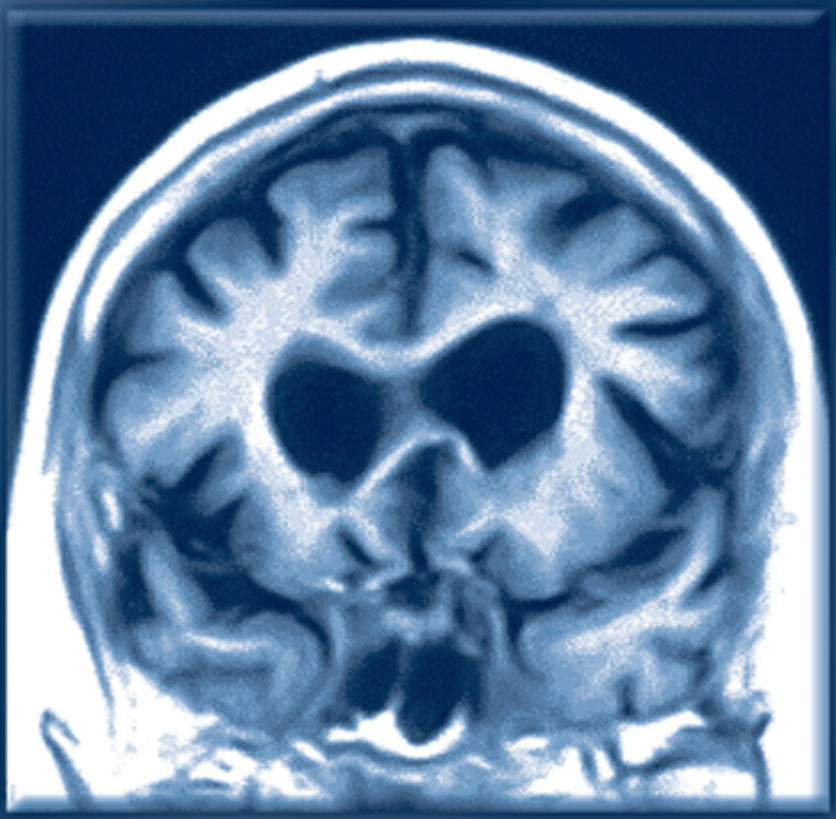
Behavioral Neurology *in the* Elderly



Edited by

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Margaret J. Giannini

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CRC Press
Boca Raton London New York Washington, D.C.

Library of Congress Cataloging-in-Publication Data

Behavioral neurology in the elderly / edited by José León-Carrión and Margaret J. Giannini.
p. cm.
Includes bibliographical references and index.
ISBN 0-8493-2066-6 (alk. paper)
1. Geriatric neuropsychiatry. 2. Clinical neuropsychology. I. León-Carrión, José. II. Giannini, Margaret Joan, 1921-
[DNLM: 1. Aging—psychology. 2. Behavior—Aged. 3. Brain Diseases—prevention & control—Aged. 4. Cognition—Aged. 5. Neuropsychology—Aged. WT 145 B419 2001]
RC451.4.A5 B43 2001
618.97'689—dc21 2001025749
CIP

Visit the CRC Press Web site at www.crcpress.com

International Standard Book Number 0-8493-2066-6
Library of Congress Card Number 2001025749
Printed in the United States of America 1 2 3 4 5 6 7 8 9 0
Printed on acid-free paper

To my father and the memory of my mother

J.L.C.

Preface

Major developments in science, technology, and health care now offer an unprecedented longevity to individuals living in modern society. Whereas at the beginning of the 20th century the average life span did not extend much longer than a person's 40th decade, today, on average, we can expect to live well into our 70s. Reaching the age of 80 is no longer as much of a feat as it used to be. Now, there is an ever-larger older adult population made up of men and women with almost double the life expectancy their ancestors had no more than 100 years ago. This is a fact. We live longer than we used to, and this obviously means there has been an increase in the *quantity* of life. However, our modern society, which has made such great progress in so many areas, is no longer content with quantity. Society now demands increasing *quality* of life for the older adult population.

The aim of this book is to help achieve this goal: greater quality of life for the oldest members of our society. Once we are assured of a longer life, we want to make sure that the time spent living it will be spent in the best physical and mental states possible. *Behavioral Neurology in the Elderly* seeks to provide a close look at the current knowledge regarding the neurobiological foundations of human behavior, specifically focused on older adults. Quality of life directly depends on the functioning of the adult brain and the way in which cognition, emotions, and behavior emerge from these brain functions. How can we place this quantity of life if we lack memory of our experience? And what if we cannot reason? What happens to our emotions and feelings as we age? What if we must physically depend upon others to fulfill our needs and desires? We hope to answer these and other questions within these pages, offering solutions and guidance regarding treatment, where necessary, and prevention, when timely.

Neuropsychologists, neurologists, neuropsychiatrists, and neuroscientists in general have much to offer in the quest to further improve mental health in the elderly adult population. Ongoing research continues working toward achieving this important objective. *Behavioral Neurology in the Elderly* has been conceived in the hope that it can be useful to all those who work with older adults, to those people who are more concerned with improving the quality of life rather than simply maintaining life or just providing care. We must go beyond. Old age should not be a time of illness or a time of idleness or boredom. Healthy old age today is a time of gratification and joy during which the fullness of knowledge and emotion that the older adult offers blends into the creative flow and prosperity of our society.

It is our hope that this book contributes to this goal and can be useful to all those who strive to give the best of themselves in their commitments to maintain the knowledge and wisdom generated by a healthy adult brain integrated within our society.

José León-Carrión
Margaret J. Giannini

Since the times of Clausius, physics has had to deal with two different concepts of time: that of time as a repetition and that of time as a decline. However, it is obvious that we must go beyond this duality. Neither repetition (negation of time) nor decadence (time understood as decline) can do justice to the complexity of the physical world. We must therefore secure a third concept of time which embraces positive and constructive aspects as well.

— Ilya Prigogine
Nobel Prize Winner in Chemistry

Irreversible processes play a fundamental role in structuring the physical world.

— Albert Einstein

Editors

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Fundamentals

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Helio Carpintero

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1.1 INTRODUCTION

Scientific psychology first emerged as a study of the relationship between the mind and the biological structures of an organism. As William James put it, scientific psychology is the science of mental states and their antecedent and consequent physiological processes.[1] Further, according to Wilhelm Wundt, this science focuses on the adult mind, in which all intervening elements and forces are operating according to general laws.

Evolutionary theory, as conceived by Charles Darwin, introduced new and important considerations. The theory focused on mental processes as instruments for adaptation, with new developments and variations deeply affecting all mental activities. Because the human mind had evolved from more primitive structures through adaptation and toward greater control, only through a developmental approach could it be fully understood. Such a view stressed the relevance of the

0-8493-2066-/01/$0.00+$1.50

study of child psychology as a means to obtain a deeper understanding of those processes from which the adult mind is formed. The study of developmental psychology soon followed the Wundtian steps toward the construction of the new science of mind. Notwithstanding, the main focus of study was placed on the early years of life, when habits, feelings, and learning receive a lasting impact and an acquired structure.

Little by little, attention was directed to other age levels, as new adaptive problems and social needs appeared and demanded the intervention of psychologists. In addition, social changes had taken place in Western societies, among them a substantial increase in life expectancy for both men and women. As a result, substantial variations have appeared in the social structure. Different age groups, for example, tend to interact more exclusively among themselves. As a consequence of these changes, elderly people are confronted with the challenge of adapting to today's very different living conditions. The social adaptation of the elderly population is beginning to rely more and more on scientific knowledge and new resources emerging from new technologies.

Humans are historical beings, and all of the different human dimensions are of a historical nature.[2] All these dimensions must be viewed in a certain historical context, within which they are to be interpreted and evaluated. Age is no exception to the rule. It has been noted that "a form of collective life is, among other things, a particular way of spending one's allotted time." This fits in quite well with the different views of old age described as follows: "old age sometimes functions as an empty wait for death, while in other societies it is an age of positive attributes, sure of itself, perhaps even proud and hopeful."[2] The meaning of old age is based on each society's general outlook regarding old age. A valuable aspect of life, it has at times been deemed positive, at times negative. The following overview of the different ways in which old age has been valued through the annals of time emphasizes the historical, and not purely biological, nature of aging.

1.2 OLD AGE THROUGH THE AGES

In classical times, elderly people, scarce in number, were often valued as living receptacles of wisdom. Positive considerations, however, have not always prevailed. As Sumner put it, "older people are generally the possessors of power and authority, but they lose physical power, skill and efficiency in action."[3] The dual nature of this attitude toward old age underlies the two morally opposite ways in which societies treat their aged: one of conventional respect and consideration, and one of physical suppression, as some sort of social liberation.

1.2.1 Greece

In classical Greece, old age was largely viewed as a declining stage of human life. In the Homeric poems, youth symbolized strength and power, whereas elderly people were limited to giving counsel and advice. Going one step farther, Greek comedy treated elderly people as objects of ridicule. Sparta alone put the political direction

of the city-state in the hands of the *Gerusia,* the Council of Elders, in what appears to have been an exception among the Greek cities.[4]

According to historical data it is the philosophers who seem to have been most interested in the peculiar quality of the various stages of life. Pythagoras presents a broad view of the different stages of life, each stage comprising 20 years, and characterizing old age as the fourth period (which spanned from 60 to 80 years of age).[4]

Plato (427–347 B.C.) is generally known as having maintained a positive view of old age. In his *Republic*, he stressed the relevance of the knowledge and experience of the elders to governing the city. This was based on the transmission of good habits and manners from the aged to the young, and in the establishment of an order dominating the whole. When Socrates queried one of his older friends about his experience of life, as a person well advanced in life's path, he was told that, while for a few, the proximity of death was felt as a liberation, for others it was a source of anxiety and fear, impelling them to believe in the fables about life after death in Hades. The fables held that each would experience in the afterlife what was merited from the present life. However, for wise men and philosophers, the real wisdom was to leave this world of sensation behind and to return to the world of ideas, the world of reality and truth. The aged were closer to such a desired end (*Republic*, 329 e sqq.).

In contrast, Aristotle (384–322 B.C.) offered a view critical of the aged. In *Rhetoric,* he presents a vividly negative image of elderly people. This Aristotelian idea of old age would reappear many times in the centuries to follow. The image of elderly people was that of doubtful, spiteful, stingy, cowardly persons, their temperaments having become cold, their strength and warmth lost. They are portrayed as having minds that could only be captivated by thoughts of their own profit. The philosopher argues that most experience in life is that of failure, and that the aged have learned that gain is a difficult task, while loss is easy. He maintains that elderly people experience weak passions, and that their minds are turned toward the past instead of looking into the future (*Rhetoric*, 1389 b 13 sqq.). He sees weakness, egocentrism, and concentration on past life as the main traits of this stage of life. While Plato conceived of elderly people as approaching the highest human goals in life after death, Aristotle took a much more worldly and empirical stance in viewing old age as full of limitations and problems. The respective and contrasting philosophies of the two philosophers clearly represent the dual face of aging.

1.2.2 Rome

The Romans have been characterized as a pragmatic, nontheoretic society, interested in human affairs and in dominating the world. Notwithstanding, their roots were in the home and the family was revered. Ancestors were honored above all, and old age was mainly viewed as a stage of wisdom to be honored. Such a view seemed to decline as the Empire supplanted the old Republic, and military power supplanted democracy.

In early Roman times, elderly people were seen as vessels of tradition and virtue. In *De Senectute,* Cicero (106–43 B.C.) raised his voice in praise of the aged. In

parallel with the Platonic model, he stressed that the negative view of aging was mainly due to four factors: the loss of control of business, the weakening of the body, the tendency of life's pleasures to disappear, and the approach of death.[5] Cicero discarded these factors as unacceptable, arguing that many aged people lead an active life[5] and that, although the strength and force of their youth have been lost, they are able to endure. The aged, he argued, continue to experience the pleasures of friendship and philosophy; while the burning desires of youth vanish, the mind achieves freedom and calm. Cicero maintained that death is a natural process, not to be feared or viewed as an ending if a new life awaits beyond. Cicero's outlook was based on the idea that nature is both the fate and cause of real processes. Hence, the assumption that aging and death are natural processes inspired him to regard both as propitious, driving him to raise his voice in praise (*laudatio*). The arguments set forth by Cicero would endure for centuries, reappearing in one form or another up to the present, where they can be found as recurring themes in literature on the subject of aging.

Later, under the Empire, there is a contrasting view of age, where an old man, "after losing his family and political power, … is left alone, retaining only his aches, ugliness and weakness."[3]

Still, the earlier position persists, and praise of old age may be found in the famous *Letters to Lucilius* from Seneca (4 B.C.–A.D. 65), a man of the Stoa, a Stoic. Stoicism relies on the acceptance of nature, the ultimate reality from which everything flows and to which everything returns. Age is considered a natural condition affecting the body and soul differently. With age, the body feels tired (*lassum*), or, toward the end, more than tired, decrepit (*decrepitum*). The soul, however, is regarded as full of power (*viget*) and as experiencing the pleasures of thinking and being alive. Life is an expectation of its end, and wisdom is coincident with nature. When that which must disappear has vanished, it is right and must be felt as right, in keeping with the ordinance of nature. The wise man must say: "*accipio conditionem*"; i.e., I accept the rule, that is the law of nature.[6] Seneca offers a positive view, old age signifying nearing the end, the end signifying freedom from body and the return to nature. Such a doctrine, although Stoic in origin, was readily accepted by religious groups that also believed in a life after death and facing the Supreme Being. Stoicism has had a long-lasting influence, through medieval and up to modern times. This philosophy, which regards old age as a time to prepare oneself for the end of this life, has been an important contribution toward a positive outlook on old age.

1.2.3 The Middle Ages

In Western civilization, medieval times were defined by the interactions between Roman civilization, which emerged and developed in the Mediterranean, and northern peoples, such as the Germans, whose mentality was based on totally different grounds. The elements of the ancient culture were lost, and a period of Dark Ages spread over the known world. Christianity spread and with it the view of the world as a temporary stage for humans, and a means to obtain final "salvation."

St. Isidore of Seville (c. 560–636), a bishop and theologian from the Visigoth Kingdom of Spain, set forth one of the first compilations of knowledge during the Middle Ages. His *Etymologiae* is an encyclopedia that offers a synthesis of classical culture, in which he expounds through the analysis of terms viewed from an etymological perspective. It includes information regarding the "six ages of man," the last of which is termed "senium," the sixth age, the age of the elderly. According to St. Isidore, the sixth age begins at 70 and has no fixed age to end, as it is the final age, ending with death.

Within the pages of the *Etymologiae,* it is suggested that the term *senes* (old man) would come from the "loss of senses." The mind becomes clumsier, and as the blood cools, elderly people become more and more imprudent. This is a clear instance of galenic humoral theory, which equated wisdom with heat.

St. Isidore considered that old age was a combination of both good and bad aspects. Freedom from passions, weakness of sexual desires, growth of wisdom, and wide experience are deemed positive values, whereas on the negative side are illnesses, weakness of body, loss of love, and sadness.[7] The Aristotelian model is clearly maintained in these pages. No special consideration seems to be forthcoming from the religious beliefs of the author.

It has been said that the Black Death that assailed Europe beginning in late 1348 destroyed one fifth of the population. This introduced important demographic changes, an important effect of which was greater power in the hands of the older population. In Venice, not only the *doges* but the whole political system relied on aged members of the great families. Similar regimes dominated Italy in pre-Renaissance times.[4]

In her general view of senescence, Simone de Beauvoir[8] affirms that historical considerations on this topic have mainly focused upon men, neglecting women. True, women have remained largely unheeded and marginalized in historic treatises until recent times, but medieval literature does offer a few examples with a positive appreciation of elderly women. For example, two masterpieces of Spanish literature present two elderly female main characters. The first is found in the 14th century *Libro de Buen Amor* (Book of Good Love) by Juan Ruiz, a book of joyful stories and love poems. An elderly go-between in love intrigues, "Trotaconventos," is portrayed, qualified by some as "the first great character in Spanish literature." Given that she is worldly in the affairs of love, Trotaconventos' assistance is called upon by young lovers in need of aid. Experience and cunning, psychological insight, and social ability are blended in this character, who later serves as a model for the second one, "Celestina." Also a procuress, Celestina is the main character in the Renaissance novel *Tragicomedia de Calixto y Melibea* (1499) by Fernando de Rojas. Able in her art to the point of being reprehensible, Celestina uses her deep knowledge of the human condition to meddle in ways that did not fit moral standards. Nonetheless, owing to her ingenuity and skills, Celestina became established as a symbol of sorts in the ways of human affairs. Old age has its own set of values and virtues: this would seem to be the lesson to be learned from these literary creations.

1.2.4 The Modern Age

In modern times, little by little references to religious beliefs began to disappear, and man and woman became more and more centered upon this world and less focused on the next. Adaptation and control of worldly affairs became the up-and-coming values, and the weaknesses and infirmities of old age became serious handicaps against true worth.

Some essential traits have been captured by William Shakespeare (1564–1616) in *As You Like It* (II, vii), in his famous monologue on the seven ages of man:

> All the world's a stage,
> And all the men and women merely players:
> They have their exits and their entrances;
> And one man in his time plays many parts,
> His acts being seven ages

which ends with these lines:

> The sixth age shifts
> Into the lean and slipper'd pantaloon,
> With spectacles on nose, and pouch on side,
> His youthful hose, well sav'd, a world too wide
> For his shrunk shank, and his big manly voice,
> Turning again toward childish treble, pipes
> And whistles in his sound. Last scene of all,
> That ends this strange eventful history,
> Is second childishness, and mere oblivion,
> Sans teeth, sans eyes, sans taste, sans every thing

Here old age is signified as the loss of everything, mind and reason included, and the return to childishness and oblivion. The empiricism found in the work of Aristotle many centuries before once again appears, bringing to the fore this negative image of the last age of man.

During the 17th and 18th centuries this negative picture did not change. Neither the economic powers nor the Church were interested in the problem. Exceptions were the English and American Puritan societies, where a kind of gerontocracy of parents and ministers exalted the value of elderly people.

In the medical world, a fledging European gerontology began to appear, first with some Renaissance books by Gabriele Zerbi and Marsilio Ficino (both printed in 1489). These ideas were later developed in the work of Girolamo Brisianus (*Geraeologia*, 1583), Luigi Cornaro (1558), Georg Pictorius von Villingen (1549), and, in Portugal, E. Madeyra Arraes. In addition, the work of the Spanish hygienist Cristobal Mendez (1553) should be distinguished in this area, as he pointed out exercises that would help aged people maintain a good state of health.[9]

Sir Francis Bacon's *The History of Life and Death* (1626), one of his last published works, has at times been considered the foundation of modern gerontology.

In this work, Bacon (1561–1626), pioneer of British Empiricism, examines the physical conditions of life and the life cycle in natural terms, as simple effects of the natural constituents of the individual. Bacon differentiated between the body and the soul, and described the body as being of two different types: the living, material body and the supernatural body. He considered the living body the result of the mixture of elements, while God "blew" the supernatural body into a man. According to the book, everything contains a "spirit or pneumatic body,"[10] but living beings have a second body, "a living spirit"[10] permeating the whole body but essentially concentrated in the brain. Living bodies are fatty ones and undergo self-change and renovation, while inanimate bodies are hard and cannot change or renovate themselves. Bacon describes life as a process that implies activity and movement. In its early stages, movement and activity is that of growth, which later stops. Gradually then, this inherent activity and movement becomes a conspiracy of sorts between the active principle or *spiritus,* and the external air. A dryness and wasting of the body is produced, causing it to deteriorate and leading finally to its end. *Spirits*, combined with external air, dry up the fats of the body, leading to a natural process of "consumption." Here is where Bacon places the roots of aging, considering it a universal process, encompassing both inanimate objects and living entities, among which he includes human nature. This aging process implies desiccation, a drying up that deteriorates the body and causes a loss or *depredatio*,[10] which becomes irreversible as senescense begins. Bacon examines two principal processes of life: the deterioration of the body (*consumptio*) and its repair (*reparatio*), both governed by natural laws. To intervene or cause any change in these processes, he maintains that one must be familiar with these natural laws. Intervention is considered possible in at least three ways: the prevention of consumption, the perfection of repair, and the renovation of that which is already old (*prohibitio consumptionis, perfectio reparationis, renovatio veterationis*).[10,11] Such ideas imply that, by taking into account the laws of the process, there is a real possibility of strengthening and prolonging life. To increase well-being, destructive risk factors must be controlled or reduced. Longevity is a multicausal process related not only to situation variables, such as the time period, climate, and place, but also to such factors as heredity, the habits of bodily functions and physical constitution, birthday (according to astrology), living habits and diet, the quality of the living conditions and the home, and psychological characteristics such as affections (*affectus*), motivations (*studia*), and occasional events (*accidentia*).[11]

The empirical approach to the problem of senescence found in these pages is noteworthy. For example, a large part is devoted to different types of nourishment, and attention is also paid to eating habits: the precept "eating before being hungry and drinking before being thirsty" is referred to here as the key recommendation for an elderly person wishing to live a long life.[11] Annotated records of very aged historical figures, such as Moses, Abraham, Solomon, and many others, are included; geographic areas favoring aging are also mentioned (not only countries with cold climates, but also islands such as Japan and the Canary Islands were seen to stimulate longevity among their inhabitants).[11] He also summed up those signs announcing death even in a healthy state, before illness appears.

Bacon considered healthy habits more important than rare potions and elixirs of eternal youth. He wrote in the "De Augmentis Scientiarum:"[11]

> It is far more probable that a man who knows well the nature of arefaction and the depredations of the spirits upon the solid parts of the body, and clearly understands the nature of assimilation and of alimentation, whether more or less perfect, and has likewise observed the nature of the spirits, and the flame as it were of the body, whose office is sometimes to consume and sometimes to restore, shall by diets, bathings, anointings, proper medicines, suitable exercises, and the like, prolong life, or in some degree renew the vigour of youth, than that it can be done by a few drops or scruples of a precious liquor or essence.

Bacon goes on to say, "Life under religious rules, or devoted to studies of philosophy and humanities seems to lengthen; diet and moderate exercise, do the same also; contrarywise, fatigue activates spirits, with subsequent destruction of body. Psychological moods deeply influence body states. Passions are not without consequence on lengthening or shortening life." "Great fears shorten life …; anger indulged … is beneficial," but not "suppressed anger," which activates destructive spirits; great shame is pernicious, as is also envy, while "hope is … the most useful" of all feelings."[10] He considers that in a comparison between younger and older persons, neither the body nor mind of the latter would surpass those of the former; the defects of old minds would parallel those of the body.[10] Bacon shows himself in the end alienated from those favoring the superiority of youth, but at the same time, offered advice on how to keep oneself at one's best, by adapting life to natural laws and conditions. Another singular trait of his personality can be found in his defense of active euthanasia, which he considered a special task to be performed by physicians, who were not only charged with the restoration of health, but also with those actions that serve "only to make a fair and easy passage from life" for people suffering illnesses, "all hope of recovery being gone."[11]

This book on "life and death" seems to have been highly appreciated among the physicians from the Baroque period as it has been noted that the great physician Boerhaave was deeply influenced by Bacon's work.

Aside from empirical considerations such as Bacon's, the stereotype of poor, limited, weak old age was strong enough to remain in force during the Enlightenment. For example, an 18th-century Spanish physician, Andres Piquer,[12] held an opinion of senescence wholly based on those put forth by Aristotle, Hippocrates, and Horace. He remarked on the obvious validity of such observations and how they coincidenced with his own medical experience. Piquer considered education and mortification as the best means to govern the mind during life.

Not far removed are the reflections on man's life by the Frenchman Georges Louis Leclerc, Comte de Buffon (1707–1788). Buffon, one of the greatest naturalists of his time, wrote a natural history of man, from a developmental perspective. Built upon the Cartesian mind/body dualism, he considered it best to analyze the mind from a natural point of view. According to Buffon, body constituents are growing

during the first stages of development, but they soon begin to multiply and accumulate without real growth: humors and organs begin to lose their flexibility. He wrote that the onset of the process of senility clearly commences at the age of 70 and that senescence would end at the age of 80 or 100 years.[13] "As age grows … body is dying little by little and part after part … death is nothing except the last stage of such a series of steps, the last facet of life." Buffon considered death only an aspect of the entire process of life.

As growth is followed by destruction, he was inclined to accept a rather mechanical view of development, that could only be affected by too much nourishment or excessive diet; neither race nor climate nor lifestyle would change the duration of life in a meaningful way.[13]

Buffon also offered some interesting figures on life expectancy. For a newborn baby, he estimated life expectancy to be 8 years, while at age 70, it was over 6 years, and only 3 years for all ages over 77.[13] With such figures, death became something quantitative and well defined, that would lose its menacing face. The age of reason was "cleaning up" the image of the final act of the play of life.

1.2.5 The 19th Century: Cabanis, Quételet

Empiricism proved that the contents of the human mind were dependent upon the natural conditions of the body. The French philosopher Étienne Bonnot de Condillac (1715–1780) and the heirs of John Locke conceived the formation of the mind as a process closely related with experience and age, and largely based on feelings and emotions. Organic development was seen as a biological process paralleled or followed by a similar evolution taking place in the mind. Old age should not be taken as a destructive stage, but as the final scene of the natural process of the development of the mind. Given the multiple variations of individuals arriving at the last age, a normal evolution was supposed to be operating. Quantitative and qualitative changes would indicate the active causes intervening in the process. Those degenerative processes that could appear in senescence had to be viewed as mental conditions, instead of mere organic damage.

Pierre Jean Georges Cabanis (1757–1808), an enlightened French thinker deeply interested in the study of the human mind and its dependence on organic conditions,[14] wrote on the subject of age and mental faculties. His writings seem to have been largely influenced by Bacon, as he considers that young bodies are more flexible than older ones, the latter having become filled up with materials. Faculties are stronger at early stages of development, and as the individual becomes older, "the action of life begins to find strong resistance, fluid movements are harder, and the feeling of strength and well-being … decreases day after day, in a notable way."[14] The same is true for "moral happiness," which is identical to well-being,[14] and which begins to fade as the feelings of unrest and uneasiness gradually appear. The upper limit for the mature age is placed between 49 and 56 years of age, and implies "a true climactic age"[14] for both sexes in that it constitutes the threshold of senescence. Body changes are followed by changes in ideas and feelings; sometimes, the melancholic mood diminishes; and other times anxiety appears as an effect of bad circulation.[14] "As age progresses, mind operations become day after day slower and

hesitant; character becomes, little by little, shy, suspicious, opposed to any haphazardous project. The difficulty of being grows continuously; the feelings of life are not openly exteriorized, and a fatal need forces the old man to retreat upon himself: should not such an egoism, by which he is usually condemned, be viewed contrariwise as an immediate effect of nature?"[14]

Age also brings with it the loss of recent memory and, at the same time, more vivid recall of childhood memories. At an early age, the impressions received by the brain are stronger, but receptivity would diminish along with age, and interference would also deteriorate the quality of contents. Long before the enunciation of Ribot's law of regression, Cabanis noted that "it may be seen … that memories disappear in an inverse order to that under which impressions were received, beginning with the more recent and weak ones, and progressing toward the older and more durable ones."[14]

Step by step, the study of mind from a physiological and natural point of view was advancing along with the century. The Belgian social researcher Adolphe Quételet (1796–1874) demanded an emphasis on more detailed and quantitative knowledge. His book, *Sur l'homme et le développement de ses facultés, ou Essai de physique sociale* (1835), has been viewed as "the first effort to apply mathematical analysis to the study of the human being, not only of his body, but also his behavior, morals, mind and soul."[15] In these pages, the names of Gall, Lavater, Pinel, and Esquirol are frequently cited. Quételet also took into account many quantitative anthropological studies, on crime, marriage, and so forth. Interested at first in phrenology and its achievements, he later became critical of it and maintained the need to "study man through his *actions,* and to ascend from effects to causes,"[16] always placing individuals within society, and societies within the whole of humanity.

Humans, as natural beings, are subject to a development according to laws of largely unknown physical and moral dimensions. There are some constant values in different dimensions of being, but there are also variations due to accidental causes, and these differences are all around the average value. Such variations are "regulated with such harmony and precision that can be classified" and quantified, but they cancel each other out when large numbers of subjects are considered.[16] Instead of concentrating upon individuals as such, Quételet stressed the need for statistical studies to clarify the "general facts" and to remove meaningless peculiarities.[16] He was in search of social laws, not immutable laws as in the physical sciences, but laws that change in accordance with social changes that are essential in societies. He wanted to study the "average man," status determined by statistical procedures. "Man, I consider here, in his society, to be the equivalent of the gravitational center in a physical body; he is the average around which all the social elements oscillate."[17] Individuals are free beings, but "free will disappears and is without visible effects when observations are made upon a large number of individuals."[16] Statistics would cast light on the essential traits of the human being.

Some social phenomena are related to age. For example, marriage, mortality, and life expectancy are age-related phenomena. Physical body traits also correlate

with the body's developmental level. Mental faculties seem equally affected by age, but correlations here are less defined, and quantification is reduced to quasi-nominal scales. For example, courage varies among individuals, and individuals may be compared in this domain, but an "absolute degree" of courage would be meaningless,[16] as no courage unit could be employed to measure it.

Using statistical arguments, Quételet noted that psychopathological disturbances correlated with age levels; feeble-mindedness was related to childhood, and insanity to senescence.[16] He made more concrete comparisons: "In Norway, only 1/8 of the demented population is over 60, while in Paris, they represent 1/6 of the total."[16] Suicide was analyzed, and data from Berlin (from the 1818–1824 period) showed 12% of people over 70 years old committed suicide, while data from Paris showed 14.5% in the same age range.[16] He did the same with marriage, and the figures impelled him to affirm that strong laws seem to govern such behavior.

Quételet showed that moral and physical phenomena of elderly people had to be considered from social and historical perspectives, and not only from a physical perspective. He maintained the need for a detailed developmental study of human faculties.[17] Faculties would develop in an orderly way, memory first, then imagination, and last reason.[16] In addition, while the natural faculties of the "physical man" would appear as stable, those related to the "intellectual man" seem to be in continuous progress, owing to scientific advancements.[17] As knowledge spreads out through society, variations tend to diminish and to concentrate toward the mean.[17] Civilization would equate to normalization, in physical, moral, and psychological phenomena.

In his approach, Quételet established the basis for a quantitative study of human behavior that reconciled the physical, intellectual, and moral dimensions of the "average man," which could represent innumerable variations.

Variations also became central to biological evolutionism as conceived by Charles Darwin (1809–1882) in *On the Origin of Species* (1859). Darwin as well stressed the relevance of physical and mental qualities in the common task of adapting the organism to its environment. Usefulness for survival became the ultimate reason for maintaining such qualities along the hereditary process. Adaptation becomes maximized when qualities endlessly change and can confront nearly all types of situations. As Darwin's cousin, Sir Francis Galton, a man of genius, wrote, "the moral and intellectual wealth of a nation largely consists in the multifarious variety of the gifts of the men who compose it."[18] Study of the subject occupied him for a good part of his life. In 1883, at the International Exhibition of London, he carried out mass observations and tested a large number of people on sensory and mental qualities. There he saw how average measures, representing the "average man," showed steady deterioration with age.

Interest in the study of psychological abilities soon concentrated on the early part of life, childhood. Physical training, school activities, and mental and moral education demanded such an approach. But it is no surprise that one of the pioneers of child psychology, the well-known American researcher Granville Stanley Hall, became interested toward the end of his life in the study of the final years of the course of human life. His work became a milestone in the field.

1.3 HALL'S *SENESCENCE* (1922)

Granville Stanley Hall, one of the pioneers of the new psychology in the United States, is the author of *Senescence*, which is usually considered the founding block of the psychological study of aging. The author considered himself a "genetic psychologist."[19] He had explored the early part of life at length in his book *Adolescence* (1904), later condensed in *Youth* (1907). As he grew older, he turned his attention toward his new stage. Although he found it a "depressing theme,"[19] he saw it as an introduction to the authentic life for himself. Some indications suggest that the experience of World War I may have influenced the author's mature view.

According to Hall, senescence represents the fourth life period, beginning in the 40s, and culminating in "senecritude," which ends with death. It "has its own feelings, thoughts, and will, as well as its own physiology, and their regimen is important, as well as that of the body."[19] Most important, this age must accomplish a task in modern societies that has not yet been recognized. Such a task is this: "intelligent and well-conserved senectitude has very important social and anthropological functions in the modern world …; the chief of these is … synthesis, … in our very complex age of distracting specializations."[19] Hall states that "age is in quest of first principles,"[19] in quest of real wisdom that should be offered to societies in need of it. Old age cannot be merely "contemplative,"[19] but has to achieve some goals, perhaps summed up in the old precept: "old men for counsel."[19] This is a basic need for modern societies: an impartial and broadly general world view, a characteristic quality of the knowledge that an elderly person has accumulated and that is missing among younger minds.

His picture includes data on creativity and production in science and art of both the under- and over-40 populations, offering a balanced result; vital statistics, which show a slow lengthening of life from the 19th to the 20th century, and countless opinions and stories related to old age.

Great attention is paid here to the objective aspects of the problem. In fact, Hall explored many institutions and social care services for elderly and poor people. Here he detected "the growing magnitude of the economic problem of old age."[19] Another interesting point is his review of literature dealing with medical and health care devoted to this life period, epitomized in a cumulative way without further integration. He was clearly against a mere hereditary explanation for longevity; instead, he maintained that senescence is "a state of mind"[19] and that it depends on knowledge and control of the conditions of such a state. Hall considers mental attitude to be the crucial factor; as a matter of fact, the 70th birthday is viewed as "the saddest" of all, and "the most dangerous milestone."[19] The meaning is that feelings and interpretations about life play a role as basic as biological factors might. All scientific data are interpreted by the mind and, based on these grounds, "psychology must henceforth have a place here second only to biology in formulating conclusions."[19]

The book also covered those theories that at that time were dealing with the problem of prolonging life, such as Weismann's immortality of germ plasma and Metchnikoff's ways of furthering senescence, endocrinology, and rejuvenation, among others. Nonetheless, in the end, he focused his hopes on psychology. Life,

according to Hall, depends on motivation and on those forces that make up the conditions of human life. These are mainly related to endocrine functions, which set the stage for a unified functioning of biological activities, psychological moods and feelings, and genetic processes.[19]

Egocentrism, demand for others' attention, "patheticism," erotic decline, the tendency to alternate moods, irritability, sleep disturbances, capriciousness, loss of attention to personal care, and the dulling of sensations are frequently accompanied by mental starvation, as sources for stimulation are diminished. According to Hall, all these phenomena indicate that "the old need a higher kind and degree of self-knowledge."[19] He is against the view of old age as a second childhood, as "there is nothing rejuvenative about it,"[19] although it is true that is a "stage of postmaturity that involves … the transvaluation of all values,"[19] and especially all those related to menopause and the loss of beauty and attractiveness in women. For men, the loss of generative potency would be in many cases their "very most psychalgic experience."[19] While sex declines, love is subject to sublimation or evolves to friendship.

The picture that emerges from these pages is mostly descriptive and largely based on self-analysis and qualitative expositions of life in old age. All these traits should be viewed as materials to be used in favor of Hall's project: the defense of an image of an old man as an active being in a crusade against ignorance and in search of objectivity.[19] The image of Nietzschean Zarathustra seems to symbolize his ideal.[19] In fact, he proposed to complement youthful virtues with those of the aged person,[19] as, in other aspects, he was inclined to combine the viewpoints of different psychological schools, to get "a sound knowledge of man."[19]

Hall included a chapter with long citations and comments on some answers he received from distinguished people to a questionnaire sent by him, dealing with their experiences on age and its more salient traits. He also added an ending in which he deals with attitudes toward death, viewed as the total end of life, although he tried to reconcile such a view with some feelings of acceptance and satisfaction for the life that has been lived.

The final pages are an exhortation to further the knowledge of aging, which he considered an unexplored topic among psychologists. However, although the book was frequently cited in later works, its lack of methodology and its overabundance of occasional and erudite information made it an oddity, without serious scientific consequences.

1.4 SOME ANALYTIC PERSPECTIVES ON AGING

During the first half of the 20th century, many different schools of psychological thought aimed at obtaining supremacy in the field. Strongly influenced by evolutionism and the ever-growing knowledge of biological structures governing animal and human behavior, most focused on early life as the period in which the structure develops that will explain mature life and adaptations.

Psychoanalysis on the one hand and behaviorism on the other have viewed human childhood as the stage in which habits, knowledge, and sources for action are acquired by the subjects, and such elements would allow explanations of behavior.

This does not mean that no reflection on aging might be found in the classic works of other representative authors. For example, well-known psychodynamic theorists such as Carl G. Jung and Alfred Adler outlined drafts of the psychology of old age that are not without interest.

Jung (1875–1961), in a well-known paper on "The decline of life,"[20] considered old age a period of life full of problems, as instincts have lost control of behavior, and imagination has given up, while the subject is confronted by the limitations of everyday reality. Moreover, Jung lamented that there was no school at all for those entering into this last part of their lives, wholly "unprepared" for the approaching tasks.[20] In his view, some changes usually bring less tolerance and a degree of fanaticism. It would be desirable to prepare people for departure from life, as the main religions have taught for centuries. The teachings would present certain images and symbols, which could be employed to adapt the mind to the coming experience. This would not be a question of faith, but of reconciliation between conscious thought and unconscious protoimages, in search of mental calm.[20]

Adler (1870–1937), on the other hand, offered a vivid picture of old age in accordance with his basic teachings. He had taught that the normal person relies psychologically on a sense of self-worth and power, whereas neurotics view themselves as faulty or inferior people when compared with others. The elderly person, under normal circumstances, might be considered a sort of functional neurotic: with feelings of uselessness, unworthiness, and of being slighted, which can generate a hostile attitude toward the world.[21]

Both pictures deal with deep motivations, mostly rooted at an unconscious level, guiding the life of elderly people, and causing most of the difficulties usually associated with that period of life.

New understanding has come from longitudinal studies on intelligence and child development. Here is found increased interest in adult and later life, combined with a growing preoccupation with the underlying sources that govern cognitive abilities and their laws. Some representative works are considered below.

1.4.1 Charlotte Bühler's "Course of Life"

Charlotte Bühler (1883–1974) was deeply influenced by her husband, Karl, and together in the 1930s they represented the pinnacle of the German school of developmental psychology. This school of thought was centered in Vienna and oriented closely with, but independent of, Gestalt psychology. Charlotte Bühler soon became interested in longitudinal studies of life careers, and through them she eventually became devoted to humanistic studies of human life, especially after the couple was exiled to the United States as the Nazis seized power in Germany and Austria.

Her book on the human course of life as a psychological problem (*Der menschliche Lebenslauf als psychologisches Problem*) is, without doubt, a milestone in the field. It is focused on human life as a goal-oriented activity, and strives to understand its structure and developmental laws.

Old age here represents the second part of the life curve, a period characterized not by "expansion," which corresponds to youth and mature age, but by "restriction"[22] or diminishment of reproductory possibilities and functional activities (from

the 50th year on). The basic proposition of the book is related to the dual nature of the life course: there is a line that represents vitality, and another that represents personal achievements; and these lines do not run strictly parallel. Climax in the former precedes climax in the latter. When an individual creates an objective work, this may develop at its own pace, enlarging and reinforcing from outside the life course of its author.[22] Cultural creatures would help their creators maintain youthfulness of spirit. And childhood and youth should be viewed as a draft and projection of what life will be later in its definite form.[22]

Charlotte Bühler combined sociobiographical data with subjective declarations and information and objective production and works.[22] Her study greatly benefited from information from applied psychology and concrete research on job performance and age. However, Charlotte Bühler also added interesting analyses of life careers from well-known people in the arts and culture, and stressed the importance of having a global view of biographical achievements to evaluate each of its parts.

Such a global view of the life course has also been the focus of the reflections on human development by another dynamic theorist, Erik Erikson.

1.4.2 Erikson's Views on Aging

Erik Erikson (1902–1994), psychoanalyst, was born and raised in Germany and later emigrated to the United States. He was attracted to the study of children in Vienna under the direction of Anna Freud. There, he was also influenced by the Bühlers' work, and he continued these studies after settling in the 1930s in Boston, where he became very influential. Nevertheless, he was not entirely free from suspicion and restrictions during the McCarthy period.

Whereas Freudian psychoanalysis had concentrated upon childhood as the source of all determinations of later life, Erikson wanted to take the life cycle as a whole, conceiving it as a succession of stages. Each stage was characterized by certain traits and delimited *a parte ante* and *a parte post* by a crisis, whose results would influence the course of the following periods. He also added new periods to the classical ones, covering the whole life span, and revised the dynamics that are in force during each stage with leeway for cultural and social factors.

Human life is characterized by a sense of identity, which does not imply an absence of change, but the building of a dimension of sameness throughout the variations. Identity emerges through experiences during childhood and youth, facing an opposite tendency toward confusion and lack of life goals. The earlier crises have already been resolved in previous steps. The first crisis, related to "basic trust versus basic mistrust" (the first 2 years of life), creates a basic feeling toward the world, depending on interpersonal experiences. Next comes the second crisis, "autonomy versus shame and doubt" (the 2-year-old), resulting from early explorations that include the child's own body and sexual organs and raise early prohibitions. This crisis is followed by "initiative versus guilt" (3 to 5 years), characterized by the so-called Oedipus conflict, and the fourth crisis, "industry versus inferiority" (during the elementary-school years). After adolescence, when the sense of values leads to a personal identity, life is experienced as a project that reaches toward certain concrete goals. This is followed in early adulthood by the conflict between "intimacy

versus isolation," when the search for love and intimacy is balanced by the fear of rejection and the need for solitude. Finally, there is the tension between "generativity versus stagnation" in later adulthood, devoting oneself to others or choosing an egoistic lifestyle.

It is precisely the next level that is dedicated to old age, and defined by an opposition between "ego integrity versus despair." The former trait is found in those who accept "one's one and only life cycle as something that had to be and that, by necessity, permitted no substitutions."[23] This reflects what sort of life is built, and is, quoting the Spanish Golden Age dramatist Calderon de la Barca, the "patrimony of the soul."[23] Despair, on the contrary, arises from the proximity of death and the fear of losing valued people and achievements. If integrity surpasses despair, one acquires wisdom, the virtue *par excellence* of old age. It implies emotional integrity and self-acceptance, and represents the positive end of all the previous crises through which the individual has built his or her personality.

This developmental approach to the life cycle as a whole clearly empathizes with themes and questions raised by theoreticians interested in viewing human psychology without losing the flavor of existence and self-actualization. Many psychiatrists and psychologists stressed, as an alternative "third force" to mere naturalistic considerations based on simple learning theories, the need to look at human life from the perspective of self-construction.[24,25] This trend was largely influenced by the contemporary existentialism of Heidegger and Sartre, as well as the philosophy of human life of José Ortega y Gasset, both rooted in the phenomenology of Husserl.

As one of the best-known representatives of this school of thought, Abraham Maslow (1908–1970), put it, life guided by values has sense and becomes ordered, and its structure is submitted to a motivational hierarchy dominated at the top by self-actualization needs. He analyzed such values and their effects on older people coming from different cultures. As their concrete content is of a sociohistorical nature, they all must be seen in definite here-and-now coordinates.[26] Aging is, then, primarily, a question of self-fulfillment in a historical context.

1.5 SOME MODERN DEVELOPMENTS

It is easy to see that in recent times, under the influence of such a vast variety of different points of view regarding human life (i.e., phenomenological, developmental, humanistic, and so forth), aging became a central topic in psychology, with inspiration coming from sources other than mere biological and naturalistic views.

Psychology began to pay greater attention to aging when stimuli from several fronts converged in the need for a global consideration of aging and its psychosocial characteristics and demands. It seems that, following World War II, life expectancy lengthened rapidly everywhere, and in some places, the need for a supplementary workforce and difficult economic conditions were conducive to older people staying on at certain types of jobs, lengthening the working period of life. The rapid growth of the over-60s population, in Western societies, and its increasing political weight in democracies, have also been decisive factors in bringing the study of

the psychology of the elderly population to the fore. Nonetheless, the social demands for early retirement have, in many cases, caused an increase in the population that gives up work and has much more leisure time.

Two books that blend empirical research with philosophical reflections will be considered here: B. F. Skinner and M. Vaughan's *Enjoy Old Age*[27] and E. Mira y Lopez's *Hacia una vejez joven* (*Towards a Young Old Age*).[26] Both represent a positive view of aging and highlight the need for a constructive attitude in facing life.

B. F. Skinner (1904–1993), the great theorist of behaviorism, and perhaps a frustrated man of letters, in collaboration with the gerontologist Margaret Vaughan, produced a book on aging offering advice and suggestions to elderly people who wanted help from experts. The book covers the usual topics in this sort of work. The need to keep oneself active, to have a good temper, to maintain adequate levels of stimulation, and to employ tricks and aids to enhance memory, social contacts, and life enjoyment are stressed. The interesting aspect is that, in concert with his theoretical position as a behaviorist, Skinner maintains that behavior is mainly under the control of the environment, mostly governed by its effects. Certain consequences arise from such principles: first, the problems of aged people should be treated as questions that need environmental changes and improvements, instead of mental accommodation of concepts and ideas. Taking notes, improving lighting, or changing furniture will improve the surroundings of aged people and, as a consequence, will afford them greater satisfaction and confidence. The second point is closely related to the first; it is necessary to reexamine all personal activities to discover those that will strengthen the individual, those that are felt to be satisfying, and then guiding life according to these real values instead of maintaining old prejudices and past life habits. Changing the world, and changing the repertoire of habits, will permit new adaptation to the new situation. And new satisfactions are to be obtained through these changes.[29]

Another positive perspective on aging may be found in the book *Toward a Young Old Age* by E. Mira y Lopez. Mira (1896–1964) was a well-known Spanish psychologist who, following his exile to Latin America, did most of his work in Brazil where he advocated applied psychology.[30] He created an interesting panoramic vision of aging, taking as points of reference the enormous numbers of aged people in modern societies and the generally good conditions for living an active life experienced by a large segment of these people.

According to his view, old age is not a simple phenomenon, but a complex one, with various dimensions. "A perceptual aging may be easily differentiated from an intellectual one, sentimental aging from volitional aging …, It is of no interest … to qualify someone as old or young, but to say exactly in what aspects one is old and in what other aspects one is young, or, better yet, *how* is he young or old."[28] He suggested the need for a new life project that would be suitable to an individual's psychophysical condition, and the introduction of those changes that would readapt the environment to the new parameters.[28] Instead of defending a remedial attitude in the face of the new problems, Mira adopted a rather creative and active resolution, to favor the adoption of new programs ensuring a feeling of well-being, efficacy, and adjustment. He maintained that past, present, and future should recombine in

the life of the elderly, in a balanced integration that would assume the essential part played by the future, ideals, and projects in human life.

1.8 COMING INTO THE PRESENT

There have been many advances since the 1950s. Although forward movement had begun before, World War II slowed development for a time, and new efforts were commenced shortly following its end. In the United States, the American Psychological Association Division of Maturity and Aging was created in 1945, the National Institute of Mental Health incorporated a section on aging in 1953, and congresses and publications on the specialty began to appear. The most widely cited journal, *Journal of Gerontology*, was founded in 1946, and studies and publications dealing with this topic multiplied between 1955 and 1965.[31,32] Taking into account many bibliographic indicators, it has been noted that "a coherence of the field developed about 1960."[33] Some aspects became permanent and well-defined dimensions for research in the field: cognitive abilities, learning and memory, motivation, sexuality, personality, psychobiological processes, prevention, and intervention.

Some insights can be gained from the analysis of the titles of some specialized handbooks.[34,35] For example, it may be noted that, when the first one-volume handbook on the behavioral aspects of aging was edited by James E. Birren (*Handbook of Aging and the Individual*) in 1959,[36] the aging process was related directly to the question of individuality. A step farther was taken in 1977, when the editorial program of a comprehensive handbook included three different volumes, one on the *Biology of Aging*,[37] a second on the *Psychology of Aging,*[38] and a third on *Aging and the Social Sciences.*[39] This throws some light on the growing complexity of research in the field, and on the three main divisions into which the field is becoming organized — biology, psychology, and social sciences. (A more recent view of the field may be found in Birren;[40] here the state, the process, and the subject who endures these changes have been clearly differentiated.)

It has been said that the psychology of aging is still in its infancy and has only recently begun to emerge as a field with clearly specified research programs.[41] Within the so-called cognitive revolution, cognitive aspects as well as emotions have regained the first place in psychological study. Both are essential dimensions in the complex process of aging. From both inside the field and out, interest in the psychology of aging is rising constantly. Many suggestions are still latent in a long tradition of experiences, reflections, and analysis, which have been only briefly delineated in these pages. The time approaches in which aging will display all its theoretical potentialities, to reveal new dimensions of the complexity of human life.

The continuous growth of life expectancy in Western societies will demand a new global evaluation of the meaning it may have in the social dynamics of the so-called third age. Hall was right in considering that there is a broad life program for people arriving at this age, but he interpreted it, in a peculiar way, as the devotion to wisdom. Now, the historical present is giving way to a large number of fully active and healthy older adults, who need to find new concrete goals and tasks aside from the professional areas covered by adults. A new "third age culture" is needed.

Only with the cooperation of all the human sciences can this problem be confronted and resolved.

REFERENCES

1. James, W., *Principles of Psychology*, Dover, New York, 1890 (reprint, 1950).
2. Marías, J., *The Structure of Society*, The University of Alabama Press, Tuscaloosa, 1987.
3. Summer, W. G., *Folkways*, Dover, New York, 1959.
4. Minois, G., Historia de la vejez, *De la Antigüedad al Renacimiento*, Nerea, Madrid, 1989.
5. Cicero, *Caton L'ancien-De la Vieillisse; Lelius-De l'Amitiè; Desd Devoirs,* Garnier, Paris, undated.
6. Seneca, *Obras Completas*, Aguilar, Madrid, 1957.
7. Isidoro de Sevilla, S., *Etimologías*, Biblioteca de Autores Cristianos, Madrid, 1951.
8. Beauvoir, S. de, *La Vejez*, Edhasa, Barcelona, 1983.
9. Granjel, L. S., Historia de la vejez, in *Gerontología, Gerocultura, Geriatría*, Universidad de Salamanca, Salamanca, 1991.
10. Bacon, F., Historia Vitae et Mortis, in *The Works of Francis Bacon*, Spedding, J., Ellis, R. L., and Heath, D. D., Eds., Longman, London, 1861, 207.
11. Bacon, F., *Opera Omnia*, J. B. Schonwetter, Frankfurt, 1665.
12. Piquer, A., *Philosophia Moral para la Juventud Española*, Ibarra, Madrid, 1755.
13. Buffon, C., De l'homme," in *Oeuvres* I, F. Didot, Paris, 1843.
14. Cabanis, P. G., *Rapports du physique et du moral de l'homme*, Imp. Crapelet, Paris, 1805.
15. Sarton, G., *Ensayos de Historia de la Ciencia*, Uthea, Mexico, 1968.
16. Quételet, A., *Sur l'homme et le développment de ses facultés, ou Essai de physique sociale*, Bachelier, Paris, 1835.
17. Quételet, A., *Du système social et des lois que le régissent*, Guillaumin, Paris, 1848.
18. Galton, F., *Inquiries into Human Faculty and Its Development*, Macmillan, London, 1883.
19. Hall, G. S., *Senescence. The Last Half of Life*, Appleton, New York, 1922.
20. Jung, C. G., *La Psique y sus Problemas Actuales*, Poblet, Madrid, 1932.
21. Adler, A., *The Individual Psychology of Alfred Adler*, Harper, New York, 1964.
22. Bühler, C., *El Curso de la Vida como Problema Psicológico*, Espasa, Madrid, 1943.
23. Erikson, E., *Childhood and Society*, Norton, New York, 1978.
24. Spiegelberg, H., *Phenomenology in Psychology and Psychiatry, a Historical Introduction*, Northwestern University Press, Evanston, IL, 1972.
25. Carpintero, H., *Esbozo de una Psicologia Según la Razon Vital*, Real Academia de Ciencias Morales y Politicas, Madrid, 2000.
26. Maslow, A., Self-actualization and beyond, in *Challenges of Humanistic Psychology*, Bugental, J. T., Ed., McGraw-Hill, New York, 1967, 279.
27. Skinner, B. F. and Vaughan, M. E., *Disfrutar la Vejez*, Martinez Roca, Barcelona, 1986 (orig. *Enjoy Old Age*, Norton, New York, 1983).
28. Mira y Lopez, E., *Hacia una Vejez Joven*, Kapelusz, Buenos Aires, 1961.
29. Skinner, B. F., Intellectual self-management in old age, *Am. Psychol*., 38, 239, 1983.
30. Carpintero, H., *Historia de las Ideas Psicológicas*, Pirámide, Madrid, 1996.
31. Brumer, S., Some documentation for the history of psychological gerontology, in *Handbook of the Psychology of Aging*, Birren, J. E. and Schaie, K. W., Eds., Van Nostrand Reinhold, New York, 1977.

32. Dosil, A., La psicogerontología como disciplina científica: visión diacrónica y situación actual, in *Tratado de Psicogerontologia*, Saez, N., Rubio, R., and Dosil, A., Eds., Promolibro, Valencia, 1996.
33. Birren, J. E., Cunningham, W.R., and Yamamoto, K., Psychology of adult development and aging, *Annu. Rev. Psychol.*, 34, 543, 1983.
34. Birren, J. E., *Handbook of Aging and the Individual: Psychological and Biological Aspects*, Chicago University Press, Chicago, 1959.
35. Riegel, K., History of psychological gerontology, in *Handbook of the Psychology of Aging*, Birren, J. E. and Schaie, K. W., Eds., Van Nostrand Reinhold, New York, 1977.
36. Baltes, P. B., Reese, H. W., and Lipsitt, L. P., Life-span developmental psychology, *Annu. Rev. Psychol*., 31, 65, 1980.
37. Birren, J. E., *Encyclopedia of Gerontology. Age, Aging and the Aged*, Academic Press, San Diego, CA, 1996.
38. Finch, C. E. and Hayflick, L., *Handbook of the Biology of Aging*, Van Nostrand Reinhold, New York, 1977.
39. Birren, J. E. and Schaie, K. W., *Handbook of the Psychology of Aging*, Van Nostrand Reinhold, New York, 1977.
40. Binstock, R. H. and Shanas, E., *Handbook of Aging and the Social Sciences*, Van Nostrand Reinhold, New York, 1976.
41. Fernandez-Ballesteros, R., *Psicologia del Envejecimiento: Crecimiento y Declive*, Universidad Autónoma de Madrid, Madrid, 1996.

2 Gerontology as a Specialty of Medicine

Robert N. Butler

CONTENTS

2.1 INTRODUCTION

We have seen a massive increase in the absolute number and relative proportion of older persons. Although many enjoy healthy lives, we are also witnessing the rise of a significant minority of frail aging persons. Clearly, the disorders of longevity present new challenges to both the field of medicine and to society as a whole.

As disabled and chronically sick persons grow older, they are joined by a large number of older persons who have become sick and disabled for the first time. Around the world, the costly and socially devastating escalation in the number of bedridden and frail aged — especially those over 85 — raises the question, "Can we afford "longevity?" Already, the rising costs of technology used to treat diseases and prolong life have been major forces driving the transformation of health care. Enormous changes are occurring in traditional physician- and hospital-based medicine, with the concomitant development of a continuum of long-term services, from home-care, day care centers, and assisted living facilities, to end-of-life and hospice care.

If costs are not contained, research is not successful, and more efficient systems of care not put in place, caring for the aging population will become increasingly expensive in the 21st century. Can we afford longevity? If we are to answer in the

0-8493-2066-/01/$0.00+$1.50

affirmative, we must support the development of the still nascent field of geriatrics and its integration into all fields of medicine.

2.2 HISTORY OF GERIATRICS

Geriatrics is the medicine of the 21st century. It is a capacious field, interdisciplinary and action oriented, requiring the application of gerontology, the study of biological, social, and behavioral aspects of aging. Geriatrics is influenced by specialties such as psychiatry and rehabilitation medicine and is strongly dependent upon an interdisciplinary team. Indeed, in its historical development, geriatrics is especially indebted to the fields of social work, nursing, clinical pharmacy, and psychiatry. Psychiatrists have played a seminal role in the development of geriatrics in the United States and, of course, have helped create geriatric psychiatry as well. Today, geriatric psychiatry is the second largest branch of geriatrics, following geriatric medicine.

The modern history of geriatrics began over 100 years ago, when Jean Charcot, a French neurologist living in the 19th century, predicted the coming establishment of geriatrics. He said:

> The importance of a special study of the diseases of old age would not be contested at the present time.… If the pathology of childhood requires clinical consideration of a special kind which is indispensable to be practically acquainted with, senile pathology too has its difficulties which can only be surmounted by long experience and a profound knowledge of its peculiar character.

The term *geriatrics* was introduced in 1909 by an American physician, Ignatz Leo Nascher, who worked at Mount Sinai Hospital in New York. In 1935, Marjorie Warren, a British physician who treated patients in a workhouse infirmary, helped create modern geriatrics. Warren is considered the mother of British geriatrics. However, despite the creation of the American Geriatrics Society and the Gerontological Society of America in the 1940s, geriatrics did not begin to become established in the United States until the 1970s.

On the other hand, the new or modern gerontology began in the 1950s, when, for the first time, longitudinal studies began replacing cross-sectional data. Better sampling was achieved by studying healthy older persons who lived in the community rather than in nursing homes. Primarily, these studies were conducted in the United States at Duke University under the direction of Ewald Busse and, simultaneously, at the National Institute of Mental Health (NIMH) under the direction of an interdisciplinary team. Principal investigators were James E. Birren, Samuel W. Greenhouse, Louis Sokoloff, Marian Radke-Yarrow (who brought her special knowledge of childhood development), and this author. Later, the National Heart Institute organized the Baltimore Longitudinal Study on Aging (BLSA) under the direction of Nathan Shock.

Some critics claimed that these study samples of healthier older persons were an unrepresentative cohort of "super aged." However, the studies enabled researchers

to differentiate between the fundamental aging process and the concomitants of aging. The healthy cohorts in these studies were predecessors to the "successful aging" populations later studied by John W. Rowe and others.

Exciting scientific discoveries about the nature of aging came to light as a result. For example, between 1955 and 1966, the NIMH studies concluded that senility (the popular term for dementia) in old age was not inevitable and that cerebral physiological status (as measured by total cerebral blood flow, oxygen and glucose consumption) declined with disease, not age, as had been previously believed. This work was confirmed in the late 1970s by Stanley Rapoport who used positron emission tomography (PET) to provide a precise and quantitative measure of cerebral functions. There are other examples:

The NIMH study found that much that was attributed to aging was not inevitable, but due instead to disease, social factors, and even personality.
The Duke University and NIMH studies demonstrated continuing sexuality in old age.
The Baltimore Longitudinal Study on Aging found that cardiac output, even under stress, does not automatically decline as a consequence of age.

In Gothenburg, Sweden, Alvar Svanborg discovered that fast-reacting muscle fibers can be retrained in individuals in their 80s. More recently, María Fiatarone of Harvard University reported similar findings, and advanced resistance training has become a major treatment modality as well as a preventive measure.

The first residency program in geriatrics in the United States was established in 1968, under the direction of Leslie S. Libow. Until the 1980s, neither geriatrics nor gerontology were treated as serious topics, either in the preclinical or clinical level of medical training. A study by the American Association of Medical Colleges noted that, of 126 medical schools, only 45 offered electives in geriatrics. Even worse was the finding, upon careful questioning, that a little over 2% of medical students actually enrolled in the electives.

In 1975, the National Institute on Aging (NIA) came into being. The NIA contracted with the Institute of Medicine of the National Academy of Sciences to make recommendations about bringing the field of geriatrics into the mainstream of medical education. The committee, under the leadership of Paul Beeson, a distinguished internist, developed the influential report, "Aging and Medical Education."

In 1982, the nation's first medical school department of geriatrics was established at the Mount Sinai School of Medicine. It fulfilled its stated mission by creating the conventional triad of an academic medical school department: (1) undergraduate, postgraduate, and continuing medical education; (2) multisite clinical services; and (3) basic and clinical research. In addition, it developed studies in health and aging policies.

In the 1970s and 1980s Anthony Cerami at Rockefeller University demonstrated that glucose played a role in aging. His work suggested that the nonenzymatic glycosylation of DNA may contribute to some of the abnormalities observed with diabetes and with aging, including increased chromosomal breakage, decreased DNA repair and synthesis, and increases in DNA–protein cross-links.

Building on the pioneering work of Hans Selye with the role of the adrenocortical secretion of glucocorticoid in adaptation to stress, Robert M. Sapolsky studied the relationship of the adrenal cortical system with aging. Because the adrenocortical system helps mediate an individual's response to stress, there is a sensitive relationship to the outer world, which also must reflect some of the interrelationships between intrinsic and extrinsic phenomena. Sapolsky's studies attempted to discover if adrenocortical secretion accounts for individual differences in "successful" or "unsuccessful" aging.

Another important body of work, led by Carl W. Cotman of the University of California at Irvine, is related to synaptic plasticity and neurotrophic factors. Cotman's work demonstrates that aged brains in rodents have the capacity to maintain and repair their circuitry. The underlying mechanisms for such compensatory activities are becoming amenable to molecular analysis. Even in the presence of Alzheimer's disease, it has been found that the brain is capable of growing new fibers and forming new connections. Cotman's work indicates that age-related neurodegenerative diseases do not destroy the brain's plasticity. In 1998, Fred H. Gage discovered that brain cells continued to regenerate in persons 70 years old. Thus, the new gerontology not only concerns discovery of what biological functions may be maintained, but how to improve or restore function.

Another example of the new gerontology is exemplified by the widely influential work of Leonard Hayflick, whose name is associated with the so-called biological clock — that is, the limitation in the number of doublings of cells in glass (the Hayflick limit), noted in 1961.

The elucidation of underlying mechanisms has led to major revisions in the interpretation of aging, with the hopeful prospects and realities of both preventive and therapeutic interventions.

2.3 THE FIELD OF GERIATRICS

Geriatrics is the overarching specialty that involves all medical fields. It is concerned with identifying, preventing, diagnosing, and treating both the medical and psychosocial conditions of late life.

Geriatric medicine is neither chronic disease medicine nor long-term care medicine, although attention to both chronic disease and long-term care is required. The focus is placed on the prevention, diagnosis, care, and treatment of both the medical and psychosocial conditions of late life. The geriatrician is both interventionist and care coordinator.

Geriatric medicine is oriented toward the two great building blocks of medical practice, the history and physical examination. If the patient's history is complete, a physician can make a correct diagnosis 85% of the time; 10% of the time a physical examination will confirm or uncover the answer; and diagnostic tests are useful tools in 5%. The "geriatric assessment" also comprises a comprehensive study of social, environmental, and personal factors.

The medicine of youth is relatively simple; it usually involves one disease. The medicine of old age provides many more complex diagnostic and treatment challenges. It is intellectually exciting. Medical schools teach "Occam's Razor"

(William of Occam, 1280–1349), which asks doctors to find a single diagnosis to account for symptoms. "What can be done with fewer [assumptions] is done in vain with more." But this rule is not applicable to old age because there is usually more than one diagnosis.

The field of geriatrics espouses an interventionist approach in which patient care is interdisciplinary. Overall assessment and treatment programs are linked with individualized care plans and long-term disease management. Rather than focusing on a specific organ or system, geriatricians are concerned with the overall functional status of their patients. A geriatrician takes into account the patient's special characteristics and the conditions that intensify with age-related changes. They understand that aging per se is a risk factor; patient assessment must incorporate identification of risks, establishment of plans to control them, and efforts to predict the future. For example, work and family history are explored in greater detail than they are in younger patients.

At the same time, geriatricians must be alert to emergencies in this population. A change in mental status may reflect significant underlying and potentially fatal conditions such as heart attack or acute dehydration following diarrhea. Syncope, heat stroke, acute infections such as pneumonia, and gastrointestinal bleeding require immediate attention.

Clinically, emphasis is placed on modifying problems as well as finding solutions. However, of equal importance is the geriatrician's need to avoid harm and preserve the quality of life of the patient. The geriatrician needs to know when not to treat, when to wait, which is more relevant in geriatrics than it is with care of younger patients. Invasive diagnostic and therapeutic procedures cannot be undertaken casually. Older patients are particularly susceptible to nosocomial infections, and physicians must carefully evaluate the necessity for routine hospital procedures. For example, catheterization can increase the risk of urinary tract infections. Surgery with anesthesia may result in fixed confusional symptoms. Frequently, one sees older patients who have been "successfully" treated in hospitals lose their functional capacity because health-care workers have ignored their physical fitness, nutrition, emotional state, and social circumstances. Frightened and depressed older patients can lose morale; with loss of appetite, they lose weight; without physical exercise, they lose bone and muscle. Their home environment frequently lacks the resources they need to recover properly. Geriatricians must employ a multidisciplinary approach to address the many challenges facing older people when they become ill.

It is important for physicians who care for older patients to understand both the possibilities and the limits of reserve or homeostasis. The fragility or progressively lowered reserve of the aging person is strikingly revealed in the body's sensitivity to changes in ambient temperature, resulting in more fatalities of older persons during summer heat waves and from deadly hypothermia in the winter cold. The body's thermoregulatory control and its adaptiveness to temperature changes are reduced with aging. Tranquilizers and alcohol increase the risk.

After age 75, and especially after 85, the characteristic geriatric patient emerges with multiple, complex, interacting, often simultaneous acute and chronic physical and psychosocial conditions. It is common for many doctors to be involved in the care of one patient, and for each to prescribe a variety of medications. Necessary

polypharmacy may lead to adverse drug reactions when communication breaks down between a patient and doctors, and between the doctors themselves. Geriatricians must also be alert to drug dosage in older persons, who metabolize drugs differently than younger persons. For example, diazepam remains in the body of an 80-year-old from 5 to 8 days, compared with 24 h in a 22-year-old.

Communication and empathy can be lost in modern high-tech medicine and bottom-line-based managed care. Geriatricians discuss topics that are often neglected by other doctors. Oftentimes, because of their own embarrassment or discomfort, physicians cannot be candid when their patients ask questions about sex, or about dying and death. A doctor's inability to respond openly to aging patients on these issues may do damage to the doctor–patient relationship. The assessment of function in the older patient not only delineates the past and immediate situation but projects into the future and deals with the ultimate passage: dying and death.

Older persons need to be listened to and touched. The laying on of hands is one of the secrets of geriatrics. The physician must shake hands (gently when shaking arthritic hands), touch shoulders, feel the pulse, and manually examine any part that hurts. The physician must listen and learn from older patients, and allow them to relate their life stories. Generally, an older patient will articulate the problem and lead a doctor who listens carefully to the diagnosis. A geriatrician must be sensitive to grief, depression, and anxiety in late life, and observant of panic attacks. Sometimes, these are characterized by apprehension when night falls, bringing an impending sense of death. Such episodes may occur by themselves or be associated with attacks of asthma, congestive heart failure, and other lung and heart conditions. Special attention must be directed to the possibility of suicide, especially in men in their 80s, who are the number one suicide group.

2.4 HEALTH PROMOTION AND DISEASE PREVENTION

In the *Guide for the Perplexed*, begun in 1176 at age 41 and completed in 1190 when he was 55, Moses Maimonides (1135–1204), Spanish Jewish physician and philosopher, wrote, "Among a thousand persons only one dies a natural death; the rest succumb early in life owing to ignorant or irregular behavior."

Geriatricians can have a great impact on helping the older patient to live a longer and healthier life. A prescription for longevity that includes a healthful diet, a sound lifestyle, and an exercise program tailored to the individual can help promote health and prevent unnecessary disabilities.

Sarcopenia (the deterioration of 30 to 40% of muscle power) accompanying old age is not inevitable. It is largely the consequence of inactivity. Exercise can lead to well-preserved lean body mass and increased vital capacity of the lung. For ambulatory older persons, walking is an excellent exercise. It is inexpensive and accessible. For the nonambulatory patient, Maria Fiatarone has proved that it is possible for older people to regain muscle function. In an 8-week study, she engaged frail 86- to 94-year-old men and women in weight-lifting exercises for 45 min three times a week. Fiatarone found that it was possible for older people to "pump-iron"