The Generation Game: No Prizes for Young Earth Creationists

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One of my long-term projects is to create a portfolio of photographs of elderly people, especially those who are beyond vanity and only smile when they want to. The ones with the lived in faces, the ones with the attitude of "*these wrinkles are a badge of time, I've earned these wrinkles*", the ones who don't care about techie things like harsh lighting and wrinkle shadow. Black and white usually works best.

This got me thinking about the time, many years ago, when I was having a drink and a chat with a work colleague, a young earth

creationist. The conversation got around to history and she made the claim that there have only been about 250-300 generations of human beings. When I first heard this I naturally assumed she meant 300 generations of human beings that we are able to directly account for i.e., since our historical records began. But no, she meant 300 generations of human beings, ever, at most. Which if you think about it, makes sense if you assume approximately 20-25 years per generation for an approximately 6000 year old Earth. I can remember thinking how mind-boggling that is. If true, it would mean that someone aged 60 years old today, and I am over that figure, would have lived through 1%, not only of the whole history of the human species, but of the entire existence of the planet (or the universe, if they are to believed) . I used to work with elderly patients conducting medical research, several of whom were in their late-90s. They would have experienced nearly 1/50th of all that has ever happened. No wonder it is said that wisdom that comes with age.

Of course, to those of us with a more realistic view, how many generations depends crucially on what is meant by human. If you include the whole of the genus Homo which first appeared about 2.5 million years ago then the number of generations is going to be much higher than that for our species of Homo sapiens which first appeared about 250,000 years ago. The problem of how to measure a generation also arises, because of changing lifespans at different periods in history. This is especially troublesome for the true believer because the Old Testament tells us, contrary to all available evidence, that people used to live much longer. For example Adam lived for 930 years, Seth for 912 years, Methusaleh for 969 years and Noah for 950 years. Of course these figures would not be unusual in a culture that relied on a lunar rather than a solar calendar, as the ancient Jews did.

Apparently people lived such long lifespans because their genome was ‘perfect’, contained more ‘information’, and had not ‘degenerated’ as ours has (this claimed perfect genome has also been used to morally justify the inevitability of incest in the earliest generations after Adam and Eve). Yet we have genetic evidence that directly falsifies that claim. Before discussing the evidence, consider this assertion from Brian Thomas in his paper 'Genetics Analysis of Jews Confirms Genesis' published in the journal 'Creation Research' in 2011 - (not his own research, of course, but a misrepresentation of others):

"*When it comes to history, genetic analyses can provide clues at best, whereas ancient records provide more reliable information.*"

Let's see if this view is sound. Realistically, for the young earth creationist account to be reconciled with the genetic evidence we have to compare present day observations of the human genome to what would be expected calculate from the population bottleneck of eight people around 2348 BC (approximately the year of the Noachian flood according to Biblical datings).
A formidable problem for their figures can be found in the genetic variation currently observed in humans. For example the DRB1 gene, one of over a hundred that make up the leukocyte antigen complex, has 59 variants in humans of which 32 very similar variants are also found in chimpanzees. This level of genetic diversity could only have developed with a minimum human population of approximately 4000 synchronously reproducing individuals, suggesting a population bottleneck no lower than 15,000-20,000 individuals since the genus Homo split from the larger ape family approximately 6-7 million years ago. These figures come from the Catholic biologist and former Dominican priest Francisco Ayala's paper 'The Myth Of Eve: Molecular Biology And Human Origins' published in 'Science' in 1995. Similar conclusions of minimal population sizes have been calculated for many other genes. All such studies indicate the complete impossibility of a bottleneck as low as eight individuals at any time in the past 6 million years. The ancient records are wrong.

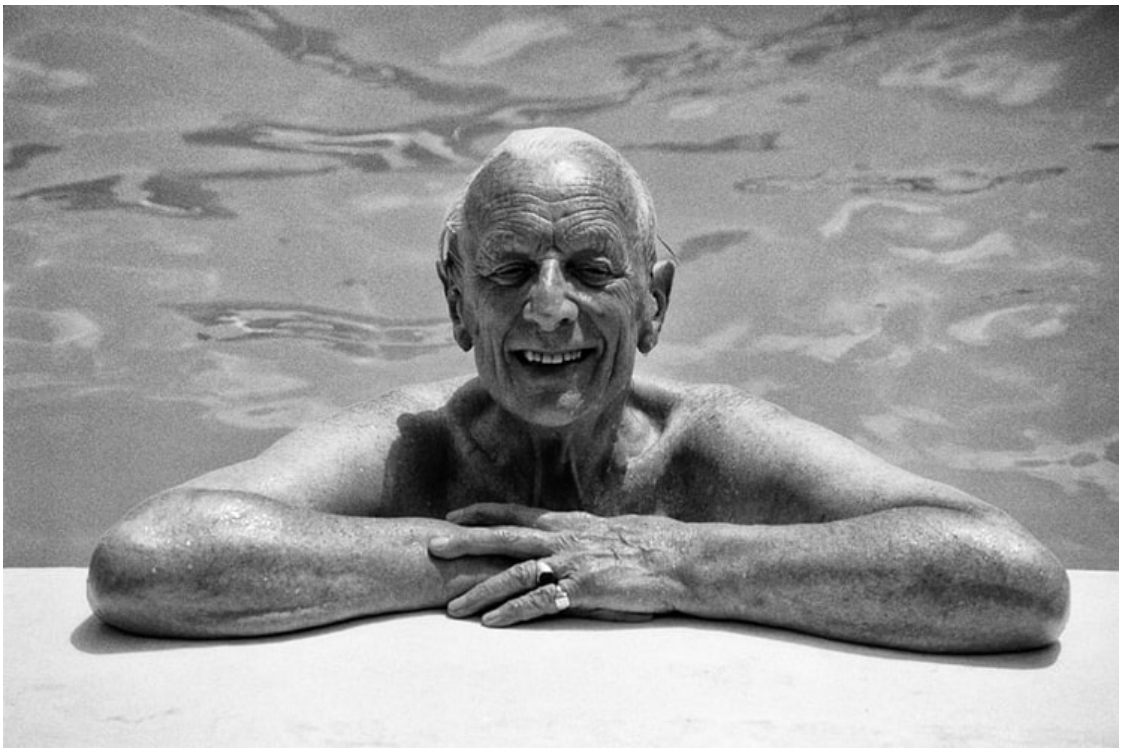
Ötzi, the mummified male found in 1991 in the mountainous border of Austria and Italy lived about 5300 years ago and his entire genome has been sequenced. The analysis, published early 2012 revealed a genome remarkably similar to those of modern humans living in Sardinia and Corsica. No evidence for a relatively 'undegenerated' genome was found. Furthermore, a sample of his red blood cells, which were remarkably intact, were found to be identical to those of modern humans. The results of Ötzi's genome sequencing come as no surprise. We know that mutations occur about 1 in every 10 billion cells. The genome of each new born baby has something in the region of 100-130 mutations across their approximately 23,000 genes that don't exist in either of the parents genomes (assuming a father of 30 years old at conception; the older the father, the higher the number of mutations). Given the current population of the world, this means that there is currently something of the order of 800 billion new mutations in each new generation.

Now remember that it is a standard creationist canard that all mutations, without exception, are deleterious. If this is so, it doesn't take a mathematician or a population geneticist to realise that, even with a starting population of eight as little as 4000 years ago, mutation rates would be so high that they would have rendered our species extinct. Except we aren't, for the simple reason that while some mutations are indeed deleterious (though these often result in a decrease of reproductive fitness; however if

enough deleterious mutations accumulate in an organism, that organism will likely die before reproducing), most have a neutral effect while rare mutations can even be beneficial. Examples of beneficial mutations are Apo-AIM (which reduces cardiovascular disease risk), LRP5 (increased bone density and strength), HbC (one copy results in a 29% reduction in susceptibility to contracting malaria; two copies a 93% reduction, both without risk of sickle-cell anaemia) and a mutation in LCT (allowing the digestion of milk after weaning). Another creationist canard is that there are no non-functional regions of the human genome. We are perfect creations. However, the fact that we are able to absorb this level of deleterious mutations at all without staggeringly high levels of phenotypic damage is due to the fact that the majority of our genome is non-functional, having been inherited from myriad ancestor species.

Another example of the impossibility of the current world population starting out with eight people is demonstrated by the HLA-A gene located on human chromosome 6p, which has been found to have 673 alleles (a figure growing year by year). After the flood the maximum number of HLA-A alleles possible would have been ten (i.e., two each from Noah, his wife and their sons' three wives - we cannot add the alleles from Noah's sons as they were inherited from their parents). This figure assumes that all were heterozygous for that gene which is by no means certain. It is possible, though statistically highly unlikely to the point of impossibility, that each of Noah's sons carried mutations for the HLA-A gene, in which case the number of alleles would be a maximum of sixteen. It is biologically impossible for these initial ten alleles on a single gene to reach 673 in around 4000 years without the species incurring mutation rates in every generation so large as to make the species non-viable.

So which is the more reliable information, genetic analyses or ancient records? Putting aside the ridiculous genetic deterioration claim and taking my creationist friend at her word while ever the rational skeptic, this got me thinking about whether the current world population (which recently surpassed 7 billion), could have been achieved in 6000 years and so support her young-earth hypothesis. Sure enough, I found the sums have been done and are proudly and widely disseminated among creationist literature and websites.



For example, according to the late Henry Morris, an American hydraulic engineer and the patron saint of modern 'creationist science' found (interestingly, the 'Salem Hypothesis' notes a positive correlation between those people labelled as engineers and a wide range of pseudoscientific ideas such as creationism), that if you start with two people in 4300 BC (i.e., Adam and Eve) and extrapolate forward you come to a world population of one billion in 1800, which is about right. He assumed the following values: An initial population of 2; a growth rate of r = 0.0033 (1/3 of 1% increase per year; derived from the estimated per capita global growth rate from 1650 to 1800 AD) and 40 years and 2.46 children per generation. Although this last figure might appear too low

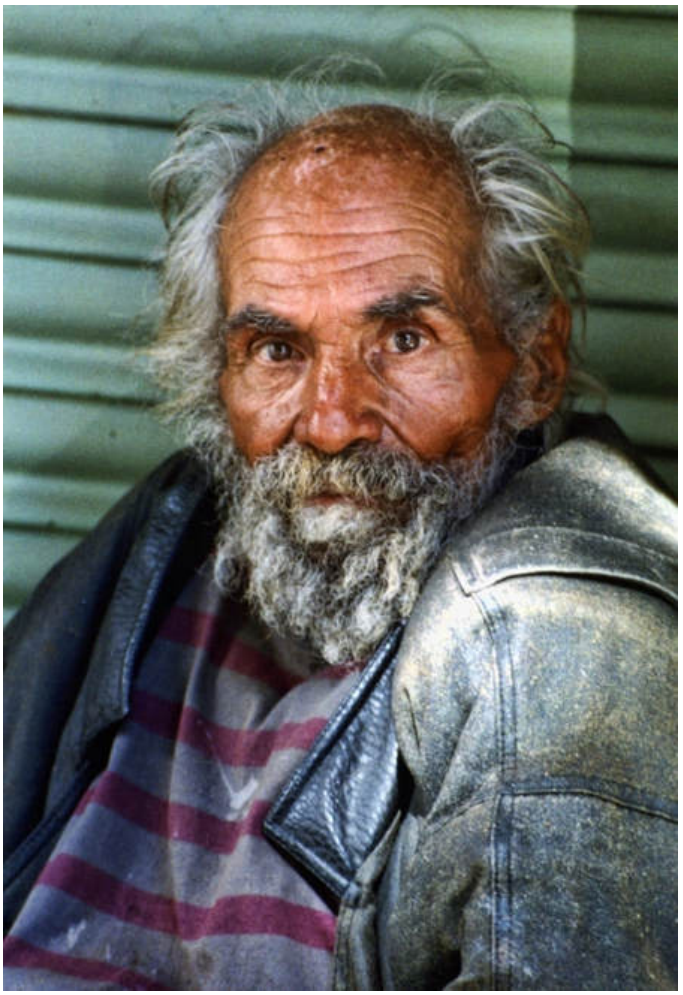
it is actually reasonable given estimates from Kenneth Hill of the Hopkins Population Center that between 40-60% of all females who have ever lived have died before reaching five years of age and of those reaching adulthood, 5-15% have died during childbirth (see 'The Decline of Childhood Mortality', 1990). Morris also offered an alternative calculation, retaining his initial assumptions, but based on a starting date of 2026 BC (exactly 4000 years before the time of his writing in 1974). OK, he was a little bit out; there were 2.5 billion people 24 years earlier in 1950, but to be honest it's not bad as a back of the envelope calculation.

Convinced? Well remember that just because it is mathematically feasible that the world population in 1974 may have originated from two people does not actually make it fact.

Whenever an initial population and steady rate of growth is accepted or at least assumed we are then able to calculate the human population for any year we choose. Unfortunately for Morris these figures, like genetic analyses, are nowhere near Bible-friendly. Morris's extrapolation from two people in 4300 BC results in laughable population estimates along the way. For example, in 2500 BC, the year the Great Pyramid of Cheops was built, the population of the earth would have reached only 750 people. If they were evenly spread around the Earth, the population of Egypt (and hence the labour force used to build the pyramid) would have been a mere eight people. Even in the highly unlikely (and Biblically contradictory) case that the entire population of the planet lived in Egypt at that time, approximately half would have been female and a good percentage would have been children (and minus also the ruling classes, who did not do manual work). To compound the ridiculous nature of Morris's claims, five more similar sized pyramids were built in Egypt within the next 200 years. To compound the error even further, large scale civilisations in India and China have been dated to over a thousand years earlier.

But it gets even worse than this. If we use Morris's figures with a starting population of two people in 2348 BC we reach the following conclusions. In 1491 BC when Moses allegedly led the Exodus from Egypt (having been there for 215, 400 or 430 years according to which Bible interpretation you accept) the population of the entire planet would have been all of 168 people. In contrast, at that time the population of Egypt is estimated by more competent historians to have been in the region of 3-3.5 million. The Bible, however, states the Exodus was of 600,000 adult men. Assuming a male to female ratio of 50:50, that's a whole 1.2 million people, not including any children (which would certainly at least double that figure). That means that something like two-thirds of the Egyptian population supposedly got up and left. The Egyptians are known to have kept very good historical records. But even if Morris is correct and the Egyptians somehow forgot to record this aspect of their history, where did they all come from? Marching ten abreast this amount of people would form a line 200 km long, apparently wandering around the 61,000 square km Sinai for 40 years, despite the fact that the distance between Cairo and the Sinai-Israel border is a mere 370 km! Little wonder there is no written historical evidence outside the Old Testament or any archaeological evidence whatsoever to support such an event. Even much later, at the time of the alleged birth of Jesus, there would have only been approximately 440,000 people alive in the whole world, which is considerably less than the entire number of documented Roman citizens that existed at that time. Clearly then, someone, either Morris, the Bible or both, is wrong.

Another method employed by young-earth creationists has been to work backward, extrapolating from the human population of the present year to the year claimed for a worldwide flood. One study by Don Batten, an Australian plant physiologist, working backwards from 2005 from the known population of 6.5 billion, does demonstrate that the present day population could have resulted from an immediate post-flood population of eight. It also reveals a total population of almost 600,000 people at the birth of Jesus, but again, just 455 souls available for the Exodus. So, although projections of population growth from a young-earth perspective appear, on the surface, to be perfectly feasible, a closer look shows that the figures just don't add up. Naturally, you'll find little serious analysis of these shortcomings in the creationist literature.



The mistakes inherent in population arguments purporting to demonstrate evidence for a young earth are twofold. First, there is reliance on the simple but erroneous assumption that the human population has always experienced a steady rate of growth despite evidence of often wide fluctuations over time. This tactic, assuming a steady state, appears to be a standard methodology employed by creationists across scientific disciplines and is apparently prevalent in their writings on geology. In the case of human population growth, creationists would have us believe that the average rate of growth has been constant over time (Morris claims a constant 0.033% per annum, Batten 0.5% per annum) and so population increases have been consistently exponential.

However, exponential population growth has only been observed in conditions were resources are plentiful. When resources are scarce, such as in hunter-gatherer and subsistence agriculture societies, which have characterised most of human history, population growth is normally at or very close to replacement rate. The population of the British Isles, for example, is calculated to have remained constant at around 5 million for 750 years from 1000 AD to 1750 AD. Even when resources were not so scarce, population growth has been shown to fluctuate, and even to decrease, in response to environmental factors. For example, an almost complete record of burials and baptisms is available to us from the parish of St. Botolph in London. These reveal that in the years 1558-1625 AD the death rate was consistently slightly higher than the birth rate and in four of those years, 1563, 1593, 1603 and 1625, the death rate was significantly higher. Similarly, the overall population of Europe is estimated to have decreased by 10% within two years in the famine of 1315-1317 and again by as much as 30-60% (estimated to be in the region of 100 million people), in the space of seven years, four decades later during the Black Death. Indeed, it has been suggested that had the responsible organism, *Yersinia pestis,* been any more virulent it is conceivable that the entire population of Europe might have succumbed.

The second mistake is that of carefully selecting (i.e., cherrypicking) a short term trend and then projecting and extrapolating it backwards until the required result is reached. The fallacy of this technique is exemplified by extrapolating backward using the current annual rate of growth, 1.14% (which by the way, is declining). This yields the current world population, originating from a starting population of eight persons, having been reached in about 1800 years (i.e., a couple of centuries or so before Jesus was allegedly born), a much younger age than claimed by Biblical literalists. It is obvious then that creationists are mistaken when assuming that human population growth has been subject to simple logarithmic growth.

Although creationists have thus far relied solely on calculating human population growth to support their young earth hypothesis, there is no logical reason why the human population need be used. The metric could just as easily be applied to populations of other species to prove their point. When this is done, however, the results become even more ludicrous. Take the humble housefly, for example. Each generation span is a few weeks only, with each individual female laying several hundred eggs during her life. Using Morris's assumption that every individual reaches sexual maturity and actually reproduces, and further reasonably assuming that each female housefly lives for four weeks and produces 100 eggs during that time, the current estimated population of houseflies would have been reached in less than 10 years. A young earth indeed!

The more realistic and evidence-based scenario, provided by multi-disciplinary research is this: Human-like creatures, the genus homo, evolved approximately 2.5 million years ago. Our particular species, Homo sapiens, first appeared approximately 250,000 years ago. For the vast majority of that time we lived in hunter-gatherer societies with a relatively low population estimated at 6-10 million. This is fewer people than many of the world's largest cities today. Even when the whole genus is taken into account, to reach a population of 6 million after 2.4 million years from an initial two individuals only requires an average population growth in the order of 0.000000009%. This is a far cry from the 0.5% proposed by creationists for hunter-gatherer societies. The emergence of agriculture approximately 10,000 years ago provided increases in both the quantity and stability of the food supply and corresponding increases in the rate of population growth. By 1 AD a human population of 300 million is estimated, about the current population of the United States. Nevertheless, the average rate of growth needed to achieve this figure is still as low as 0.00006% again, magnitudes below the creationist estimates. Between 1 AD and 1700 the average rate of growth is estimated to be in the region of 0.1%, a fifth of Batten's estimate.

In the mid-1700s, as machinery began to replace manual labour in Europe and production of goods increased, living conditions and per capita economic growth rose gradually, while widespread famine and epidemic decreased gradually. The result was the beginning of exponential growth in the human population. From an estimated population of 760 million in 1750, the number of humans increased to 1 billion around 1800. The 20th century alone saw an almost 400% increase in the human population, from 1.6 billion to 6.1 billion, equating to a growth rate of 3.81% per annum. In 1950, the world had 2.5 billion people, 55 years later in 2005, this figure had more than doubled to 6.5 billion. In 2011, the 7 billionth human was born.

The creationist claim of a young earth producing the world current population exponentially in about 300 generations is only tenable if large chunks of history are debunked, and that includes most of Biblical history. Creationists cannot have their cake and eat it too. The strongest evidence points to Homo sapiens having lived for something like 7,500 generations rather than 300 or so. In addition, the vast majority of our population growth has occurred in less than a tenth of one percent of our veridical history rather than exponentially across a tiny fragment of our tenure on Earth. Theoretical models that include data from real and observable phenomena and, once applied, remain objective as to the conclusions found are always going to be more effective methods of investigation than models persistently based on a preordained conclusion which is then employed as the premise for an argument.

This fact resonates strongly with me as a photographer when capturing images of people, especially the elderly. Creationists are missing out on so much; an appreciation of our species's evolved brain, our gradual shift toward inventiveness and creativity of spirit, our continuing diversity and vigour, by believing in an abrupt beginning in near history and a comparatively short, shallow history determined or influenced by an entity whose intentions cannot be agreed on, even by it's own believers. Human beings become far more interesting, more awe-inspiring, when understood to represent the current phase of a genetic lineage that has been forged through natural selection for two million years and who knows how far beyond?

As the writer Douglas Adams once said "*I'd take the awe of understanding over the awe of ignorance any day*".