Abstract

Aging is ghastly. So ghastly, in fact, that ever since humanity became aware of aging we have sought ways to put it out of our minds. And we have been remarkably successful in that effort. We have invented religion; we have created all manner of secular stories and fears about a post-aging world to distract us from how dearly we desire it; we have even confused ourselves as to what “aging” actually means at all. Even a simple phrase such as “endless youth” must be painstakingly defined in order to pre-empt impressions of endless naiveté, endless physical youth accompanied by ever-worsening dementia, or any number of other absurdities. In this short essay I will attempt to demystify aging sufficiently to cajole – or, perhaps I would more accurately say, coerce – you into acknowledging that aging really is both undesirable and defeatable, maybe quite soon – maybe, dare I say it, in time for you.

The pro-aging trance

When I was a schoolboy, one of the highlights of my and my friends’ recreational experience was the annual visit from a nationally renowned stage hypnotist. I was never the hypnotisable sort (not even at university, when expert hypnotists tried their best on me one-on-one), but many of my fellow pupils were. We were immensely entertained by the bizarre acts that some of our otherwise quite sane friends would be induced to perform on stage.

Among the various tricks performed during such shows, a particular favourite of mine was the logical conundrum. The standard sequence was as follows:

- First, having attempted to hypnotise the entire hall and succeeded in hypnotising a dozen or so pupils and brought them up to the front, the hypnotist would invite one person to sit in a chair in the centre of the stage.

- Having further deepened the subject’s trance, he would then impress on him that the elbow that you and I would think of as his left elbow was in fact his right elbow, and vice versa. If you have never seen such a show, you may wonder how this can be done – but I assure you that a hypnotised subject will simply accept and assimilate such “information” without the slightest doubt or hesitation.

- Once the hypnotist had satisfied himself that the subject was thoroughly educated with this misinformation, he would ask the subject to touch his right elbow with his left hand.

- Much writhing and wriggling would ensue, to the delight of the unhypnotised audience. This was because the implications of one’s right elbow being the one attached to one’s left hand (and vice versa) had not been addressed during the miseducation process: as
such, the subject retained his historical knowledge that it is in fact perfectly simple to touch one’s right elbow with one’s left hand.

- But this was not the high point of the act: that came next. After perhaps a minute of struggle, the hypnotist would tell the subject to stop – and then he would ask the subject why he had been unable to do such a simple thing. Thus was introduced the truly astounding and hilarious moment: the subject would invariably give – without hesitation – a totally lucid and articulate explanation. Different subjects, in different shows in successive years, would give different explanations – and indeed I can no longer recall any of them. But that wasn’t the point. The point was that, inevitably, each such explanation was (and was instantly apparent as) utterly absurd, but its absurdity was completely lost on the person stating it.

Lest it be unclear why I have begun this essay with an anecdote so far removed from the biology of aging, let me add a few words of clarification. I am first and foremost a biologist, but one consequence of my success in spearheading a field in which there is so much public interest is that I am constantly called upon to give my views on the social context of my work. The overwhelming majority of questions that I am asked concerning what a post-aging world would be like are based on concerns – fears of problems that the defeat of aging would bring about. And those questions are positively mild compared to the bald assertions of apocalypse that are publicly made to whomever will listen or read by many who encounter my work. Not only that – these assertions all too often emanate from people with perfectly good educations and without even the excuse of still being schoolchildren. Yet, the flaws in the logic underlying such views and concerns are every bit as catastrophic as those of my hypnotised friends concerning their exchanged elbows. Hence my adoption of the phrase “pro-aging trance.”

The single most insidious strategy of apologists for aging in defending their views against all assaults of logic, science and morality is a simple case of circular argument. In a nutshell, their position (though they would not use these exact words, of course) is a combination of two individually quite reasonable stances:

1) “I refuse to examine seriously the question of whether the defeat of aging is feasible, because it’s obviously not desirable.”

2) “I refuse to examine seriously the question of whether the defeat of aging is desirable, because it’s obviously not feasible.”

Accordingly, having embarrassed you into the realisation that these stances cannot logically be used to ramify each other, I shall in the remainder of this essay address them separately.

**Why defeating aging is desirable**

A few hundred words is obviously inadequate to address in persuasive detail the challenges that individuals and society might face in adjusting to the redefinition of the life cycle that the defeat of aging would entail. In fact, a hundred thousand words would be inadequate, simply because there is so much that we cannot remotely predict about what multicentenarian humans would be able, willing or eager to do, even setting aside the technological advances unrelated to biomedical matters that might further broaden those horizons.

Indeed, it is precisely that unpredictability – and the fear of the unknown that it elicits – which underpins the phobia exhibited by so many people when they consider this matter. Why, then, am I so sure that this fear is misplaced? My certainty arises from the existence of two arguments for defeating aging that transcend all these details, demonstrating that, whatever problems we might face in consequence of defeating aging, they cannot possibly outweigh our
current problem, i.e. the non-defeat of aging. My accusation that those who do not share my view are in a pro-aging trance is a strong one, I know – but I feel it is fair, being merely an assessment that these two arguments are so blindingly obvious and decisive that anyone who has not independently arrived at them must have been suspending all his or her normal critical faculties on the matter. Are they really so obvious? Well, you can judge for yourself.

The first argument is centred on choice. Even the most rabid opponent of the defeat of aging does not suggest that people will be chained down and rejuvenated by force. Thus, if a post-aging world were to conclude that this was a technology of net negative benefit, it could simply revert to the pre-post-aging situation by not using rejuvenation therapies. Moreover, this decision could be taken by a group, rather than the whole of humanity, in just the same way that the Amish eschew much of modern technology and Jehovah’s Witnesses eschew blood transfusions. The only cases in history where this logic falls down have been the invention of weapons of mass destruction, and the property of those cases that makes them exceptional – namely, the fact that they can be used by small numbers of people to do immense harm very quickly – quite clearly does not apply to the defeat of aging.

The second argument is centred on sense of proportion. A century or so ago, we worked out that hygiene (and then antibiotics and vaccines and so on) were capable of virtually eliminating death in infancy and in childbirth. As use of these methods spread and millions of lives were saved, the population rose sharply across the Western world – as was probably foreseen by at least a few people. But was this put forward as a reason not to save those lives? Of course not. When the opportunity is present, the saving of lives always comes first – and even more so when doing so comes with the alleviation of extended and severe suffering, as is the case for most deaths from age-related causes. Yet, when the technology to save those lives is not yet available – and the timeframe for its development is speculative – somehow most of us seem to prefer to forget this most basic aspect of our moral compass.

**Why defeating aging is feasible**

So, aging must be defeated as soon as possible. But how soon – if ever – is that?

Everyone knows that top physicists were declaring with certainty that heavier-than-air flight was impossible right up until it was done. What’s less well appreciated is that this sort of thing is very common: that those who have developed the knowledge needed to solve a technical problem are very often not the most perceptive in seeing how to use that knowledge to create that solution. Basic science is psychologically very different from technology: in science the goal is to acquire knowledge for its own sake, whereas in technology the goal is to acquire knowledge as a means to an end. Engineers seek to sidestep their ignorance, not necessarily to confront it head-on.

This applies across all technology – including all biotechnology and, in particular, including biomedical gerontology. The plan that I have set out since 2000 for defeating aging is a framework encompassing many different biological disciplines, some of which had not previously been applied to aging – at least, not as their main application – and one of which had never been applied to anything biomedical at all, but rather to environmental decontamination.

What is this plan? SENS (Strategies for Engineered Negligible Senescence) is a comprehensive repair and maintenance program, aimed at restoring the aging body’s molecular and cellular structure to something like that of a young adult. There will be no magic bullets that miraculously enable the body to heal itself without our direction: rather, each of the many different types of molecular and cellular damage that accumulate throughout life as side-effects of our essential metabolic processes must be directly eliminated (or, in some cases, made
harmless). This is closely analogous to the way in which a mechanic restores a car to working order each year – its annual service – and, even more, to the way in which more thorough repair and maintenance succeeds in maintaining very old cars in full working order indefinitely.

Even more? Yes, because the goal of SENS is not just to add a couple of decades to our healthy lives, but to extend them as long as we may desire. It is thus vital to appreciate that the repair and maintenance of a machine does not necessarily become inexorably more difficult as the machine gets older. That is only the case when the repair is not comprehensive: when some things are being repaired but not others, such that as the unrepaired things become more and more dysfunctional the repaired things need to function more and more perfectly to compensate. Inadequate maintenance like this is doomed to fail eventually, as the dysfunction of the unrepaired components becomes too great for such compensation to be possible. But if everything is being repaired – even if such repair is only partial – this no longer applies: the machine will remain structurally unaltered over the long term, and that means it will remain functionally unaltered too.

You want details of course, and you will find them in abundance in my book “Ending Aging” which was published in September 2007 (St. Martin’s Press, ISBN 0312367066). But I hope I have demystified aging for you in the above short account, enough to motivate you to read it. When you have done so, you will truly appreciate how close we are to defeating aging and how urgent it is to cast aside the psychological crutches – the pro-aging trance – that we have until now found so useful as ways to put the horror of aging out of our minds.