

MECHANISM OF AGING SUGGESTED FROM STUDY OF ALTERED DEATH RISKS

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1. Introduction

Questions we ask about aging need experimental investigation; for example, is aging to be explained as cellular change and, if so, is it a change in all cells of the organism or a relative change in populations of cells? On the other hand, should many of the common manifestations of aging be explained on an organizational or physiological level of body function? In the near absence of suitable experimental approaches to aging, analysis of vital statistics can reflect some consequences of aging in the way they encroach upon the average individual. Observations of this kind have been reported over the past 300 years and extensive statistical material is available in various life tables for many Western peoples over this period. The most significant feature of aging to be deduced from life tables is that morbidity and mortality increase more rapidly than the first power of time during adult life; the relation has been variously presented in terms of a power of time or with time as an exponent. I shall refer to this relation as a multiplicative increase of morbidity or mortality [1]. The biological interpretation follows that the physiological changes which generate these end stages of overt agedness grow multiplicatively with time or that the severity of their impact to induce aging is multiplicatively increased over time lived. In any event, given a multiplicative rise in death risk, life span becomes limited by it.

Francis Bacon [2] may have been the first to express a definite concept of the manner of aging of animals and to characterize a difference in life span by species. His listing of the various species by life span, written more than 300 years ago, agrees remarkably with present estimates. He developed a number of deductions about the relations between individual constitution and longevity that resemble those current today, such as the effects of leanness and body type. He should be credited as the first body-typer. It may be useful to reinvestigate some of the esoteric beliefs of Bacon, such as the life characteristics associated with hairy lower legs, hairy chests, large ears, and large nostrils. These matters are discussed in the following selections from Bacon's *History of Life and Death* [2]: