Book Reviews

The Biology of Life Span: A Quantitative Approach *by L. A. Gavrilov and N. S. Gavrilova, edited by V. P. Skulachev,* Harwood Academic Publishers, New York, N.Y. Hardcover, 385 pages, $40.00.

The authors define this as the science of the mechanisms which determine the life span of organisms. Its origin begins several hundred years ago. John Graunt in 1662 published the first life tables for the inhabitants of London. Since then the life tables have become much more important and much more sophisticated. Benjamin Gompertz in 1825 enunciated the basic law that the force of mortality increases with age according to geometric progression. The Gompertz-Makeham equation is now the keystone to the biology of life span. Early on we learn that some ideas of life span and aging populations are wrong. For example, the aging of populations is not due to an increase in life span but is due to the reduction in the birth rate. In fact, the increase in life span has prevented aging of the population. This book examines many ideas or hypotheses about aging which are held very tenaciously especially in the West and which are not supported by facts. Thus, I am grateful to the authors for having cleansed my mind of some of these ideas about aging and what to do about it.

The biology of life span has been studied and reported by gerontologists, demographers, ecologists, geneticists, radiobiologists, toxicologists, oncologists, and zoologists, often apparently without realizing that the other disciplines are also working in the field. The authors plead that these scientists ought to become familiar with each others' work. There would remain fewer misconceptions and science could develop faster. However, they are optimistic that the "... means for prolonging life will be developed and practised, since the struggle for the prolongation of life is the struggle for the lives of human beings."

I will not attempt to summarize this book with its many useful equations regarding life spans. But I will briefly discuss variation in life spans, some hypotheses to account for this variation and prospects for extension of the life span in humans.

There is a wide variation in life span between animal species, something well known. It also varies with age. Mortality has its extremes such as the 75% mortality of the fertilized human egg at one end of the life spectrum to the exceptional long lived individuals who live to ages of 110, or more. Apparently this variation is not genetic. They write, "Contrary to wide-spread opinion, there is no convincing evidence that the observed individual lifetime differences are primarily genetic in nature. What is more, a multitude of data indicate rather that the contribution of genetic heterogeneity to the observed differences is not great, and in any event decreases with age." So far, laws governing life span distribution have not yet been established.

In humans there are three distinct periods: (1) during infancy when mortality decreases markedly with increasing age, (2) during maturation when the forces of mortality grow with . age and, (3) during senility when these mortality forces are very great. These forces are not understood but there are several hypothesis. The most favored one is an old one revived in the past 25 years that there is an inevitable biological upper limit to life, perhaps around 100 to 110 years. This is the ecological crises hypothesis. It is supported by research which showed that in cell cultures some cells such as epidermal cells had a natural limit to the number of times they could divide. When they came to this limit, about 60 times, they would naturally stop dividing and the culture would be called dead. Gavrilov and Gavrilova criticize this research severely and totally disagree with the conclusions.

Another hypothesis is the endogenous and exogenous hypothesis. According to this view, mortality factors are divisible into these two categories. Endogenous factors are conditions such as diabetes, or cancer, while exogenous factors are within the environment. This hypothesis suggests that removal of these conditions would increase life span. The authors point out that in reality this is not true, that the reduction in mortality from these factors does not lead to an increase in life span. There are several striking examples. In one study in Europe a large number of subjects were given

clofibrate to lower their cholesterol levels. There was, in fact, a decrease in coronary heart disease, but the total mortality remained the same, as there was a corresponding increase in deaths from violent acts such as suicide, homicide and accidents. The authors are not aware that the exception to these findings arose from the National Coronary Study which studied niacin as well as clofibrate. With niacin there was an 11 percent decrease in mortality and a two year increase in life span. This makes niacin unique among compounds used to lower cholesterol. Another example was from the study using aspirin to decrease coronary mortality. This it did, but there was an increase in fatalities from strokes. Further evidence that the endogenous hypothesis is not correct is the fact that the reduction in adult mortality can be calculated on the basis of life tables relating to the beginning of the century which contains no information about the structure of the causes of death.

A third hypothesis which these authors favor is the limited reliability of the organisms. Each organism contains multiple redundant systems with a high degree of reliability. Thus we have two kidneys, more liver than we need, and so on. If there is a failure in one of these systems it will continue to function, but the organism becomes more vulnerable to other sources of failure. Thus, if the immune system breaks down the body becomes much more susceptible to a host of other pathological conditions. They write, "The limited reliability hypothesis predicts that the traditional approach, based on the fight against individual causes of death, has no prospects. According to the hypothesis, the strategy for the future struggle to prolong human life must be fundamentally altered. Apparently, the future belongs to another strategy founded on explaining the mechanisms which determine the reliability of the organism and its nonspecific resistance to a broad spectrum of harmful factors. If there is any success in this direction, a simultaneous reduction in mortality from a wide variety of diseases is bound to occur."

This means that the most useful way to improve health and lifespan is to increase the general health of the population by measures which strengthen the body's resistance to those pathological factors which increase mortality. The only way this can be accomplished is by following the principles of Orthomolecular nutrition, as has been recommended by Linus Pauling in his book, *How To Live Longer and Feel Better*. One of the first vitamins to be used in large doses, niacin, which lowers cholesterol and elevates HDL, has already been shown to increase lifespan. This is a good omen for similar findings for other vitamins when similar studies are done.

This brief discussion represents only a small fraction of the interesting and valuable material in this book. It deserves to be read widely. Scientists and physicians who are interested in the aging of populations or of individuals will be much more effective in their work if they become familiar with the subject matter of this book.

Acute Trauma and Systemic Enzyme Therapy (In The Chiropractic Practice) *by A. C. Cichoke,* 15925 S.E. Stark St., Portland, OR 97233. Soft cover, loosely bound, 74 pages, $79.50, 1992. **A New Look at Chronic Disorders and Systemic Enzyme Therapy.** Soft cover, loosely bound, 42 pages, 1991.

For too long have the medical and the chiropractic professions been at loggerheads and ill at ease with each other. Medical physicians are generally almost totally ignorant of what chiropractors do, whereas chiropractors know a good deal more about the medical practitioner's work. For this reason I was pleased to receive a copy of Dr. Cichoke's book, which describes the use of enzymes for the treatment of acute inflammatory reactions. Even though I am probably more aware than are most physicians about the work of the chiropractors, I was amazed at how little I did know about the proper use of these enzymes preparations. I have used them, but only in a few patients and to assist them with their digestive problems. This is an excellent book which I recommend to physicians and to the lay public, especially that portion of the population exposed to damage from trauma. These include athletes, people engaged in physical activity, and workers in factories. I especially recommend it to worker's compensation boards and to their physicians.

Dr. Cichoke discusses acute trauma injuries, especially those obtained during sports activities,

but the general principles are the same for all injuries. The number of people injured is very large and the costs are correspondingly great. About 10 to 15 percent of athletes are injured in any year, chiefly in contact sports. Car accidents provide an additional large number of injuries. About 40 percent of the injuries are sprains and strains, 25 percent contusions, 10 percent fractures, 5 percent concussions, and 5 percent dislocations.

There are three stages in the sequence from accident to repair. The first is the acute stage which will last up to 72 hours. It is characterized by hyperemia and stasis. Fibrin is formed which obstructs blood vessels and there is marked exudation. The fibrin forms a barrier around the inflamed site. The pain is caused by the rapid release of kinins, histamine, potassium and prostaglandins. Heat is caused by the vasodilatation of the vessels. Edema results from the exudate which can not be removed quickly enough, and the inflamed area is red from the increased blood flow. Finally there is loss of function. The second stage is the stage of repair, about 3-42 days. The microcirculation is restored, there is marked leukocytosis, the swelling begins to decrease, debris is removed and new collagen is laid down. This process is helped by vitamin C and by the bioflavonoids. I wonder whether 1-lysine might be very helpful here since it is used to make collagen. The third stage is the stage of regeneration, which lasts from 3 to 52 weeks. The tissues are repaired and remodelled slowly. The remodelling may take much longer. I broke my wrist about ten years ago. It is still being remodelled as my body attempts to recreate its original form and structure.

The book contains a good description of enzymes, their functions, how they work and what are the factors which determine the rate of reaction. Enzymes are large protein molecules, about 2500 in the body. But they require a co-enzyme to activate them. Some of the vitamins are coenzymes and some require metal ions for their function. Enzymes are prepared from animal and vegetable sources. For this reason they are safe, remarkably free of toxic side effects. They are good Orthomolecular compounds. The enzymes which digest protein include pancreatin, trypsin, chymotrypsin, papain and bromelain, the latter two extracted from papaya and pine-apple plants. They are available as pure preparations, but Dr. Cichoke prefers the mixed enzymes because they work better. The enzymes work by digesting the fibrin and by helping the body's own natural defenses. They accelerate healing, decrease pain, and decrease the formation of scars. The dose must be large since only about 20 percent will survive the digestive tract and be absorbed into the blood. With the mixed enzyme tablets he recommends 30 tablets per day in three divided doses for five days, and then 15 per day thereafter.

Dr. Cichoke has a substantial section outlining the results of treatment, referring to many single and double blind controlled therapeutic trials. Thus in one experiment on 450 boxers, facial cuts healed twice as fast when they took these enzymes. In another study on surgical patients it was found that patients given enzymes were discharged in 16 days while those not so treated required 20 days. Think what this would do to our overcrowded hospitals in Canada. On the fifth day the treated group had 70 percent less edema while in the control group it was down only 10 percent. Many more studies with equally good results are summarized. The enzymes can also be used for prevention. Dr. Cichoke recommends that people engaged in hazardous activities ought to take the enzymes in advance for prophylaxis, and he provided evidence for the efficacy of this procedure.

The book contains a brief description of the steroids, which I will not review. They are more toxic than the enzymes and not as effective. It is clear to me that the enzymes ought to be used in preference to the corticosteroids or anti-inflammatory toximolecular compounds.

In the second volume dealing with enzyme therapy, Dr. Cichoke discusses the use of these enzymes in the treatment of chronic diseases. These chronic diseases have become the major problem facing modern medicine. Our track record in dealing with these conditions has been very poor, even though each year more and more powerful drugs are released which are designed to help. Not only are these drugs relatively ineffective, they also carry a heavy burden of toxic reactions. Enzymes, if they are as good as the drugs, are therefore very much better because they are free of side effects.

The chronic conditions described as responsive to enzyme therapy are immune complex disorders which include virus diseases, the arthritides, multiple sclerosis, aging, and cancer. The author refers to studies which show that almost all patients with shingles respond well and quickly to enzyme therapy used as a salve, taken internally, or injected. There are 116 references, thus giving the reader a chance to become familiar with this imposing literature. These two books make a fine set.

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