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## Life and Death.

THE ages of the Jewish patriarchs as recorded in the Old Testament have provoked much discussion and speculation. Has the span of life decreased during the passage of the centuries? Census statistics show, at any rate in Great Britain, that the expectation of life at birth has increased considerably in recent years. This, however, does not necessarily mean increased longevity, and investigations on remains of men of periods about two thousand years ago suggest that the expectation of life in advanced ages has actually decreased. The men who survived in those days were necessarily of strong constitutions.

To those who may have hoped that science will soon provide the means whereby the span of human life may be prolonged, the critical consideration of the factors concerned in the onset of old age given by Sir Humphry Rolleston in the following pages will show that such hope is as yet vain. This does not necessarily imply, however, that the declining years of life cannot, in certain cases, be rendered less irksome.

As is well known, certain primitive organisms, such as *Paramoecium*, may be described as immortal. Why then are multicellular animals mortal? The mutual influence of the cells of the body upon one another appears to be the basis both for the rise of the multicellular animals in the scale of life and also for their mortality. In artificial cultures certain of the cells of the higher organisms can live and multiply indefinitely, provided that they are supplied with suitable nutriment and their waste products removed. But if the latter accumulate to any extent they exert an inhibitory action on the life and reproductive power of the cells: it appears possible, then, that some similar process may account for the gradual decay of the body's cells in old age.

On the other hand, one of the most important, if not the dominant factor, in determining the span of life, is inheritance, and this is acted on by the other factors, the sum of which forms the environment in its broadest sense. A favour-

able environment is produced by healthy living, especially the avoidance of excesses of every kind: and in such a case a very fair degree of mental and physical vigour may be retained even to the last. But few people escape lesions, produced by some kind of infection during the course of their life and tending to shorten it. Are there any means by which the span of life may be prolonged or old age rendered less irksome, by which, in fact, the body may be 'rejuvenated'?

On the hypothesis that old age is largely caused by the decay of those cells in the sexual glands which are responsible for the onset of puberty and the development of the secondary sex characters of the individual, Steinach and Voronoff have devised operations to increase the activity of these cells and thus postpone the onset of old age. They have claimed that, by stimulating the individual's own cells to increased activity or by supplying the necessary secretions from foreign cells introduced into the body by grafting, they have been enabled to prolong life and postpone senility in both animals and men. In so far as the symptoms of old age are due to the decrease in the secretions of these glands, it should be possible to relieve them by increasing the supply of these secretions, but to assume that the decrease in the latter plays the sole, or even the major part in the onset of old age, appears to be to take too narrow a view, considering the mutual influence which the cells of the body are known to exert upon one another.

There appears, then, to be no short cut to the abolition of old age and the prolongation of life. Each of us must watch his (or her) step from the day we are born. As Sir Humphry Rolleston expresses it: for a long life there are necessary "a judicious choice of parents, avoidance of disease and worry, moderation in all things, mental and physical exercise, an open-air life, serenity and charity to all men." The prescription seems simple, but the present and coming generations may find it increasingly difficult to carry out under the stress of life under modern conditions.