychtwald, Ken, 86
- Dying
- coping, 249–252
  - cost, 44, 242–245
  - expression, 245–247
- Dyson, Freeman, 21, 29
- Dyusamo, Belayneh (marathon record), 121
- E**
- Earth, surface (physical system), 26
- Eating habits. *See* Bushman
- Economos, Angelo, 31, 35
- Eddington, Arthur, 21, 27
- EEG. *See* Electroencephalograph
- "Effect of Diet on Metabolism of Fat in Man, The" (Bortz II), 198
- Ego chill, 250
- Einstein, Albert, 157

- genius, question, 160  
sleep, 210
- Eisdorfer, Carl, 262
- Eiseley, Loren, 112, 116
- Ejaculatory demand, reduction, 137
- Ejection fraction, 50
- Elder hostels, success, 267
- Electrocardiograph (EKG), usage, 82–83
- Electroencephalograph (EEG), usage, 210
- Elwood, Paul, 60
- Emergency room (ER), usage, 49–50
- Emotional liability, 211
- Endocrine gland, stimulation, 132
- Energetics, 222
- Energy  
conservation, 22  
defining, 23–24  
destructive impact, 110–118  
impact, 21–22. *See also* Stress  
ordering effect, 108  
source, 26  
addition, 168–169
- Energy flow. *See* Constant energy flow
- impact. *See* Cycling; Feedback
- ordering, impact, 107–108
- targeting, 167
- Engle, George, 101
- Entropy, A New World View* (Rifkin), 132
- Entropy (decay), 23, 107  
deceleration, value, 29  
force, 27
- Environment, interaction (efficiency), 222
- Environmental cleanup/protection, 268
- Environmental pollution, worsening, 42
- Erectile competence, 146
- Erhard, Werner, 106
- Erikson, Erik/Joan, 216–218, 222–223, 227–228, 262, 266  
life phases, 270
- Estrogen replacement therapy, usage (restriction), 149
- Etheredge, Lynn, 261
- Euthanasia, procedures. *See* Active euthanasia
- Evans, William, 128
- Evolutionary pattern, theories, 111–112
- Exercise  
amount, 192  
benefits, denial, 185  
cancer, relationship, 189  
cultural bias, 184–185  
heart disease, relationship, 189–190  
impact. *See* Coronary arteries; Life  
importance, 181, 183  
increase, impact, 129  
intensity, 192–193  
nutrition, impact, 207  
patterns, 271  
purposes, 191  
RDA, 190–191  
rhythm/vigor, continuation, 271  
selection, 190–192  
types, excellence, 193–197  
usage, 183–197
- Exercise Myth, The* (Solomon), 185
- Expenditure, impact. *See* Life
- Experience of Dying, The* (Patterson), 241
- F**
- Failure, fear, 142, 146
- False confidence, 65
- Family  
member, desire, 220  
responsibility, reward, 264  
role, 269–270
- Fat, carrying, 201–202
- Fatalism, impact, 64, 79–80

282 *We Live Too Short and Die Too Long*

- Fates, impact, 10  
 Fatigue, impact, 171–172  
 Feedback  
     control mechanisms, energy flow (impact), 26  
     loop. *See* Positive feedback loop  
 Female/male responsiveness, anatomic similarities, 149  
 Female sexuality, relationship. *See* Aging  
 Fifty Plus Running Association (sexual activity questionnaire), 141  
 Fight or flight behavior, 99, 101  
 Finances, mistake, 220  
 Financial incentives, impact, 64, 77–79  
 Fixx, Jim, 50, 237  
     death, 185  
 Food  
     centrality, 115  
     excess, 142  
     selection. *See* Diet  
 Footsteps, importance, 112  
*Formula for Life: The Anti-Oxidant, Free Radical Detoxification Program* (Kronhausen), 205  
 Frain, Lyman, 234  
 Frank, Jeremy, 103  
 Freeman, Walter, 26  
 Fretz, Bruce, 220  
 Freud, Sigmund, 137  
 Fries, James, 5, 131  
 Frisch, Ray, 189  
 Fuchs, Victor, 58, 266  
 Fuel supply, disuse (relationship), 127  
 Fuller, Buckminster, 166  
**G**  
 Gardner, John William, 96  
 Gardner, Sandy, 211  
 Gates, R. Ruggles, 164  
 Gaussian curve (bell curve), 87–88  
 Gavrillov, Leonid/Natalia, 35  
 Geller, Harvey, 81  
 Generativity, 218  
 Genetic messages, printout, 158  
 Genius  
     ability, 161–162  
     accomplishment, 160–161  
     identification, 160  
 Geriatric Grand Rounds Conference, 144  
 Geriatric obstetrics, 138  
 Geriatrics, coinage, 14–15  
 Gerontologic Society of America, 15  
 Gerontophobia, 11  
 Gilmour, John, 233  
 Glenn, John, 118–119  
 Glucose tolerance, 188  
 Goals, setting, 272  
 Goldberger, Ary, 25–26  
 Good health  
     habits, definition, 67  
     importance, 216  
     strategy, prevention (factors, impact), 64  
 Goodman, Walter, 11  
 Gorer, Geoffrey, 241  
 Gorillas (Rwanda), observation, 112–113  
 Gose, Kathleen, 178  
 Gould, Stephen Jay, 38, 154–155  
 interpretation. *See* Intelligence quotient  
 Governmental impact. *See* Aging  
 Grand-generativity, 218  
 Gravity, offsetting, 118–119  
 Graying, vanity, 255  
 Gray Panthers, 225, 257  
 Great Rift, 112  
*Greening of America, The* (Reich), 270  
 Growald, Eileen Rockefeller, 268  
*Growing Old Is Not for Sissies* (Clark), 234–235  
 Guilt, sexual expression (relationship), 137  
*Guinness Book of World Records*, 3

**H**

- Halsted, Eugene, 57
- Hamlet (play), 107
- Happiness, importance, 216
- Hard science, impact. *See* Aging
- Harmon, Dennis, 30
- Harris, Lou, 184
- Haskell, William, 188
- Hawking, Stephen, 22
- Hawthorne effect, 103
- Hayflick, Leonard, 8–9, 37–38
- Health. *See* Good health
  - achievement, process, 183
  - exam, payment, 77
  - guides, impact, 74
  - habits. *See* Personal health habits
  - hoarding, 64
  - preservation/promotion, logic (failure), 87–88
  - responsibility, misplacement, 64, 66–68
  - self-efficacy, impact, 221–222
  - simplicity, 64, 68–70
- Health care
  - expenditure, 42
  - high cost, 42–44
  - professional, relationship. *See* Sex
  - provider/consumers, terms (usage), 71
- Health maintenance organization (HMO), problems, 77–78
- Health of Nations, The* (Sagan), 43
- Heart
  - muscle strength, 188
  - problems, side effects, 128
  - pump failure, 50
  - trouble, impact, 51
- Heart disease
  - impact, 49–51
  - relationship. *See* Exercise
- Heat loss, impact. *See* Age
- Helpless/hopeless syndrome, 102–103
- Helton, Roy, 22, 36
- Henderson, Brian, 189
- Heredity, discussion, 39
- Hibernation, 29
- High blood pressure, side effects, 128
- High density lipoprotein (HDL), 188, 202–203
  - measurement, 83
- Hip fractures, 125–126
  - mortality rate, 54
- Hirsch, Calvin, 110–111
- Hoffman, Edward, 162
- Holmes, Oliver Wendell, 63, 252, 257
- Homeostasis, 108
- Homo sapiens*, identification, 153
- Horne, James, 207–208
- House, James, 267
- Human growth hormone, impact, 127–128
- Human Options* (Cousins), 87
- Human Population Laboratory, 187
- Humans
  - body, design, 1–2
  - characteristics. *See* Primitive humans
  - illness, belief system (presence), 99
  - life span, defining, 3
- Humans, implications. *See* Aging humans
- Human sleep pattern, 210
- Humor, maintenance, 272
- Hunter-gatherer era, 115
- Huxley, Julian, 159
- Hyndam, Eleanor, 234
- Hypertension (treatment), beta blockers (usage), 150
- Hypertrophy, exhibition, 170

**I**

- Iatrogenic illnesses, 59
- Ideal death, concept, 252–253

284 *We Live Too Short and Die Too Long*

- Igarashi, Tesicki, 34  
 Illich, Ivan, 241  
 Illness  
   impact, 171–172  
   presence. *See* Terminal illness  
 Immobility, deteriorative effects, 229  
 Immortality  
   discussion, 37–39  
   search, 19–20  
 Immune responsiveness, maintenance (improvement), 32  
 Immunity, nonapplication. *See* Self-destruction  
 Immunologic capacity, 188  
 Impotence  
   diabetes, impact, 144  
   fear of failure profile, 146  
   mechanical approach, 147  
   treatments, 145–148  
 Impotence Foundation, 142  
 Inactivity, 118  
   lifetime, 190  
   minimization, 182  
   relationship. *See* Obesity  
 Inadequacies (perception), physiologic response (conditioned alteration), 223, 236  
 Independent living, 227–228  
   ability, 182  
*Index Medicus*, 74  
 Individual responsibility, reward, 264  
 Industrial Age, 184  
 Infectious diseases, conquest, 42  
 Information curve, change, 46–47  
 Insomnia, 73, 213–214  
 Institutionalization, avoidance, 182  
 Intellectual ability, decline, 172  
 Intellectual decline, disuse (impact), 172–173  
 Intellectual development,  
   nature/nurture (discussion), 163–164  
 Intellectual functioning, study, 171  
 Intelligence quotient (IQ)  
   credentialing, 165  
   decline, 170  
   exercise, impact, 174  
   Gould interpretation, 165  
   increase, 168  
   longitudinal study, 171  
 Intestinal absorption, abilities (change), 203  
 Intestinal intolerance, 204  
 Isumi, Shigechiyo (life span), 6
- J**  
 James, William, 271  
 Jefferson, Thomas, 177  
 Jerison, Harry J., 154–155  
 Jet lag, 209–210  
 Jogging, usefulness, 195  
 Johanssen, Don, 112, 154  
 Johnson, Virginia, 135  
 Jong, Erica, 11
- K**  
 Kagnoff, Arona, 146  
 Kaiser, Henry J., 78  
 Kaiser Permanente Health Plan, initiation, 78  
 Kamala, primitive behavior, 163–164  
 Katz, Sidney, 131, 188  
 Kaye, Danny (happiness), 104  
 Kinsey, Alfred, 138–139  
 Kivnick, Helen, 217, 218  
 Klein, Helen, 232  
 Knowledge  
   base, change, 46–47  
   impact. *See* Life  
   increase, 45–47  
 Knowles, John, 60, 64  
 Kraus, Hans, 131  
 Kronhausen, Eberhard, 205  
 Kuhn, Maggie, 225–227
- L**  
 Ladakh, shaman (observation), 98

- Lahey, Frank, 57  
 Lamm, Richard, 42–43, 239  
 Langer, Ellen, 222, 224, 225  
 Lapierre, Dominique, 240  
 Lapp, Danielle, 178  
 Lashley, Carl, 156  
 Lawry, Gabriel, 143  
 Laziness, 118  
 Leaf, Alex, 3–4  
 Leakey, Mary, 112  
 Leakey, Richard, 2, 115  
 Learning  
   capacity, aging (impact), 165–166  
   case. See Continuous learning  
   outcome, improvement, 173–174  
   process, question, 157–158  
   relationship. See Motivation  
 Lecithin, usage, 91  
 Lee, Russell, 95  
 Legal involvement, high cost, 45  
 Lemke, Leslie (piano playing), 161  
 Lenard, Lane, 156–157  
 Leveton, Alan, 250  
 Levi, Gloria, 178  
 Libido, absence, 148  
 Life  
   breath, impact, 24–25  
   correlation, Metropolitan Life Insurance Company, 39  
   defining, 20  
   disease, fatality, 41  
   environmental enrichment, impact, 166  
   expectancy, 188, 238. See also Active life expectancy  
   extension  
     exercise, impact, 186–189  
     knowledge/expenditure, impact, 47–48  
   good news, 55–57  
   lengthening, caloric intake reduction (impact), 31–34  
   order, deterioration, 108  
   physics, 24  
   quality, estimates (reliance). See Quality of life estimates  
   saving, 48  
   third age, appearance, 15–16  
 Life insurance, premiums, 82  
 Life/living design, 260  
 Life span  
   biostatistical maneuvers, 6–7  
   defining, 5. See also Human life span  
   longevity/skeletal maturation, 7–8  
   normalcy, 33  
   observational data, 6  
   prediction, 5–10  
 Lifestyle, consistency, 135  
 Lifestyle, evidence, 114  
 Lindsay, Robert B., 273  
 Linnaeus, Carolus, 162–163  
 Living rate, theory (Pearl), 34–35  
*Living to Be 100* (Seegerberg), 230, 249  
 Longevity  
   formula, search, 216–219  
   maturation, 7–8. See also Life span  
   predictor, 187  
   secretion glands, relationship, 12  
   sexuality, relationship, 151–152  
 Louis Leakey Institute for the Study of African Prehistory, 111–112  
 Lovejoy, Owen, 154  
 Lubitz, James, 242  
 Lukagiewicz, Julius, 45–46  
 Lung cancer, incidence, 189  
**M**  
 Mace, Nancy L., 94  
 MacLean, Duncan, 233  
 Magenes, Ludwig, 234  
 Magnetic resonance imaging (MRI), usage, 156  
 Mainstream, alignment, 272  
 Malacarne, Michele, 167

286 *We Live Too Short and Die Too Long*

- Male potency, alcohol (impact), 144
- Male sexuality, relationship. *See* Aging
- Malnutrition, 33
- Malpractice insurance, increase, 45
- Manton, Kenneth, 3, 264
- projections, 6
- Marsh, Anabel, 232
- Mason, James, 70
- Masoro, Edward, 32
- restrictive feeding, interpretation, 34
- Massachusetts Male Aging Study, 148
- Master athletes, 232–235
- Masters, William, 135
- Master therapy, 227
- Mastery experiences, set (creation), 223–229
- Matter
- equation, 21–22
- mind, impact, 97–101, 221–222
- May, Rollo, 257
- Mayer, Jean, 126, 200
- Mayr, Ernst, 22
- McCay, Clive, 31–32, 198, 206
- principles, application, 33
- McCoy, Norma, 140
- Mean lifetime potential (MLP), 7–8
- calculation, 9
- Medical Aspects of Human Sexuality*, 143
- Medical care, improvement, 42
- Medical care, rationing, 244
- Medical care cost, contributions, 44
- Medical Economics*, 146
- Medical knowledge, increase, 42
- Medical Nemesis* (Illich), 241
- Medical practice, difficulty, 74–75
- Medical profession/system, job, 55
- Medical technology, rationing, 264
- Medicare Drug Entitlement Bill, problems, 119–120
- Medicated survival, 238
- Medicine
- deficiency, 74
- failure, 41
- role, 269
- Medusa and the Snail, The* (Thomas), 7
- Meir, Golda, 166
- Memory
- ability, 162
- chain, 177–178
- function, explanation, 177–180
- loss, 176
- aging, impact, 176–177
- question, 157–158
- teaching, 179
- Mental distress, reduction (assurance), 182
- Mental fatigue, 142
- Mental problems, 142
- Mental reaction times, comparison. *See* Athletes
- Meprobamate, 188–189
- Metabolic Consequences of Obesity" (Bortz II), 199
- Metabolic instability, 130
- Metabolism, impact, 25–27
- Mid-meal snacking, absence, 67
- Midnapore, wolf children, 163
- Miller, Henry, 234
- Miller, Pearl, 234
- Miller, Stanley, 24–25
- Mindfulness* (Langer), 225
- Mindset, 221
- Mis-Measure of Man, The* (Gould), 155
- Mobility. *See* Physical mobility
- Molecular biology, revolution, 25
- Montaigne, Michel de, 242
- Morell, Martha, 148–149
- Moriya, Yoshinobu, 6
- Mormons, life span, 58
- Morowitz, Harold, 21, 26–27, 104, 209
- Morrison, Malcolm, 261
- Mortality, exposure, 252
- Mother Theresa, 240–241

- Motivation, learning (relationship), 173–174
- Mozart, Wolfgang (genius, question), 160
- Multiple Risk Factor Intervention Trial (MRFIT), 187–188
- Murphy's Law, 21
- Muscles, weakness, 125–126
- Musculoskeletal fragility, 130
- Muslimov, Shirlibaba, 4
- N**
- NASA, health problems, 118–120
- Nascher, D.G., 14–15
- National Health Interview Study, 184
- National policy initiatives, 259
- Natural death, facilitation (question), 247–249
- Negentropic device, 25
- Nerve cells
- division, cessation, 159
  - filaments, elongation, 158–159
- Nervous system, development, 159
- Neurobiology
- basics, 156–157
  - frontiers, 155–156
- Neurological connections, 159
- Niehans, Paul, 12
- Niehans Cellular Therapy Clinic, 13
- Nocturnal penile tumescence (NPT), 145–146
- Normalcy, measurement, 116
- Novak, Mark, 10
- NPT. *See* Nocturnal penile tumescence
- Nutrition
- impact. *See* Exercise science, 197–198
- Nutritional adequacy, improvement, 42
- O**
- Obesity, 130
- caloric excess, 199
- inactivity, relationship, 126–127
- response, 72–73
- survival, 200
- Obligation, sense, 225–226
- Ochsner, Alton, 57
- Ochsner Sr., Alton, 75–76
- Oerter, Al, 235
- O'Keeffe, Georgia, 166
- Okel, Ben, 68
- Old, defining, 3–4
- Old age, chart, 17
- Old age diabetes, 127
- Older persons
- psychological inventories, 129
  - sexual attitudes, 139–141
  - treatment, 95
- Older worker, changes (inevitability), 266–268
- Oldest old, coping ability, 220
- On the Origin of Species* (Darwin), 109
- Oracle of Delphi, 83
- Orangutans (Borneo), observation, 112–113
- Ordering, impact, 108. *See also* Energy flow
- Order Out of Chaos* (Prigogine/Stengers), 23
- O'Rourke, Paul, 102
- Oscillatory cycle, 209
- Osler, William, 95–96, 227
- Osteoporosis, 125–126
- Other Ways of Growing Old* (Eisdorfer), 262
- Outcomes, management, 60
- Oxygen
- movement, improvement, 122–123
  - necessity, 120
  - transfer, use, 120–123
- Oxygen volume (VO<sub>2</sub> max)
- improvement, 122
  - usage, 120–123
  - age, relationship, 122

288 *We Live Too Short and Die Too Long***P**

- Paffenbarger, Ralph, 186, 189
- Page, Henry, 216
- Paige, Satchel, 85
- Painful Prescription, The*  
(Aaron/Schwartz), 43
- Palmore, Erdman, 216
- Palo Alto Task Force on Aging, 223
- Parkinson's disease, correction, 175
- Parr, Old Tom (life span), 4, 12
- Patterson, E. Mansell, 241
- Pauling, Linus, 25
- Peace Corps, seniors (serving), 267
- Pearl, Raymond, 34, 39
- Peek, Kim, 162
- Pepper, Claude, 265
- Performance  
  decline, 121  
  deterioration. *See* Alzheimer's disease
- Personal health habits, 67
- Persuasion and Healing* (Frank), 103
- Pfeiffer, Eric, 149–150
- Physical activity  
  evolution, 114–115  
  usefulness, 67
- Physical conditioning, optimum, 192
- Physical distress, reduction (assurance), 182
- Physical exams  
  sham, 64, 80–83  
  technique. *See* Annual physical exam
- Physical exercise  
  impact. *See* Brain  
  restorative effects. *See* Body function
- Physical fatigue, 142
- Physical mobility, 228–229
- Physical problems, 142
- Physical work, cultural bias, 184–185
- Pifer, Alan, 15–16, 257
- Pills, impact, 72
- Piva, ay, 232
- Placebo effect, 14, 103, 204
- Plemons, Judy, 173
- Plimpton, George, 196
- Polio, 55–56
- Pope Pius XII, 13
- Porath, Otto, 235
- Positive emission tomography (PET)  
  scanner, usage, 167, 169, 170, 177  
  usage, 156
- Positive feedback loop, 167
- Positive thinking, strength, 14
- Powell, Richard, 174–175
- Precocious aging, 130
- President's Commission for the Study of Ethical Problems in Medicine, 246–247
- President's Council on Physical Fitness and Sports, 185
- Prevention, 56  
  demonstration, 75  
  impact, 69–70  
  problem, 63  
  lectures, 63
- Preventive medicine  
  logic, failure, 87–88  
  payment, determination, 79
- Prigogine, Ilya, 21, 23–24, 107  
  insights, application, 51
- Prihoda, Ronald, 242
- Primitive humans, characteristics, 113
- Principle of Invariance, 5–6
- Principle of Least Effort, 116–117
- Principle of Proper Mass, 155
- Productive aging, 257
- Prostate, cancer, 142
- Protein restriction, 32
- Proust, Marcel, 11
- Provider-consumer  
  model, pharmaceutical industry (impact), 71

- Provider/consumer. *See* Health care
- Pruyser, Paul, 87–88
- Public hygiene, improvement, 42
- Pygmalion* (Shaw), 97
- Pygmies and Bushmen of the Kalahari* (Dorman), 113
- Q**
- Quality of life
- defining, 245–246
  - estimates, reliance, 60
- Quickfix cure orientation, problems, 73
- R**
- Raab, Wilhelm, 131
- Raffin, Thomas, 190
- Rapaport, Stanley, 171
- Rapid eye movement (REM), 146, 210
- decrease, 213
  - reduction, 212
  - sleep, 213
- Rate of living theory. *See* Living rate
- Recommended Daily Allowance (RDA), 198–199, 203. *See also* Exercise
- Recreation, 191
- Redundant capacity, 64–66
- Reich, Charles A., 270
- Reichel, William, 248–249
- Reincarnation, game, 104–106
- Relaxation, learning, 214
- Relman, Arnold, 61
- Renewal effort, 228
- Repetitive sex, boredom, 142
- Reproduction, 137–139
- Reserve capacity, 65
- Residue levels, toxicity (reduction), 32
- Respiratory arrest, 243
- Respiratory function, 188
- Responsibility, importance, 272
- Responsible aging, 257
- Rest, obtaining, 272
- Retirement
- impact, 66
  - Lou Harris poll, 228
  - self-efficacy, relationship, 227–228
- Rhodes, Cecil, 250
- Rhythmic oscillatory behavior, 209
- Richter, Curt, 100–102
- Rifkin, Jeremy, 132–133
- Rockefeller, Nelson, 50
- Rodin, Judith, 221, 224
- Roessle, Robert, 41
- Role models, set (display), 223, 230–235
- Root behavior, influence (ability), 183
- Rose, Morris, 31
- Rosenzweig, Mark, 166
- Ross, Nellie Taylor, 230
- Rossmann, Isadore, 125
- Rothfarb, Ruth, 232
- Rowe, John, 216
- Rubner, M., 34
- Rudman, Daniel, 127
- Runners, characteristics, 232–233
- Russell, Bertrand, 253
- S**
- Sacher, George, 35
- Sagan, Carl, 116, 157, 255
- assertion, 180
- Sagan, Leonard, 43
- Savants, cases, 162
- Schaie, K. Warner, 172–173
- Scheibel, Arnold/Madge, 173
- Schneider, Edward, 30
- Schrodinger, Erwin, 25
- Schultz, Rudy, 234
- Schulz, Richard, 224
- Schwartz, William, 43
- Schweitzer, Albert, 237
- Scitovsky, Ann, 243
- Second Law, biologic implications, 26

290 *We Live Too Short and Die Too Long*

- Second Law, The* (Atkins), 24
- Sedentary Death Syndrome (SEDS), 131
- Segerberg, Osborne, 230–231, 249
- Segovia, Andres, 230
- Self-control, sense, 97
- Self-destruction, immunity (nonapplication), 68
- Self-efficacy, 215
- approach, 236
- elements, 229
- failure, impact, 220
- impact. *See* Health
- mastery, 236
- measurement, 221
- prescription, 223
- relationship. *See* Retirement
- Self-expression, 137
- Self-fulfilling prophecy, 86
- Self-knowledge
- achievement, 256
- drive, 155
- Self-organization processes, 108
- Self-Renewal* (Gardner), 96
- Selye, Hans, 109–110
- Selzer, Richard, 235
- Setting Limits* (Callahan), 48, 244
- Sex
- aging, relationship, 150–152
- death, relationship, 151–152
- enlightenment, 137
- health care professional, relationship, 150–152
- importance, 137–139
- performance, frequency (meaning), 135
- Sex and Sexuality in Mature Years* (Starr/Weinerin), 140
- Sexual activity
- improvement, 136–137
- misconceptions/prejudices, 135
- women/men, percentages, 139
- Sexual attitudes. *See* Older persons
- Sexual capacity, 188
- Sexual expression, relationship. *See* Guilt
- Sexual incapacity, 141–142
- Sexual intercourse, trends, 139–140
- Sexuality
- enhancement, antidepressants (usage), 150–151
- menopause/infertility, relationship, 138–139
- relationship. *See* Aging;
- Longevity
- transitional epoch, 137
- Sexual performance, absence, 148
- Sexual problems, 150
- Shadows, avoidance, 272
- Shakespeare, William
- genius, question, 160
- observation, 165
- Shaw, George Bernard, 97, 166, 168
- Sheehan, George, 194
- Shelley, Percy Blysshe, 271
- Shock, Nathan, 8
- Shumway, Norman, 70–71
- Siegel, Paul, 5, 28
- Singh, JAL, 163, 164
- Skeletal maturation, 7–8. *See also*
- Life span
- Sleep
- activity, impact, 208
- anatomy, 210–211
- apnea, 212–213
- deprivation, 211
- disorders. *See* Age-related sleep disorders
- environment, control, 214
- function, 207–208
- hours, requirement, 67
- importance, 181
- increase. *See* Deep sleep
- juice, 210
- obtaining, 272
- quality, improvement, 208
- schedule, usage, 214
- time, restriction, 214

- usage, 206–214  
 Sleep Center (Boston State Hospital), 211  
 Sleeping pills, danger, 212  
 Smallpox, control, 56  
 Smith, Charlie (life span), 4  
 Smoking abstinence, importance, 216  
 Snoring, 213  
 Social persuasion, 223, 235  
 Solomon, Henry, 185  
 Somers, Anne, 80, 182, 258, 262  
 Space travel, calcium wastage, 126  
 Spangler, Paul, 233  
 Spirduso, Warren, 169, 174  
 Sports, types, 117  
 St. Vincent Millay, Edna, 241  
 Stack, Walt, 233  
 Starr, Bernard D., 140  
 Statutory senility, 95  
 Stavskis, Leo, 258–259  
 Steel, Knight, 78–79  
 Stegner, Wallace, 217  
 Steinberg, William (medical problems), 104–105, 230  
 Stengel, Casey, 179  
 Stengers, Isabelle, 23, 107  
 Steroid starvation, 148  
 Stevenson, Adlai, 41  
 Stewart, Anita, 60  
 Stimulants, avoidance, 214  
 Stokowski, Leopold, 230  
 Stone, Virginia, 216  
 Strehler, Bernard, 10  
 Strength, health (contrast), 191  
 Stress  
   energy, impact, 109–110  
   impact, 21  
 Stroke, impact, 53–54, 82  
 Successful aging, 257–258  
 Suffering, presence, 248  
 Suicide Prevention, 222  
 Sun, energy, 26  
 Sundowning syndrome, 212  
 Supergerons, 4  
 Superoxide dismutase tablets, promotion, 205–206  
 Sweat, ability (evolutionary factor), 113  
 Symes, H. Leonard, 268  
 Synapses, connections, 156  
 SzentGyorgy, Albert, 20  
**T**  
 Taeuber, Cynthia, 5  
 Tarahumara Indians, kickball races, 114  
 Technologic imperative, 43  
 Technology assessment, 59  
 Temperatures, variations (impact). *See* Aging  
 Tennyson, Alfred Lord, 256–257  
 Terminal illness, presence, 182  
   confirmation, 247  
 Testicles, function, 145  
 Testosterone, impact. *See* Brain  
 Thackwell, Larry, 234  
 Thermodynamics, First Law, 22  
   imperative, 133  
 Thermodynamics, Fourth Law, 108  
 Thermodynamics, Second Law, 35, 132  
   biologic implications, 26  
   consistency, 38  
   imperative, 133  
   reconciliation, 24  
   restatement, 107, 132–133  
   understanding, 21–22  
 Third age, 16–18  
   appearance. *See* Life  
*Thirty-Six-Hour Day, The* (Mace), 94  
 Thomas, Dylan, 273  
 Thomas, Lewis, 7, 53–54, 88  
   death, observation, 101  
 Thompson, Paul, 185  
 Thoreau, Henry David, 226  
 Time  
   defining, 22–23

292 *We Live Too Short and Die Too Long*

- equation, 21–22
- TM. *See* Transcendental Meditation
- Tokma, Dennis, 70
- Too Many Promises: The Uncertain Future of Social Security* (Boskin), 263
- Toscanini, Arturo, 230
- Transcendental Meditation (TM), benefits, 125
- Traumas (accidents), impact, 54–55
- Treffert, Donald, 161
- Tryptophan supplements, 210
- U**
- "Ulysses" (Tennyson), 256–257
- Under-nutrition, 33
- Universal disorder, 23
- Useful aging, 256–257
- V**
- Vanity, 191. *See also* Graying
- Vascular inadequacy, 147
- Viagra, introduction, 147
- Visual training, 132
- Vital Involvement in Old Age* (Kivnick), 217
- Vital organ function, decline, 8
- Vitamin
- pill, impact. *See* Age supplements, usage, 204–206
- VO2. *See* Oxygen volume
- Voodoo, 97–101
- confrontation, 98
- phenomenon, reality, 100
- practice, evidence, 100
- W**
- Wakefulness, promotion, 208
- Walford, Roy, 28, 30, 205–206
- diet restriction, 33
- Walter, Bruno, 230
- Warm bath, usage, 214
- Watershed moment, 2
- Weaver, Eula, 232
- Weiner, Norbert, 157–158
- Weinerin, Marcella Baker, 140
- Well-being, self-dependence, 272
- Wellbeing, Social Security system (impact), 96
- What is Life?: The Physical Aspects of the Living Cell* (Schrodinger), 25
- What Men Live By* (Cabot), 197
- White, Paul Dudley, 123–124, 189–190
- Who Shall Live?* (Fuchs), 58
- Why We Sleep* (Horne), 207
- Widower syndrome, 146
- Will, trait, 231
- Williams, Frank, 123
- Willis, Sherry, 172–173
- Wilson, Larry, 233
- Windows on the Mind* (Barth), 159
- Wisdom of the Senses* (Erikson), 217–218
- Wolf, Stewart, 102–103
- Wolf children. *See* Midnapore
- Wolff's Law, affirmation, 126
- Work, therapy, 95–96
- Work satisfaction, 216
- Worry time, scheduling, 214
- Wright, Frank Lloyd, 166
- Wyden, Ron, 244
- Y**
- Youth, medical proselytizing, 11–14
- Z**
- Zaretsky, Malcolm, 39
- Zerhouni, Elias, 24
- Zing, Robert M., 163
- Zins, Dora, 215
- Zoo animals, 186
- Zukor, Adolf, 227