

# PHYSICAL IMMORTALITY: HUMAN LONGING, SCIENTIFIC BASIS AND RELIGIOUS RESPONSE

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*Kuruville Pandikattu*

"The ancient seers were not egoistic. They called the whole humanity — past, present future — *Amrutya putra*. You are all sons of immortality. Equal and eternal." Bhagawan Rajneesh<sup>1</sup> (Osho 1998: ch3)

"Mankind will postpone human ageing substantially in the future, doubling the human lifespan at least, when we have accomplished this we will be ashamed that we did not work on it much sooner." Michael Rose, Evolutionary Biogerontologist.<sup>2</sup>

"Die Beschäftigung mit den ersten und letzten Fragen des Mensch-Seins ist keine blutleere akademische Diskussionswissenschaft mehr — schon gar nicht Theologie —, sondern profitables Business. Es wird viel Geld hineingesteckt, und noch mehr soll (und wird) herauskommen." Der Spiegel.<sup>3</sup> (Spiegel 2000)

## 0. Introduction

According to the creation myth of Konos tribes of Guinea, Sa or death existed before anything. Death is regarded as the primary creator in this tradition. Once, long time ago, there was only darkness and Sa lived there with his wife and daughter. Since he wanted something more durable he created a slushy

- 1 Bhagavan Osho, *Beyond Enlightenment*, ch 3, "No other path but life." (From CD rom) 1998. For a general introduction to physical eschatology from scientific and religious perspectives see the award winning Kuruville Pandikattu, "Eschatology: Arena for Creative Encounter between Science and Religion." *Jeevadhara* 29 (April 1999) 154-164.
- 2 From the *Future Fantastic* episode titled Immortals. For a succinct account of the different technologies for achieving physical immortality see the award winning article, Kuruville Pandikattu "Significance of God if humans were to become immortal," *The Month* 33 (July 2000): 264-268.
- 3 Der Spiegel 17/2000. URL <http://www.spiegel.de/spiegel/21jh/0,1518,73761,00.html>

kind of mud sea as a place to live. From nowhere appeared the god Alatangana and he decided to improve on the work of Sa. Alatangana made the slush solid and added animals and plants to it. Sa was pleased and they became friends. But when the god asked for Sa's daughter the friendship fell apart. However, Alatangana met the girl secretly and eloped to a distant place and they produced 14 children: four white boys, four white girls, three black boys and three black girls. The children spoke different languages and the parents could not understand them.

This made them so upset that they decided to return to Sa and ask for his advice. Sa was ready to reconcile and demanded that the black and white children do not intermarry. So the different race originated. Sa demanded further: "You have stolen my only child. Now you must give me one of yours whenever I wish it. When I wish to call one of your children I must never be denied. You will know I am called by the sound of the calabash rattle in your dream."<sup>4</sup> (Lemming & Lemming 1994: 164) So it was that death for us humans is the bride-price for Alatangana's marriage with Sa's daughter. So death is intrinsically linked to human's origin.

This simple myth explains aetiologically both darkness and life, death and birth, sex and procreation and gives justification to the races. The main focus of my article is that this intimate link between death and life may be soon broken — at least in our collective consciousness. It will have shattering consequences for our human — philosophical and religious — longing and hope.

In this article I first study the quest for human physical immortality as a religious search. I see the emerging religious and collective movements which try to overcome death. In the next section we see the scientific basis for physical immortality. Though there is no hard "scientific" evidence for physical immortality, there are so many scientific disciplines at their cutting-edge or frontier research which indicate at least the theoretical possibility for physical immortality. In the final part we see the social or religious response to such a scenario. We shall show that such a possibility does not negate but radically alters our very understanding and scope for longing and fulfilment. We conclude by affirming that such a guiding of our total destiny requires a healthy dialogue between science and society or technology and religion.

### 1. *Physical Immortality: A Primordial Human Longing*

Though the longing for an everlasting life has been a perennial quest, we are somehow used to our physical death. Since we all take our mortality for

4 David Leeming and Margareth Leeming, *A Dictionary of Creation Myths*, OUP, New York/Oxford: 1994. 164. The story is summarised from the same book, pp. 163–164.

granted, the gerontologist author Herb Bowie holds that we tend to ignore the most potent anti-ageing organ in your body — the mind! If so, then the subconscious messages we are constantly sending ourselves may be sabotaging human longevity. “Can you imagine yourself living for 100 years, 120, or even longer? If not, then you may be undermining your nutritional program by feeding yourself mental junk food’ — negative programming predicting your own deterioration and demise.”<sup>5</sup> (Bowie 1999)

The author exhorts that we should start feeding your mind a new food. His book, *Why Die?* speaks clearly and intelligently about the possibility of living virtually forever. By stretching the mind to accept this exciting new human possibility, we shall be conditioning ourselves to live a longer, healthier and happier life.<sup>6</sup>

Most of us make the unconscious decision that we have to die. They assume that their fate is ordained by the laws of nature, or by destiny. This choice is made so early in life, and at such an unconscious level, that few people ever even challenge it. So ask the question on human immortality will shake people up. Because even to ask this question is to imply something unthinkable for many people — that death is a choice, and not a foregone conclusion. Further, most of us feel disoriented and threatened by the consideration of physical immortality as a real possibility. It is within these chilling prospects that the author introduces the concept of physical immortality.

To understand the idea of living forever, according to Bowie, we must look at two very different aspects of physical immortality. On the one hand, it is about eternity, about surviving to some unthinkably distant point in the future. On the other hand, though, it is all about choosing how to live our lives today. It is only when we connect these two extremes, and find a way to live our lives as an unbroken continuum between these two points, that we fully achieve physical immortality. There is an element of paradox here.<sup>7</sup>

5 Herb Bowie [http://www.powersurgepub.com/books/immort/Bowie why die. htm](http://www.powersurgepub.com/books/immort/Bowie%20why%20die.htm), 1999.

6 It is interesting to note the reasons given by the author as to why we should read his book and occupy ourselves with thoughts on human immortality. “If you’ve always believed that physical immortality is possible, but have been confused because there seemed to be no one else who felt that way — then this book is for you.”

If you’ve already discovered others who feel that they too were born to live, and you now wish to deepen your feelings of living forever — then this book is also for you.

If you can’t think of a good reason to go on living another year, or even another day — much less for all of eternity — then this book is for you as well. Living forever is all about transforming the quality of your life today, and these pages can help inspire that transformation. And yes, even if you think that physical immortality is the craziest thing you’ve ever heard of — then this book is for you too. Because by the time we’re done, you may just see why living forever is the most sensible thing you’ve ever started.” From URL: <http://www.sff.net/people/benbova>.

7 This may seem like a paradox — to ask you to focus on forever and your life today at the same time. This is the way it first sounds when people show you what are called “Magic

This paradox is also expressed in these haunting lines from William Blake.

To see a world in a grain of sand  
And a heaven in a wild flower,  
Hold infinity in the palm of your hand,  
And eternity in an hour.<sup>8</sup>

(Capra 1977: 288).

I believe that Blake was not speaking metaphorically though. In the book the author wants to talk about transforming the quality of our lives today, by focusing our attention on our own eternity. At the same time, I will be talking about actually living for hundreds and thousands of years, by focusing our attention on the quality of our lives today. The author asserts that if such a view seems like a paradox, then this is only because we view our today's and our tomorrow's as separate and unconnected.

Physical immortality is difficult, in a way, to talk about at length because it can be approached from so many different angles. Since all of these perspectives are equally valid, it is impossible to do the subject justice by discussing it in a strictly linear fashion. We can start with forever and work backwards. We can start with today and go forwards. We can talk about the fate of humanity, or we can discuss the personal feelings of one individual. No matter how we approach the subject, though, we always seem to arrive at the same conclusion: that living forever is a practical and meaningful goal.

Reaching the same conclusion from so many different starting points is reassuring in the long run, but can be a bit disconcerting at first, as we repeatedly shift perspectives. We may feel more comfortable with some approaches than with others, and so may be tempted to skip around.

Following similar lines of thought, another scholar claims that the first immortal human beings are living among us today.<sup>9</sup> (Bova 2000) It is asserted by its proponents that there are men and women alive today who may well be able to live for centuries, perhaps even extend their life-spans indefinitely. For them, death will not be inevitable. Death will have to die for them!

Such immortal humans will not age. They will not become feeble and sickly. Ageing will be stopped, even reversed. One may be young and vigorous forever. Accidents and violence will not disappear, of course. People will still

Eye" pictures, and tell you to focus beyond the page, on infinity. But if one relaxes and follows along, then after a while something new and different really does appear. (Nowadays it has become out of date and is not available on the market. There are even now computer programs to produce such Magic pictures or three-dimensional pictures.)

<sup>8</sup> Quoted in F. Capra, *The Tao of Physics*, A Bantam Book, 1977, p. 288.

<sup>9</sup> Ben Bova, *Immortality*, Avon Books, 2000 (forthcoming)

be vulnerable to poor judgement, bad luck and evildoers. But death from old age, death as the inescapable end of life, will become a thing of the past, a dark memory of primitive days. As the American immunologist William R. Clark put it, "Death is not inextricably intertwined with the definition of life." Just because human beings have always died does not mean that they always will die.

This same idea is reflected in the leading article of the German weekly: *Der Spiegel*.<sup>10</sup> (Hanshalter 2000) It asserts that immortality belongs to the ordinary human desire (*Ursehnsucht*). It will not just redeem humanity from death but raise it almost to the level of gods. Michael Fossel, professor of Clinical Medicine in the State University of Michigan asserts: "the most significant turn in the human history has begun. In twenty years we can stop the process of ageing and reverse biological clock." He certainly is a super-optimist. Philipp Lee Miller of the Longevity Institute in Los Gatos, prophesies: "in a few years time 80 year olds will feel like 20 year olds and will play like teens." This sentiment is accentuated by the New Yorker Professor Michio Kaku, who expects a tripling of life expectancy and a cessation of ageing process in a few years time.

The above longings and claims make it abundantly clear that immortality is slowly distilling into the collective unconsciousness of humanity. We shall study further the claims of immortality and see if there is any psychological and scientific basis for it.

## 2. *Human Immortality: A Latent Hope or Tall Claim?*

The authors who write on this subject rightly maintain that in the quest for immortality time is on our side. The medical and biological advances that will be achieved over the next ten to twenty years will undoubtedly allow us to live long past one hundred; and the longer you live, the more knowledge that biomedical scientists glean, the farther and farther our life-span will be extended. Finally it is hoped to reach the unlimited and immortal state. Of course, most of the authors admit that very few scientists accept today that immortality is within our grasp. Even those working in the fields of cellular biology, molecular genetics and life extension have not yet faced the fact that current research has already opened the path to human immortality. That is the crucial issue. The authors of human physical immortality maintain that it is an achievable aim, an approachable goal.

10 Hanshalter, "Der (fast) unsterbliche Mensch — lässt sich das Altern hinausschieben?" *Der Spiegel* 17/2000. The quotations in this paragraph are translated from this article.

A poignant case in this respect is a book that will soon be published.<sup>11</sup> (Bowie 2000) Here we give a summary of the Book *Why Die*<sup>12</sup> (Bowie 2000) The book consists of 12 parts. In the first part which deals with "The Vision" Herb Bowie offers a fictional look into the next century. This narrative focuses on one couple as they experience the possibility of living forever. The story gives a good overview of what is meant by physical immortality, and introduces many ideas that will be expanded on later in the book. The second part, "Beginnings," includes several different chapters that, in different ways, start the discussion of living forever. Our culture has produced many different images of physical immortality, so a terminological discussion on the term 'immortality' is called for. The origins of the idea of immortality is traced, pointing out that the idea of living forever is not really as strange as it may first seem. One may be surprised to hear what some experts in related fields have to say on the subject. Finally, the author looks at the case of someone who decided to stick with the safety of conventional beliefs, and strongly suggest that we try something different.

Part three, "The Decision to Live," suggests that life and death are the results of decisions we make, and not things that just happen to us. A straightforward quiz that will determine your IQ (Immortality Quotient) is given. Many forms of social conditioning prepare us to pack it in after only 70 or 80 years, and these will be pointed out. Also included here will be a discussion of the benefits that a belief in our own physical immortality can have on your life today.

Further, the next part, "How To Live Forever," reveals what the author calls the 15 minimum requirements for physical immortality. He believes that these techniques are bound to improve your life today, and offer real hope of extending our lives indefinitely. Part five, that deals with "Feelings," talks about the importance of recognizing and nurturing our feelings of being here forever. In this part of the book Bowie talk about what it feels like to look forward to eternity.

The next part of the book looks at the possibility of human physical immortality from a scientific perspective. It is pointed out that the physical and biological sciences have found no fundamental principles that would make immortality impossible. The author also explains why I think that the phenomenon of evolution has brought humankind to the brink of a new phase of history, in which immortality is our next logical step.

Human value systems are a subject of utmost importance to the survival of our race. So in part seven, the author explains how the idea of physical immortality can help us transform and unify these values. Life would be meaningless without other people in our lives. In part eight, the subject of

11 Herb Bowie *Why Die? A Beginner's Guide to Living Forever*, Avon Books.

12 Herb Bowie *Why Die?*.

“Human Relationships” is tackled. It is claimed that the decision to live forever can improve the quality of our connections to others, at a global as well as a personal level.

Almost all of us have been raised in one or more religious systems, and all of us have grown up in the shadow of religion. In part nine, the author explains how physical immortality is the next step in the evolution of religion. Seeing ourselves as living forever has a profound impact on other aspects of our individual and collective self-images, and we so talk about this in the next part of the book.

Part eleven gives some examples of how the principles of living forever can be applied to other areas of life, such as parenting and bodywork. In the last part of this book (“Where to Go From Here”), the author shares some possibilities for further development of human immortality. Some concrete suggestions as to what to do next in the search for immortality are given.<sup>13</sup> (Bowie 2000)

So far we have seen the human longing and the hope for immortality. In the next section we shall see some scientific basis for it. We do not make any claim that there are strong scientific evidence here. Since we are dealing with the future we acknowledge that “the only thing certain about the future that it will not be as certain as we think of it.”

### 3. *Physical Immortality: The Scientific Basis*

After having a glimpse of some of the arguments for physical immortality based on our mental upbringing, we turn our attention to the “hard facts” about immortality. At the outset, it must be emphasised that science today is in no position to provide us with immortality. But there are clear indications, specially boarding on cutting edge technologies, which indicates to us that the quest for immortality is based on scientific facts. There are many ways of approaching this subject. Many fields are involved indirectly in the quest for immortality. Some of them like brain uploading,<sup>14</sup> (Strout 1998) Human Genome Project, and cryonic suspension deserve our study, although I do not approve all their conclusions regarding immortality. But the lack of space forces me to take only few selected scientific basis for immortality.<sup>15</sup> Here we

13 Adapted from the preface of Herb Bowie, *Why Die?* Available at the URL: [www.powersurgepub.com/books/whydiep.html](http://www.powersurgepub.com/books/whydiep.html).

14 See J. Strout, “Mind Uploading: an alternative path to immortality.” (1998) *Cryonics* 19: 26–30.

15 I hope to treat the other scientific areas dealing indirectly with human immortality at a later stage in a forthcoming book on *Human Immortality*.

limit ourselves to the biological study of cells and related items like protein hormones and cloning.

#### a. The Hayflick Limit and the Immortal Cells

In the 1970s the American cellular biologist Leonard Hayflick discovered that most types of human cells have a natural limit to the number of times they can divide, or reproduce.<sup>16</sup> (Hewitt 1996) Some types of cells, such as those that produce red and white blood corpuscles, can divide millions of times. Others, such as most nerve cells, do not reproduce at all. If a cell's Hayflick limit is 50, for example, it will divide 50 times and then become senescent. It withers and dies. When enough of our cells die, we die.

Some cells have no Hayflick limit. Barring external death, they are immortal. They can be killed, but they do not age. The "lowly" bacteria are immortal. They can be killed — by starvation, radiation, lack of water, or being eaten by another organism. But they do not age nor die a natural death. Bacteria keep on dividing forever, until some outside agency kills them.

There are some cells in human body which are similar to the bacteria cells. Cancer cells are similarly immortal. They keep on dividing endlessly, unless they are killed or their host dies. "HeLa" cells, taken from the tumour of Henrietta Lacks in 1951, are still reproducing as vigorously as they did nearly 50 years ago. Human germline cells — ova and sperm cells — also show no Hayflick limit. Why can some cells keep on going and going like the pink bunny in the TV commercials, while others curl up and die after a certain number of divisions? That has been a question that has eluded the scientists till now. Only now an answer seems to be emerging.

#### b. Ageing Associated with Mitochondria

The Journal *Science*<sup>17</sup> (Science 2000) reports that specific changes in the mitochondria DNA (mtDNA) are associated with ageing. There are several reasons to believe that the mitochondria may be important in ageing. The mitochondria are the generators that power our cells. In performing this function they generate free radicals. Therefore changes in the mitochondria that occur with ageing are of practical interest for those who would like to extend the human life span.<sup>18</sup> (Hewitt 1996)

16 Copyright 1996–98 by Duane Hewitt. <http://www.immortality.org> For this section I base myself primarily to this home page.

17 October 22, 2000. See also <http://www.sciencemag.org>

18 See Immortality Duane Hewitt main page: <http://www.immortality.org>



Mitochondria are unique components of a cell because they possess DNA of their own and replicate in a manner similar to the cells in which they are found. This DNA is a remnant of the ancient forerunner of the mitochondria which was a free-living bacterium. This study, which was conducted at the California Institute of Technology focused on mutations in the region of mtDNA that controlled the replication of the mtDNA itself. It was found that specific mutations in the control region would appear and proliferate within individuals as they age. This complements prior work that demonstrated that the amount of active mtDNA declines as an individual ages. It may be that the accumulation of the mutations such as those detected in this study are the underlying cause of this phenomenon.

This study involved meticulous and laborious bench work and data analysis. Samples from over twenty individuals were assayed for multiple mutations. In some cases two samples from the same individual at different ages were processed. Certain mutations were common (57%) in older individuals (above 65 years) but absent in samples from younger individuals. In the samples taken from the same individual at different ages (longitudinal studies) the same frequency of mutations was also observed. This data indicates that specific mutations in mtDNA become more frequent with age. However, these results do not prove that these mutations are involved in ageing. Further studies will be required to determine if these mutations are related to impaired function of the mitochondria.

One concern that emerges from these experiments is related to the fact that the region being examined is involved in mitochondrial DNA replication. This means that it is possible that mutations in this region may impair or increase the efficiency of replication of the mutated mtDNA. Therefore, it is quite possible that the mutations observed in this study give rise to mitochondria that are more efficient at self-replication. This would explain the accumulation of mtDNA with these mutations with the passage of time (i. e. in older individuals) without any role in the phenomenon of ageing.<sup>19</sup> (Hewitt 1996)

### c. Telomeres and Telomerase

Further, scientists assume that ageing can be controlled or even reversed. Some biogerontologists<sup>20</sup> believe the answer lies in our telomeres. Inside the nucleus of virtually every cell in your body are the long strands or filaments called chromosomes. Human cells have forty-six chromosomes, except for

19 For more details contact by email [duane@immortality.org](mailto:duane@immortality.org)

20 A gerontologist is a scientist studying physical ageing.

the sex cells, which have half that number. The chromosomes contain DNA. DNA makes up the cell's genes.

At the tip of each spindle-shaped chromosome is a sort of cap, called a telomere. Telomeres somewhat resemble the aglets\* on the ends of shoelaces. The telomeres keep the ends of the chromosomes from sticking together, and from sticking onto other chromosomes. Bacterial DNA does not have telomere caps, and tends to loop itself into a ragged circle, like a snake swallowing its tail. Telomeres keep the individual strands of DNA in our cells from looping or connecting to one another. They also play an intriguing role in cellular ageing. Some researchers believe that telomeres are a sort of cellular clock that sets the rate at which the cells age and eventually die. Each time a cell divides, its telomeres shorten. When the telomeres become short enough, cell division stops and the cell soon dies. But cancer cells regrow their telomeres after every division. Michael Fossel, professor of clinical medicine at Michigan State University, says quite clearly, "Telomeres [are] the clocks of ageing." He and other researchers believe that telomere shortening is responsible for cellular ageing and, eventually, cellular death. Most biologists do not accept so simple an explanation. Still the claim has to be seriously evaluated and scientifically researched.

In January 1998 researchers announced that they had extended the lifespan of human cells "indefinitely" in a laboratory experiment in which telomerase was added to the cells. Telomerase is the enzyme that essentially builds new telomeres.

Cancer cells produce plentiful telomerase. Normal human cells do not — even though they have the telomerase gene in their DNA. In normal human cells, that gene is suppressed, deactivated. The researchers, from Geron Corporation and the University of Texas Southwest Medical Center, inserted an activated telomerase gene into the cells. The cells reproduced even beyond their Hayflick limits, giving powerful evidence that telomeres have a decisive influence on cellular senescence and may indeed be "the clock of ageing." Writing in the prestigious journal *Science*, biologist Titia de Lange, of Rockefeller University's Laboratory for Cell Biology and Genetics, commented, "The doubt [about telomeric influence on ageing] has now come to an end with a report... describing direct evidence for a causal relation between telomere shortening and cellular senescence."

The active component of the human telomerase complex has now been cloned.<sup>21</sup> (Hewitt 1996) This has been accomplished by two groups working independently.<sup>22</sup> (*Science* 1997) They used the sequences obtained from the.

21 See <http://www.immortality.org>. Copyright 1997 by Duane Hewitt.

22 See *Science* (August 15, 1997) Volume 277, Pages 955-959. See also *Cell* (August 22, 1997) Volume 90, Pages 785-795.

This protein has an important if not essential role to play in both cancer and ageing.

When the equivalent gene is deleted in yeast the cells age rapidly due to telomere loss. This phenomenon is believed to resemble ageing in human cells which lack telomerase except in a restricted number of cell types. Telomerase is activated in a wide variety of tumours and is believed to be essential for the immortality of cancer cells. Both groups found that this protein is expressed in immortal cell lines but not in cell lines with a limited life span. One of the groups established a strong correlation between the expression of the telomerase catalytic subunit (hEST2 or hTERT) and tumour formation. They detected expression of this protein in all eleven tumour samples that they examined from two different types of tumours. They also correlated hEST2 expression with telomerase enzymatic activity which means that expression of this component may be the rate limiting step in telomerase activation. The significance of the cloning of this gene is that an inhibitor specific for telomerase promises to be an effective general anti-cancer drug. It may be that telomerase is the Achilles's heel of cancer and characterisation of this enzyme has the potential to yield promising new cancer therapies. The two companies to watch in this area are Merck and Geron.

#### d. Telomerase and Cancer

Many researchers are interested in finding how to prevent cancer cells from producing telomerase. If a telomerase "off" switch could be found, it will become possible to stop tumours before they grow large enough to be trouble.

The fact that normal cells possess the telomerase gene but do not employ it may be a warning signal. Activate that gene and the cell may start runaway cancerous growth.

The goal, then, is to control telomerase production well enough to remove the cell's Hayflick limit and allow the cell's owner to live forever without causing cancer.

#### e. Human Growth Hormone

One protein that seems to have a measurable effect in extending life-expectancy is human growth hormone (hGH), also known as somatotropin.

Human growth hormone is secreted by the pituitary, a tiny gland located at the base of the brain, not far from the pineal. The pituitary is known as the master of the endocrine system, because it regulates the secretion of hormones by the body's other ductless glands, such as the thyroid, adrenals, gonads, etc., which, in turn, secrete the hormones that regulate the body's metabolism.

Human growth hormone has many vital functions, ranging from building bones and muscles to strengthening the immune system and helping to heal

wounds. Dwarfism is a consequence of lack of hGH, and abnormally small children are treated with it to help them to grow closer to normal size. While growth hormone is secreted in large amounts by adolescents during sleep, in adulthood its production diminishes, often as much as ten to 15 percent every ten years in men. Women maintain higher levels until they reach menopause, then their hGH production rapidly declines. Researchers have not missed this obvious hint that slowdown in hGH may be related to ageing.

Low levels of hGH are associated with loss of muscle leanness and accumulation of fat. Worse, as the individual's weight increases, hGH levels drop more, setting up a negative feedback loop. Injection of hGH improves muscle strength and leanness, apparently helping the body to build protein instead of fat. Dr. Daniel Rudman of the Medical College of Wisconsin tested hGH's anti-ageing possibilities with a group of male volunteers in their 60s and 70s. Half the volunteers received no hGH injections; they were the control group. The others received hGH injections three times a week for six months, so that their hGH levels were returned to the amounts they had as young men.

While the men in the control group showed the normal deterioration of muscle, bone and organs expected for men of their age, those who received the hGH injections not only stopped ageing — in some ways their ageing was reversed. They put on new muscle mass. Their skin increased in thickness by almost ten percent. Internal organs such as the spleen and liver also gained mass. Some of the deteriorating effects of ageing had been stopped and even turned around. To make certain these effects were due to hGH, the researchers stopped the injections. The "youthful" group began to age normally once again.

It is far too early to be certain, but if there is a single elixir of youth, human growth hormone might be it. Still, hGH needs to be tested over long time spans, and its possible side effects must be tracked down. It is known, for example, that overly large doses of hGH can cause or aggravate hypertension, lead to diabetes, enlarge the heart and effect the joints.

Where we are heading for? Between mtDNA, hGH, telomerase, MORF4, and other possibilities such as organ regeneration (not to mention nanomachines or cryonics), the avenues toward immortality are many and the roadblocks are coming down. Commenting on the future possibilities of various therapies for ageing, molecular biologist John Medina, of the University of Washington School of Medicine, puts it this way: "What this means is nothing less than a bombshell. There are active researchers in the field today who think that we may soon have protocols that could double or even treble normal human life spans." Doubling or tripling your life span means you will live to 150 or 225, at least. And by that time, biomedical research will have uncovered another century or two of life-extending techniques for you. At the same time scientists are quick to point out that there is a long way between extending the lifetimes of cells in a Petri dish and extending human lifespan, such work is a major step toward the day when ageing is banished and death itself

becomes an option rather than an inevitability.<sup>23</sup> Further, we shall briefly see cloning as another candidate for anti-ageing and attaining immortality since it has become so popular nowadays.

#### f. Cloning for Extending Life?

When Dolly was unveiled three years ago as the first cloned mammal it was as if the new millennium had already dawned. From the pages of pulp fiction and B movies came the clones with an all out media blitz which had pundits opining and scientists pontificating. On this occasion it seems that the media feeding frenzy was proportionate to the significance of the discovery.<sup>24</sup> (Hewitt 1996)

One issue that was of particular interest was whether the age of Dolly's cells would reflect their previous incarnation or did Dolly start with a tabula rasa like any new-born. It was soon determined that Dolly's cells were older than sheep that had been born naturally. It had been hoped that the nuclear transfer cloning technique would be able to provide a limitless supply of cells for regeneration and repair of diseased tissues. The limited life-span of Dolly's cells were a setback for this goal.

The April 28th, 2000 issue of *Science* features a report indicating that Dolly's premature frailty is not necessarily the rule when dealing with clones. On the contrary, it appears that clones can actually be younger than naturally born animals. The bearer of this joyous news is an aptly named young calf, Persephone.

The clones in this study were made by a technique that is somewhat distinct from how Dolly was produced. The cells that were used to generate Dolly and Persephone were halted at different stages of the cell cycle. Dolly was produced from cells that had temporarily withdrawn from the cell cycle into a stage referred to as G0 or quiescent phase. Persephone, on the other hand, was produced from a cell that had divided until it could undergo no further DNA replication and encountered a roadblock at the border of G1 and S phase. Persephone's mother cell was considered senescent. This may be the reason that Persephone is younger than she should be and Dolly is older than she should be.

23 Further it may be mentioned that MORF4 also is associated with research on human immortality. Researchers at Baylor College of Medicine in Houston have cloned a gene that makes some types of human cells live more than twice as long as they would normally. It is hoped that it may also cure cancer. When added to cancerous cells, the MORF4 gene (Mortality Factor from human chromosome number 4) stops the cells from reproducing. The tumor stops growing and becomes senescent. A mutated form of MORF4, when added to normal human cells, allows them to keep on reproducing far beyond the normal limits of their life-span.

24 See <http://www.imortality.org>. Copyright 1997 by Duane Hewitt.

The implications of the experiments with Persephone are enormous. This confirms that it is possible to produce a plentitude of cells through nuclear transfer and somatic cell cloning. These cells can be used to repair tissues that have been damaged by ageing or disease. This research has yielded a model system which enables the examination of the role that telomere length plays in ageing. It also gives rise to the more controversial possibilities of creating longer-lived human clones. Whatever future developments proceed from this discovery, it is a watershed development in ageing research and is particularly pertinent to the telomere theory of ageing.

#### 4. *Immortality: The Possible Religious Responses*

In this section we shall broadly see three possible responses to the doors of opened by science. We shall deal with the three types of response briefly and suggest a creative, dialogical and healthy interaction between science and society.<sup>25</sup> Here we represent religion as the core of the society (apart from science).

The response to the frightening or fantastic scenario and scientific possibilities described above may be summed as that of total opposition (active denial), orphic admiration (passive submission) or creative appreciation (prophetic acceptance). The larger society has a role to play in determining the future of the society, not just the few individual scientists who quest for knowledge or corporate managers who seek profit. The larger society in general and religion in particular have a role to play in determining the destiny of life. So we suggest briefly the possible response to the technological marvel of (possible) human immortality.

##### a. Active Denial

Opponents of this project advocate the policy to "deny or delay" the whole issue of search for physical immortality. According to them, science is constantly creating new opportunities for us, but new opportunities always generate new problems for society. These social problems inevitably fall into the hands of our politicians and the general public and affect life negatively. The first impulse of these people is to be cautious, apprehensive and overly critical. Their first instinct, prompted by religious zealots, will be to ban it. "It's

25 Here an assumption is made that we can equate society with religion. Since we are dealing with the most profound aspect of human existence — its very destiny — we are equating religion with all other factors that do not come under the umbrella of science. So when we speak of society or religion in this section, we include all forces in the society except the scientific or technological.

new, it's something that's never been done before, therefore it must be wrong — perhaps evil." After all, that was just the immediate reaction to the news that a sheep had been cloned? "Ban it!" cried the presidents of the U. S. and France. "The scientists are trying to play God!"<sup>26</sup> (Peters \*\*) They chanted. So the Clinton administration wanted to pass a law outlawing human cloning.

But while many people are justifiably wary of cloning humans, the offer of virtual immortality will be too powerful to sweep under the rug. Right or wrong, good or bad, no matter what the eventual consequences to society, most people do not want to die. Most people will leap at the chance to extend their lives indefinitely, and to be youthful and vigorous for centuries. Or millennia. The politicians' and the public's second instinct will be to control the research. Write laws and set up bureaucracies that keep the scientists on a tight leash. Control the purse-strings for research so that only compliant scientists can receive government funding. Delay the whole process as much as possible so that we can at least postpone the problem.

This way of responding reminds us of active denial or positive confrontation and will only lead to conflict between science and society or religion and has no creative contribution to break. If we go on blocking all sorts of progress, one day the block has to give way.

The greatest drawback of this method is that it simply does not work. The society (or religion) can suppress the scientific quest but one day it will break through and then it will pay back with vengeance. In the long run such a method is counter-productive.

#### b. Passive Submission

The diametrically opposed view is characterised by total admiration and blind absorption of the new changes brought about by science. There will be enthusiasts who will go out all the way for the new technologies, without in any way personalising or critically reflecting on it. Again, the pressures to push such research forward as rapidly as possible and make its results available to everyone will be overwhelming. We are talking of life and death here, and the basic animal drive to stay alive is far too powerful to deny or even delay. No matter how expensive it may be, no matter how it distorts our society, people will want to extend their lives as far as they can.

Without any conditions, without any pause to think they may absorb it whole-heartedly and become part of it. They submit themselves passively and adorably to the dictates of technology. The cyborg generation may not really care about their own individual or even human identity, but only about the survival which technology promises. Such a passive and uncritical sub-

mission, reminiscent of orphic adoration also will not lead to true progress and development of human destiny.

The problem with such an approach is that it simply does not contribute anything constructively to the society. If the society is constantly carried on and pushed forward by science, the dominion of science over society will never stop. If we swim all the time along with the current, the current will never cease carrying us. So we cease to have our own identity, our own convictions or values.

### e. Prophetic Acceptance

So what is called for, I believe, as a response to the scientific revolution is a creative appreciation, which is prophetic and affirmative. We should be aware that the research may not develop in the way we wish. The promised immortality may not arrive. Or it may take longer time than imagined. But it seems to be almost certain that there is a theoretical possibility and a practical probability that physical immortality is achievable. But it may be just a hype and hope that never realised.<sup>27</sup>

So the role of religion and society in general is to guide and shape the human longing, not just to follow the steps science has taken. Such a view nurtures hope for the future and evaluate the dangers posed by technology. It affirms life and even immortal life without belittling even the weak the fragile life on the earth.

What is called for is creative appreciation, critical guidance, prophetic fostering of life in its totality. Strong and definite no may be called for and society should not shirk this responsibility when need be. Above all such a society and religion has to be a spokesperson for LIFE (animals, plants, weak, strong, powerless) including the immortal life promised by technology. Such a society nurture values, fosters life and promotes community.

<sup>27</sup> An example from the 1980's of a compound that has fallen well short of the lofty claims that had been made for it is Beta Carotene. When the antioxidant properties of Beta carotene were being hyped it was touted as the "Miracle Antioxidant" in a manner similar to melatonin today. Megadoses of 10,000 to 25,000 IU were recommended by some (US RDA 0 IU). The studies that initially identified Beta Carotene established that consumption of fruits and vegetables high in carotenoids was associated with reduced cancer and heart disease risk. It was proposed that Beta Carotene was one of the compounds responsible for these positive health effects. However, recent large scale studies have shown that megadose Beta Carotene supplementation has little effect upon cancer incidence and may cause an increase in some forms of cancer in smokers. Therefore Beta Carotene alone is not the cause of the health benefits of carotenoid containing fruits and vegetables. In this case the proponents of Beta Carotene were guilty of greedy reductionism which caused them to attribute the effects in a complex interaction to a single simple cause that could be packaged and sold. However this case does not mean that supplementation of vitamins cannot have a significant health effect as in the case of Vitamin E. See [duane@immortality.org](mailto:duane@immortality.org).



So the call is not to let science alone determine the agenda for future progress. Both science and religion, humanity as a whole, determine the future destiny of humanity and life.

This demands genuine dialogue between science and society, enriching partnership between the two and trusting critique of one another. The readiness to listen and to change the stand based on informed opinion and calculated facts given by the mutual encounter of both society (religion) and science. This calls for commitment both to the larger values of society and to the particular values of scientific progress and the possible physical immortality. A commitment that also demand at times a definite "no" to some directions of lopsided growth.

We should recall that "Live longer" does not necessarily lead to "Live happier." Longer life does not always lead to a more fulfilling life. Quantity of life has to be matched with quality of life.

## 5. *Conclusion*

Such a possibility of human immortality has deep rooted religious consequence. Religions can ignore the challenges posed by immortality only at the danger of instant self mortality. The obvious danger of such a possibility is that each one becomes so preoccupied with his own individual immortality and forgets the human community and life in general. There is a danger that the larger issues of providing justice for the impoverished, fostering of life in general and love as the most significant human value may be forgotten.

At the same time it must be reiterated that physical immortality does not render God superfluous, religion redundant and human longing unnecessary. Even in the situation of immortal humans there is scope for meaningful hope, for relevant religion and for a liberating God. At the same time Immortality necessitates a human hope that may be detached from physical death. In our ordinary understanding of human longing, death is seen as the starting point of eschatology or human hope. That view has to be given up and we need to delve deep into the "inaugurated eschatology" which theologians have taken seriously since few decades.

We still need to take death seriously. But death may not be given the supreme importance and inevitability that was it due once. So the human hope and fulfilment has to begin with this present world, with the here and now. There are of course social and existential problems like poverty and injustice which are to be tackled seriously.

It must be noted that overcoming physical death and attaining physical immortality does not solve the problem of human contingency. The issue of human finitude has to be addressed in a much wider sense. The tendency of those seeking physical immortality — passive acceptance — is to reduce human life to a physicalistic or mechanistic view point. They would stress that

attainment of physical immortality — temporal unlimitedness — necessarily leads to human fulfilment. We need to focus also on the existential and ontological contingency of human condition, not merely that of the temporal conditioning.

So even in a world of immortal human beings, human longing and hope is imperative. Hope still remains intrinsic to humans. But it is a hope based on the day-to-day experience of humans and rooted in the present day, not one aimed primarily at a later world "a pie-in-the-sky-when-you-die" type. So life, today's precious, fragile life, has to be taken seriously. It has to be affirmed, respected and fostered in its entirety. We can hope to pay back the bride-price for Alatangana's marriage with Sa's daughter and life lives "full and abundant" and not necessarily temporally limited.

### *References*

- Osho, Bhagavan, *Beyond Enlightenment*, ch 3, "No other path but life." (From CD rom) 1998.
- Pandikattu, Kuruville, (1999) "Eschatology: Arena for Creative Encounter between Science and Religion." *Jeevadhara* 29 (April 1999) 154-164.
- Pandikattu, Kuruville (2000) "Significance of God if humans were to become immortal," *The Month* 33 (July 2000): 264-268.
- Spiegel, Der* (2000) 17/2000. URL.
- Leeming, David and Leeming, Margareth, *A Dictionary of Creation Myths*, OUP, New York/Oxford: 1994.
- Bowie, Herb, [http://www.powersurgepub.com/books/immort/Bowie why die. htm](http://www.powersurgepub.com/books/immort/Bowie%20why%20die.htm), 1999. See also URL: <http://www.sff.net/people/benbova>.
- Capra, F., *The Tao of Physics*, A Bantam Book, 1977.
- Bowie, Herb *Why Die? A Beginner's Guide to Living Forever*, Avon Books. 2000 (forthcoming)
- Bova, Ben, *Immortality*, Avon Books, 2000
- Strout, J., "Mind Uploading: an alternative path to immortality." (1998) *Cryonics* 19: 26-30.
- Science October 22, 2000. See also <http://www.sciencemag.org>.
- Hewitt, Duane, 2000 Immortality main page: <http://www.immortality.org>. contact.
- Science* 1997 (August 15, 1997) Volume 277, Pages 955-959. See also *Cell* (August 22, 1997) Volume 90, Pages 785-795.
- Peters, Ted, "Playing God" \*\*
- Rose, Michael *Future Fantastic* episode titled Immortals