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Death as an unnatural process

Why is it wrong to seek a cure for ageing?

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Not everyone thinks it is a good idea to live longer lives. Some writers, perhaps most notably Daniel Callahan, the co-founder of the Hastings Center, a bioethics research institute in Garrison, NY, USA, argue that the quest to extend life is not a self-evident good. A longer life, Callahan (1990) contends, is not necessarily a better life. Others, such as the philosopher and physician Leon Kass (2002), the political theorist Francis Fukuyama (2002) and the theologian Gilbert Meilaender (2002), maintain that research to increase human life expectancy should not be pursued because lengthening life is not consistent with human nature. It is 'unnatural', they say, to extend human lives beyond the proverbial three score years and ten that the average citizen of an economically developed nation can expect to survive.

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However, scientists eagerly seek ways to extend the maximum and average human life expectancy. French scientists have produced mice through genetic engineering that can live 26% longer than normal (Bensimon, 2002). Others have shown that mice, rats and primates live significantly longer when on a low-calorie diet. Still others believe that by genetically engineering the telomeres of our chromosomes, reducing the levels of free radicals or replacing human growth hormone, the changes associated with ageing can be slowed down or even reversed. Some physicians maintain that by rigidly adhering to good lifestyle habits, our lives could be extended by 30, 40 or even 50 years. We do not know enough about the biology of ageing to assess whether any of these interventions will lead to a longer life. But this ongoing research may provide answers to what does and does not work. It therefore raises the question of whether Callahan, Kass, Fukuyama and many others are right: are the scientists, physicians and others who work on techniques to extend human lifespan engaged in unethical activities?

Critics who worry about the personal, social and economic consequences of life extension must demonstrate that human culture is not clever or flexible enough to learn how to cope with more life. They must also show that to extend life beyond what we now know and are familiar with is to engage in activities that violate some natural norm or a prescriptive principle. In part, the resolution of this debate rests on empirical facts. It also rests on resolving a normative dispute.

Does longer life inevitably mean more social misery and economic havoc? One way to answer this question is to ask whether humankind has adjusted to similar changes in the past. If one compares life for say, the ancient Assyrians, Hebrews, Greeks and Romans with life for Syrians, Israelis, Greeks and Italians today, it would seem that longer life has not brought more misery in its wake. Few could seriously maintain that an average lifespan of 35 years is preferable to the 75 years enjoyed today, even if some spend their final years frail, demented or debilitated. And it would be hard to argue that, despite such very real

problems as overpopulation, environmental damage and ageism, the quality of life for the average person has decreased so much from the time of our forebears that we live more poorly or less happily today. Few, in other words, would trade their longer lifespan for the much shorter lives lived by their ancestors thousands of years ago.

> After all, if ageing is not a natural process, what is?

Callahan and others are right to wonder about the social and economic consequences of pursuing longer lives. But the empirical evidence does not support the case that trying to live longer must necessarily bankrupt society or lead to lives of pain and misery. We may need policies to ensure that a fair proportion of resources are devoted to the young, that seniority on the job does not become stasis in the workplace and that we do not use medical technology aggressively once life has become a burden or simply too painful to endure. We may also need to rethink career paths, the funding of social welfare programmes and even the definition of extended family if we live longer lives. But there is no empirical evidence to suppose that we cannot do so in ways that make longer life enjoyable, productive and meaningful.

Critics, such as Kass, Fukuyama and Meilaender, therefore pose a more powerful critique of the war on ageing. They maintain that it is unnatural to live much longer than we do now. Of course, for this argument to hold, they must demonstrate why extending lifespan is unnatural. Or, to put it another way, they must show that ageing and senescence are both natural processes and, as such, intrinsically good things. They need to show that the lifespan we now have is part of our human nature. Can that case be made? I do not think so.

It may seem odd to question the 'naturalness' of a process as familiar and universal as ageing. After all, if ageing is not a natural process, what is? This belief is reflected in the practice of medicine—for example, most textbooks in the areas of medicine and pathology do not mention ageing as abnormal, unnatural or indicative of disease. It is true that such texts often contain a chapter or two on diseases commonly associated with ageing or found in the elderly. But it is the diseases of the elderly, such as pneumonia, cancer or atherosclerosis, rather than the ageing process itself, that serve as the focus of descriptions of sickness and disease. Why are the physiological changes and deteriorations that are associated with ageing considered to be unremarkable natural processes whereas similar debilitative changes are deemed critical diseases when they occur in younger people? Progeria—rapid ageing in a child—is considered a horrible disease, whereas the same changes occurring 80 years later are considered normal and unworthy of medical interest.

Surely it cannot simply be the life-threatening aspects of cancer or atherosclerosis that distinguish these processes from ageing. Although it may be true that hardly anyone manages to avoid contracting a terminal disease at some point in their life, ageing itself produces the same ultimate consequence as these diseases—death. Our bodies break down and death is inevitable. Nor can it be the familiarity and universality of ageing that inure medical science to its unnatural aspects. Malignant neoplasms, viral infections, gingivitis, acne and hypertension are all ubiquitous phenomena. However, medicine maintains a radically different stance toward these processes compared with the so-called 'natural' changes that occur during ageing.

> One thing that does differentiate ageing from other processes or states traditionally classified as disease is the fact that ageing is perceived as a natural or normal process

It could be argued that processes denoted by the term 'ageing' do not fit the standard concept of disease that operates in clinical medicine. However, in medical dictionaries, disease is almost always defined as any pathological change in the body. Pathological change is inevitably defined as constituting any morbid process in the body. And morbid processes are usually defined in terms of disease states of the body. Regardless of the circularity of this concept, ageing would therefore seem to have a *prima facie* claim to being counted as a disease. Pathological or morbid changes are often the sole criteria by which age is assessed in the human body; coroners and medical examiners use these changes to determine age in a dead body.

One thing that does differentiate ageing from other processes or states traditionally classified as disease is the fact that ageing is perceived as a natural or normal process. Medicine has traditionally viewed its role as that of ameliorating or combating the abnormal, either through therapeutic interventions or preventive, prophylactic regimens; it is in response to or in anticipation of abnormality that physicians' activities are legitimated. E. A. Murphy, among many other doctors, noted that "the clinician has tended to regard disease as that state in which the limits of the normal have been transgressed" (Murphy, 1976). Naturalness and normality have, historically, been used as baselines to determine the presence of disease and thus the necessity of medical activity. In light of the powerful belief that the abnormal and unnatural are indicative of medicine's range of interest, it is easy to see why many biological processes are not thought to be the proper subject of medical intervention or therapy. The processes of puberty, growth and maturation all stand outside the sphere of medical concern as they are normal and natural occurrences. Similarly, it seems odd to think of sexuality or fertilization as possible disease states, precisely because they are commonly thought to be natural and normal components of the human condition.

Nonetheless, it is true that certain biological processes, such as contraception, pregnancy and fertility, have been the subject of heated debates over their standing as possible disease states. The ideas that it is natural and normal for only men and women to have sexual intercourse or for women to undergo menopause have been challenged in many quarters. The question then arises as to whether the process of ageing can be classified as abnormal and unnatural in a way that will open the door for its reclassification as a disease and, thus, a proper subject of medical attention, concern and control.

The perception of biological events or processes as 'natural' or 'unnatural' is decisive in determining whether physicians treat states or processes as diseases—one need only think of the controversies that surround the biological 'naturalness' of homosexuality or schizophrenia to see that this is so (Socarides, 1970; Illich, 1974; Goldberg, 1975). This claim is further borne out by an argument that is frequently made by older physicians to new medical students who often find it difficult to interact with or examine elderly patients. They may

feel powerless when confronted with the seemingly irreversible debilities of old age. To overcome this reluctance, older physicians are likely to point out that ageing and senescence are processes that happen to everyone and should hold no terror for a young doctor. Students are told that while there may be nothing they can do to alter the inevitable course of ageing, they must learn to help patients cope with it as best they can. It is as if teaching physicians feel obligated to label the obviously debilitative and disease-like states of old age as natural to discourage the students' inclination to treat the elderly as sick or diseased.

What are the grounds on which this label is applied? Why do we think of ageing as a natural process? The reason that comes immediately to mind is that ageing is a common and normal process. It occurs with a statistical frequency of 100%. Inevitably, bones become brittle, vision dims, joints stiffen and muscles lose their tone. The obvious question then is whether commonality, familiarity and inevitability are sufficient conditions for labelling certain biological states as natural. To answer this question, it is necessary to first draw a distinction between ageing and chronological age.

In a trivial sense, given the existence of a chronological device, all bodies that exist can be said to age relative to the measurements provided by that device. But since physicians have little practical interest in making philosophical statements about the time-bound nature of existence, or empirical claims about the relativity of space and time, it is evident that they do not have this chronological sense in mind when speaking about the familiarity and inevitability of ageing. Physicians are interested in a particular set of biological changes that occur over time. In the aged individual, cells manifest a high frequency of visible chromosomal aberrations. The nuclei of nerve cells become distorted by clumps of chromatin and the surrounding cytoplasm contains fewer mitochondria. Collagen fibres become increasingly rigid and inflexible, as manifest in the familiar phenomenon of skin wrinkling. The aorta becomes wider and more tortuous. The immune system weakens and the elderly person becomes more susceptible to infections. Melanin pigment formation decreases and, consequently, hair begins to whiten (Hayflick, 1974). These changes are universal and inevitable.

Universality and inevitability do not, however, seem to be sufficient conditions for referring to a process as natural. Coronary atherosclerosis, neoplasms, high blood pressure, sore throats, colds, tooth decay and depression are all nearly universal in their distribution and seem to be inevitable phenomena, yet we would hardly call any of these things natural. The inevitability of infectious disease does not cause the physician to dismiss infections as natural occurrences of no particular medical interest.

If universality and inevitability are not adequate conditions for naturalness, are any other criteria available by which naturalness can be assessed and used to drive a wedge between ageing and disease? There is a further sense of 'natural' that may prove helpful in trying to understand why physicians prefer to think of ageing as a natural process, which is rooted in the notions of design, purpose and function (Hausman, 1975). Axes are designed to cut trees. Scalpels are meant to cut human tissue. It would seem most unnatural to use axes for surgery and scalpels for lumberjacking, although a very skilful surgeon could probably perform with an axe. Similarly, many bodily organs—the liver, spleen, blood vessels, kidneys and many glands—can compensate for other functions when certain organs or tissues are damaged or removed, but these are not the purposes or functions for which they were 'designed'. Although the arteries of many organisms are able to constrict to maintain blood pressure and reduce the flow of blood during haemorrhage-induced shock, it is not the function of arteries to constrict in response to such circumstances. The presence of vasoconstriction in arteries is in fact an unnatural state that signals the physician that something has gone seriously awry in the body. It would seem that much of our willingness to accept ageing as a natural process is parasitic on this sense of natural function.

Two answers are commonly given to the question: What is the function of ageing? The first is a theological explanation. God, as a punishment for the sins of our ancestors in the Garden of Eden, caused humans to age and die. In this view, people age because the Creator saw fit to design them in that way for retribution or punishment. Ageing serves as a reminder of our moral fallibility and weakness. The second view, which is particularly widespread in scientific circles, is that the purpose or function of ageing is to clear away the old to make way for the new. This theory was first advanced by the German cytologist and evolutionary biologist August Weismann at the turn of the twentieth century (Weismann, 1891). Weismann argued that ageing and debilitation must be viewed as the organisms' new mutational and adaptive responses to fluctuating environments. Ageing therefore benefits the population as a whole by removing the superannuated and allowing evolutionary change to occur. In both of these views, ageing has an intended purpose or function. And it is from this quasi-Aristotelian attribution of a design that the 'naturalness' of ageing is often thought to arise.

> The determination of the naturalness of ageing, if it is to be rooted in biology, will depend not on how the process of ageing actually operates, but rather on why it exists

If the naturalness of ageing resides in a functional interpretation, the philosopher can tap a rich and abundant literature on the subjects of function and purpose. However, rooting the source of the naturalness of biological processes in ideas of function or purpose also has its drawbacks. The primary problem is that philosophers have not reached anything even remotely resembling a consensus about the meaning of such terms as 'function' or 'purpose'. The only distinction required for understanding the function of ageing is the difference between explaining the existence of a particular state, organ or process, and explaining how a state, organ or process works in a particular system or organism. Functional or purposive statements are sometimes used historically to explain the existence of a trait or process. At other times, such statements are used mechanistically to explain how something works or operates. If we ask what is the function, role, or purpose of the spleen in the human body, the question can be interpreted in two ways: How does the spleen work—what does it do in the body? Or, why does the spleen exist in its present state in the human body—what is the historical rationale for humans having spleens (Boden, 1972; Wright, 1973; Cummins, 1975; Nagel, 1979)?

It is this latter sense of function—the historical sense—that is relevant to determining the naturalness or unnaturalness

of ageing. Although there is no shortage of theories purporting to explain how ageing works, these theories are not relevant to the question of its function. The determination of the naturalness of ageing, if it is to be rooted in biology, will depend not on how the process of ageing actually operates, but rather on why it exists (Caplan, 1976). This is the sense of naturalness that Kass, Fukuyama and others must rely on to make their case that extending life by conquering ageing is wrong because it is unnatural.

Two purported explanations—one theological, one scientific—of the function or purpose of ageing have been given. Both are flawed. Whereas the theological explanation of ageing may carry great weight, it will simply not do as a scientific explanation. Medical professionals may have to cope with their own religious feelings and their patients advocating this explanation. But, from a scientific perspective, it will hardly do to claim that ageing, as a result of God's vindictiveness, is a natural biological process that is not worthy of treatment.

More surprisingly, the scientific explanation of ageing as serving an evolutionary role is also not true, because it rests on a faulty evolutionary analysis. It assumes that biological processes exist to directly benefit or advance the evolutionary success of a species or population. In other words, it supposes that ageing exists because it serves a function or purpose in the life history of a species—in this case, that of removing the old to make way for the new. However, evolutionary selection rarely acts on entire species or populations. Selection acts on individual organisms and their phenotypic traits and properties. If some traits or properties confer advantages in certain environments, it increases the likelihood that the organisms having these genes will pass them on to future generations.

Given that selective forces act on individuals and their genotypes and not species, it makes no sense to speak of ageing as serving an evolutionary function or purpose to benefit the species. How then do evolutionary biologists explain the existence of ageing (Williams, 1966; Ghiselin, 1974)? Briefly, the explanation is that features, traits or properties in individual organisms will be selected for if they confer a relative reproductive advantage on the individual, or his or her close kin. Any variation that increases reproductive fitness has a very high probability of being selected and maintained in the gene pool of a species. Selection, however, cannot foresee the possible consequences of favouring certain traits at a given time; the environment selects for those traits that give an immediate return. An increased metabolic rate, for example, may prove advantageous early in life, in that it may provide more energy for seeking mates and avoiding predators; it may also result in early deterioration of the organism due to an increased accumulation of toxic wastes or genetic mutations in the body (Herndon *et al*, 2002). Natural selection cannot predict such delayed debilitating consequences. Ageing exists, then, as a consequence of a lack of evolutionary foresight; it is simply a by-product of selective forces that work to increase the chances of reproductive success. Senescence has no function; it is simply the inadvertent subversion of organic function, later in life, in favour of maximizing reproductive advantage early in life.

The common belief that ageing serves a function or purpose, if this belief is based on a misapprehension of evolutionary theory, is mistaken. And, if this is so, it would seem that the common belief that ageing is a natural process is also mistaken. And if that is true, and if it is actually the case that what occurs during the ageing process parallels the changes that occur during paradigmatic examples of disease (Boorse, 1975), then it would be reasonable to consider ageing as a disease.

The explanation of why ageing occurs has many of the attributes of a stochastic or chance phenomenon. And this makes ageing unnatural and in no way an intrinsic part of human nature. As such, there is no reason why it is intrinsically wrong to try to reverse or cure ageing. There may be external reasons—cost, inequity, or even a fear that the overall quality of life will diminish—but without more argument and more empirical evidence these worries seem exactly that: worries. Those who want to make the case against treating ageing as a disease must show why human beings are not capable of solving the challenges that a longer life expectancy would create. There is no intrinsic ethical reason why we should not try to extend our lives.

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