The physician Alexander Leaf (1973) quotes Frederic Verzar, the Swiss gerontologist, as saying the following: "Old age is not an illness. It is a continuation of life with decreasing capacities for adaptation." Some students of aging would disagree. Some have argued, and it is a popular current view, that if old age is not an illness in and of itself, there is at least a strong relationship between biological aging and pathology. This view simply posits that biological deteriorations create a state of susceptibility to disease, and susceptibility to particular disease leads to mortality.

One way out of this disagreement may be to distinguish between biological and pathological aging (Blumenthal, 1968). While it is difficult to say at what point in life a person is old, it is clear enough that everyone becomes so. Everyone ages. Genetic and other prenatal influences set the stage for the aging sequence, and postnatal environmental factors (demographic, economic, psychological, and social) act to modify this sequence (Sobel, 1966; Wilson, 1974). The changes that accompany aging occur in people at different chronological ages and progress at different rates. Changes in physical appearance are the most easily recognized. That physical capabilities diminish is also well known. These changes may be placed in the category of biological aging.
BIOLOGICAL AND PSYCHOLOGICAL ASPECTS OF AGING

Disease is another matter. As individuals grow older, they are more likely to become afflicted with certain diseases—many of which prove fatal. Changes that occur as a result of disease processes may be categorized as relating to pathological aging.

In the remainder of this paper we will look briefly at the various systems of the human body in an attempt to understand how they are affected by the aging process. In this regard we will be concerned explicitly with biological aging.

Senescence

Senescence is the term used by biologists, gerontologists, and others to describe biological aging. Comfort (1964) describes the study of senescence as the study of those processes which lead to a decline in the viability of the human organism and an increase in its vulnerability. Senescence may be distinguished from other biological processes in four ways (Atchley, 1972; Strehler, 1962): (1) its characteristics must be universal; (2) the changes which constitute it come from within the individual; (3) the processes associated with senescence occur gradually; and (4) the changes which appear in senescence have a deleterious effect on the individual.

Gerontologists use the term senescence to describe not one process, but rather many. In some measure, this accounts for the numerous existing theories of biological aging. “Programmed” theory, “mutation” theory, and the “autoimmune” theory of aging are just a few of those receiving attention from catalogers of the theories of senescence (Atchley, 1972; Curtis, 1966; Rockstein, 1974).

We will not discuss the merits of these theories of senescence here. Such a discussion would have a low yield, and we could not definitively determine precisely why the body ages—that is a task for others with competence in this area. What we can and will do here is simply discuss the results of senescence—those important bodily changes that occur as age increases. As Atchley (1972, p. 47) so aptly points out, understanding these changes is salient for the social gerontologist “because they represent the concrete physiological arrangements are built.”

Skin

With age, skin tends to thicken, and while easily broken, heals less in older people than in younger people. Pigment plaques are not unusual and while easily broken, heals less in older people than in younger people.

Skeletal-Muscular System

Stiffening of joints, particularly in the knees, is common with age. There is a more stooped posture in older individuals. Tissue is reduced progressively, coordination declines; muscles become weaker.

Senses and Reflexes

The sensations of touch are affected with age. There is a decline in the sense of taste, smell, and hearing. The sense of hearing becomes less sensitive also. Reflexes decline in the elderly, memory is reduced, and the ability to retain information is diminished.

Nervous System

There is loss in the total weight of the brain in the elderly. The weight diminishes to about 90% of the total after the age of 70 (Leaf, 1973). Hardening or
represent the concrete physiological limits around which social arrangements are built."

**Skin**

With age, skin tends to become wrinkled and rough, and pigment plaques are not unusual. The skin is more vulnerable and while easily broken, heals slowly. Sweating is considerably less in older people than in young, and hair loss may occur.

**Skeletal-Muscular System**

Stiffening of joints, particularly at the hip and knee, is evidenced with age. There is a reduction in height, and typically, a stooped posture in older individuals. The total mass of muscle tissue is reduced progressively with age. Muscular strength and coordination decline; muscular efficiency does not.

**Senses and Reflexes**

The sensations of touch and pain are reduced. Statistically, there is a decline in the visual acuity of older people. There is a progressive change in the tension of the muscle that operates the pupil and the lens; less light reaches the retina, and the curvature of the lens changes. Cataracts are found increasingly with age. The older person has less ability to distinguish pitch and intensity of sound. Taste and smell apparently become less sensitive also. Reflexes decline. Reaction time is slowed. Short-term memory is reduced, although long term memory appears to be retained.

**Nervous System**

There is loss in the total bulk of brain substance. Brain weight diminishes to about 92 percent of age-30 value by age 75 (Leaf, 1973). Hardening or occluding of blood vessels creates
circulatory problems in the brain, thereby reducing the speed of nerve impulses to nerve tissue. This is often reflected in strokes, senility, and/or other psychological impairments.

Circulatory System

By age 75, the cardiac output (at rest) of the average individual is about 70 percent of the age-30 value (Leaf, 1973). This reduced cardiac output, itself a function of reduced elasticity or “hardening” of the arteries, may result in heart disease or an interrupted flow of blood to the brain. Circulatory-system failure and related illnesses are a common cause of death in the middle and later adult years.

Respiratory System

As a result of weakening muscles involved in lifting the rib cage, and a reduction in the expandibility of the lungs, the total capacity of the lungs decrease with age. The vital capacity, or maximum one-breath capacity, is reduced as well. Leaf (1973) reports maximum breathing capacity at age 75 to be 43 percent of the age-30 value.

Digestive System

Digestive-tract difficulties are common to the elderly. There is a reduction in peristalsis of the intestines, and motility of the stomach, yet much digestive difficulty relates in one way or another to diet, poor or no teeth, and/or ill-fitting dentures.

Other Systems

The reproductive, temperature control, and kidney filtration systems all show decline with age. The kidney filtration rate of a person aged 75 is about two-thirds (60 percent) the rate of a 30-year-old (Leaf, 1973). Other systems cause serious problems.

Two concluding notes

1. Everyone ages, but the rate at which aging occurs in people at different ages varies greatly. Biological aging occurs at different rates.

2. Biological aging does not appear to operate alongside demographic, economic, social, and environmental factors.
rate of a 30-year-old (Leaf, 1973). Rarely does the decline in other systems cause serious problems in older people.

Conclusions

Two concluding notes are in order:

1. Everyone ages, but it is important to recall that biological aging occurs in people at different chronological ages and progresses at different rates.

2. Biological aging does not take place in a social vacuum. Demographic, economic, psychological, and social factors appear to operate alongside biological ones to produce the results of senescence.