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PROCESS AND APPARATUS FOR SLOWING THE AGING OF MAN AND SIMILAR LARGE MAMMALIAM ORGANISMS

This invention relates to processes and apparatus for carrying them out which may be used to slow the aging of man. One example of the invention, showing its potential usefulness is as follows:

Assume a 40-year old man falls ill with a disease that is incurable at present and that would leave him a life expectancy of five years, so that on the average he would die at the age of 45. He may have a family of small children and a wife, who would need his attention for a much longer period than five years. Applying the process described below he may be kept asleep at a low temperature for nine months out of the year for instance and be at normal temperature, living an active life, three months each year.

While the body is kept at low temperatures, aging is slowed down by a factor greater than 2 for every 10 degrees C° below normal body temperature. Thus the total amount of aging during the nine month period out of the year during which the man is kept asleep, may be nigligible for the puppose of this discussion so that one may say that the absolute life expectancy of this man, affected by the incurable disease, will be close to 20 years out of which he will be able to spend three months with his family each year and he will be kept asleep the rest of the time. The active life expectancy will be close to five years. One may also say that at the time of his death, if he dies at the age of 60, his physiological age will be only slightly above 45.

If during the 20 years of his absolute life expectancy a cure is found for his disease, he may be awakened and cured, and then continue to lead an active life. His absolute life expectancy could of course be stretched beyond 20 years by keeping him within each cycle, a longer period asleep at the low temperature and a shorter period awake. There is a limit to this stretching, determined by two factors. It would be inadvisable to make the wakeful period shorter than a week and since some aging occurs during theperiod of sleep, the ratio of sleeping period to wakeful period should not exceed a certain limit which is determined by the temperature at which he is kept asleep. Otherwise his active life expectancy will be shortened.

It is perhaps worth noting that in the case of a couple, when neither husband or wife are diseased, but the husband is much older than the wife, the husband may be kept asleep part of the time in order to equalize the absolute life expectancy of husband and wife in spite of the difference in age and the husband will have only a slightly higher physiological age than the wife if they die in accordance with the said absolute life expectancy.

The cycle of sleep and wakefulness could of course be made shorter than a year, but it would be inadvisable to reduce it below one month, in which case three weeks of sleep may alternate with one week of wakefulness.

It is of course also possible to have no cycles but a very long period of uninterrupted sleep followed by a long period of uninterrupted wakefulness. The lower the temperature is kept during sleep, the slower the aging and the longer will be the period of uninterrupted sleep that will be permissable without using up an appreciable fraction of the man's active life expectancy.

Thus in case of a comparatively young man, who suffers from an incurable disease that will rapidly lead to his death within a matter of years, he may be kept asleep at a low temperature continuously until a cure can be found for his disease, and then he can be returned to normal temperature and be cured. In the case of a man of, say, 20 years of age who suffers from an incurable disease that would rapidly kill him, one may keep him asleep if necessary as long as 40 years and still leave him an active-life.

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PROCESS FOR SLOWING THE AGING OF MAMMALIAN ORGANISMS -- ANIMALS AND MAN

This invention relates to the process that may be used to slow the aging of mammalian organisms, in particular of man. One example of the invention, showing its usefulness is as follows:

Assume a 40-year old man falls ill with a disease which is incurable at present and which normally will kill him five years later at the age of 45. He may have a family of small children and his wife and small children will need his attention. According to the invention, he may be kept asleep every year, nine months out of the year, and be awakened and live his normal life three months every year.

Over the nine month period while he is asleep, his body temperature is kept either constantly at a low pressure of T-0 or else the temperature may vary intermittently between the T-0 temperature and a higher temperature of T-1, which is still low enough for him to remain unconscious as a result of the anesthesia produced by the cold. If temperatures T-0 and T-1 are used, his body temperature might be kept at T-0 for three hours and at T-1 for one hour, so that there are six cycles every 24-hour period.

The temperature T-0 is so low that no appreciable aging occurs while the body is at that temperature and at the higher temperature of T-1, aging is still very slow -- thus the total amount of aging during the nine month period while he is asleep will amount to less than one month. Under these conditions, assuming a five year expectancy due to the incurable disease, this man will live about 20 years spending every three months with his family and will be asleep the rest of the time.

There is, of course, always the chance that during this 20-year period, a cure may be found for his disease, in which case he may be returned to his normal life and be cured.

Otherwise, if he dies after 20 years of this "treatment" his physical age will not be 60, but much closer to 45. This admittedly introduces some complications since his wife would age at the normal rate.

There is, of course, no reason to alternate waking periods and sleeping periods in the manner mentioned and the man could be kept asleep for 30 years, during which he would age only negligibly, and until such time as a cure has been found for his disease.

The process consists in the following steps. Some form of anesthesia is applied in order to set the thermo-regulatory mechanism out of action. The body is then cooled down by either one of the processes which have been published in the past and are known to the art, or else by some of the methods which will be described further below.

When the body is being cooled down to temperature T-0 and throughtout the time while it is kept at the low temperature, artificial respiration is maintained and the heart is kept at a temperature which is above the limit of T-2, at which experiments have shown that fibulation might set in. The heart is heated by applying diathermy or a radar beam to the region of the chest that covers the heart. The skin of the chest itself might be cooled if necessary.

After the temperature T-0 is reached, cooling must be maintained at a sufficient rate in order to remove the heat introduced by diathermy or radar in the region of the XXX heart and artificial respiration is maintained throughout the period of sleep.

During the prolonged and uninterrupted sleep we might carry out the process in either of two ways:

a.

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Process and Apparatus for Growing Algae

By Leo Szilard

According to this invention, algae may be grown in a layer of sweet water which floats above a mass of salt water. The thickness of the sweet water layer can be chosen to have a suitable value between one and perhaps 25 centimeters. The surface of the salt water is covered by a thin layer of chlorinated hydrocarbon or a mixture of chlorinated hydrocarbon and mineral oil. In place of a refined mineral oil, crude oil from which the water soluble components have been removed by water extraction and from which the volatile component has been permitted to evaporate, could be used. The chlorinated hydro-carbon, or the mixture of chlorinated hydro-carbon and mineral oil, is so chosen as to have a density which is lower than the density of the salt water, but higher than the density of the sweet water. A value about half way between these two densities is most suitable. If a comparatively small salt lake is used, a plastic band with its plain surface arranged vertically might be placed to run around the periphery of the whole lake, and dip into the salt water across the chlorinated hydro-carbon containing non-aqueous layer, so as to prevent the non-aqueous layer from being soaked into the soil in the periphery of the lake. If there is a water in-flow to the salt lake, the stream may be dammed up and the sweet water from the side of the river might be lead through pipes into the sweet water layer which floats above the non-aqueous layer. Nutrient salts may be added as desired in a continuous flow to the sweet water layer, and the algae may be harvested by gently stirring the sweetwater layer without breaking the non-aqueous layer and pumping the algae suspension so obtained into settling tanks which can operate on a continuous flow principle and return the sweet water free from algae to the sweet water layer in the lake.

Read and Understood -

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