

Article

Biotechnology's Potential Impact on the Cycles of Civilization through Enhancement of the Human Mind

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Abstract: Humanity has had such a profound impact on Earth that questions arise as to both their viability and future. Modern civilization is based on dynamics that, while at first relatively innocuous, have become destructive to itself and to our living planet. What can be done to preserve life on Earth and the evolutionary promise embodied in humanity? Human nature is at the root of these dynamics and what needs to be transformed to preserve and advance our potential and life on Earth. Tactics such as reducing population and mitigating industrial harm are necessary yet not sufficient in themselves to create a sustainable future. Biotechnology is a potential key to both ending the destructive cycles of civilization, human-caused pressures now stressing planetary systems, and preserving life on Earth. Bioengineering is over 12,000 years old, accelerating today, and in need of long-range, ethical guidance via an approach with potential to address our myriad challenges and transcend our failings.

Keywords: Transhumanism, Civilization, Anthropocene, Biotechnology, Ethics, Evolution, Germline Editing

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"The darker side of the human spirit is not refined away by civilization. It is not something we are done with."

Barry Lopez (Lopez 1986)

1. Introduction

Humans have populated and transformed the earth to such an extent that we have begun a new period in geological time – the Anthropocene (Waters et al. 2016). Transitions to new geologic periods have happened in the past for a limited number of natural causes, each resulting in momentous variation in Earth's climate while altering the environment for all life. Geologists cite changes in our sun, Earth's orbit, variations in carbon dioxide levels, meteorite impacts and increased volcanic activity as notable causes. Each resulted in major planetary disequilibrium, decipherable in significant natural separation points of fossilized strata in the lithosphere. Today an unprecedented separation point is emerging on the surface of the Earth, marking a new stratum that will be observable in the distant future. Gone will be the bones and shells associated with the earlier Quaternary period, replaced by the bones of humans and domesticated animals. The sedimentary rock record will be populated with materials manufactured by humans while gas bubbles locked away in ice will show a marked increase in carbon dioxide, nitrous oxide, methane, and chlorofluorocarbons. Today *Homo sapiens* are the primary cause of planetary existential risk, which in turn impacts the long-term viability of human life itself (Bostrom 2013).

Reflecting on this embryonic stratum in the geological storyline raises interesting insights. We are both the cause and the first life form to consciously witness a new stratum forming, are aware of

planetary change as it happens, and have the power to alter its progression. Geologists note that the transition points between eras are not instantaneous but unfold over thousands of years. Perhaps we will not have as much time during the current passage, for the transition has been rapidly building since the dawn of the Industrial Revolution, amplified by our growing numbers. Yet we likely do have sufficient time to introduce temporary mitigation measures while implementing a long-term strategy to preserve and advance life on Earth. The mitigating tactics could simply be to decrease our numbers to one sustainable with existing planetary systems while reducing the industrial harm feeding climate change. This has been suggested before and is much easier to say than to do. The literature supporting these tactics is monumental and will not be reviewed here (Bonpasse 2015; Cribb 2021). One of the strategies for creating lasting planetary equilibrium could in part be a focused project to improve humanity through biotechnology. However, biotechnology alone will not thwart humanity's tendency toward self-destruction. We require supporting initiatives and institutions to use biotechnology safely and wisely while supporting the goals of planetary preservation and sustainability. To accomplish this demands a conscious, well-planned, targeted approach or "planned path emergence" that supports the prevailing view that the idea of shaping the future should dominate over the conception of a predetermined future (Tiberius 2011). A transhumanism vision, properly conceived and implemented, can be a major part of a long-term solution, encompassing dimensions not yet fully appreciated or understood. This is the central theme to be developed in the coming pages.

This basic suggestion has been presented before, but with different approaches than proposed in the current essay. For instance, in a 2012 article entitled "Human Engineering and Climate Change" the authors consider a bioengineering solution to the challenges humans face in dealing with climate change (Liao, et. al. 2012). Their tactic involves biomedical modification of humans so that they are adapted to adverse climatic conditions. Ethical considerations are discussed in the article, but it is concluded that such concerns can be mitigated. Rather than using bioengineering to make humans more adapted to global warming, the approach in the current essay is to enhance the intellectual scope and depth of humans as the means to diminish anthropomorphically caused existential risks. Additionally, in the book *Unfit for the Future: The Need for Moral Enhancement*, Savulescu and Persson argue for radical enhancement of the moral dimensions of human nature (Savulescu and Persson 2012). Enhancing moral psychology, they suggest, will assist in addressing the challenges presented within our global community as well as serving the interest of future generations by altering the actions taken today. As with the previous mentioned article, these authors suggest society use the "new technologies of biomedicine" to enhance moral motivation. They too find no philosophical or moral objections to using biotechnology to strengthen our moral propensities. They underline one perspective presented in the current essay by arguing that the traditional approaches to supporting moral behavior, be it from religious or educational instruction, are insufficient in themselves to bring about what is needed to avoid our looming challenges or to improve the fate of future generations. Unlike these two sources, the essay you now read finds the lessons learned, and the moral failings associated with the Eugenic movement of the early 20th century, indeed give serious pause for thought as we embark on any bioengineering path.

Before going further, it's important to understand what the author means by biotechnology, transhumanism, and bioengineering. Biotechnology encompasses all research agendas emanating from the life science fields of pharmacology, engineering, mathematics, and other physical sciences seeking to address challenges in medicine, biology, and health care. Simply stated, it is useful biology. Transhumanism, on the other hand, strives to focus current and projected biotechnology in such a way as to propel humanity beyond existing physical and mental limitations. Transhumanism, therefore, seeks to harness and direct biotechnology toward specific goals. Externally focused biotechnology, from cochlear implants to brain-machine interfaces (e.g. Neuralink), holds the promise of enhancing human performance yet will not necessarily alter base human behavior. Bioengineering is often defined simply as another term for genetic modification, and this is the operative definition utilized in this paper. It will be argued that human behavior is the root of the problems facing civilization today, as well as across time, and that only germline editing, within an ethically constrained program, holds the promise of altering human behavior sufficiently to create a foundation for sustainable sociocultural evolution in harmony with earth systems. This paper does not address the potential emergence of unexpected, unknowable futures. Emphasis is on propelling a transhumanism agenda onto a promising path, guided by known biotechnological trends.

2. The 5th horseman of the Apocalypse

Most know of the four horsemen of the Apocalypse as presented in *Revelations*. They symbolize war, famine, pestilence, and death. This final book of the Christian bible was written around 100 CE with no one questioning the dark shadow each “horseman” has cast on human existence before or since that time. Each horseman serves as a powerful metaphor for the precarity of the human condition and the contingency of being. Little more is to be said here other than modern agricultural and medical technology have mitigated the agony of each other than war-- although we’ve recently experienced a pandemic to remind us that pestilence is far from vanquished. Warfare continues to be augmented by technology, is becoming much more potentially deadly, and is inexorably related to what is here named the “5th horseman” – found within the shadows of the human mind. The origin of this new metaphoric horseman emanates from mammalian emotions that once served survival yet become increasingly destructive within the cycles of civilization. While emotion theorists differ on what they surmise as the primary negative emotions, the focus here is on fear, anger, disgust, contempt, and greed (Tracy and Randles 2011). While this short list serves in this paper, emotion theorists argue that negative emotions have at least 158 manifestations (Davis 2022). Upon this primal, emotional foundation, the 5th horseman becomes the root cause of mounting inequality, violence, prejudice and, it will be argued, the dominant causal factor during the final stages of civilization.

Further, since the dawn of civilization in the Middle East, the destructive power of this 5th horseman has only grown as our numbers increased and our industrial and military technology advanced. It manifests in pernicious behaviors rooted deep in our prehistory. We are each aware of the tug within and without of what has been characterized throughout time by theologians as the conflict between “good” and “evil”. Both are reflections of mental, contextual processes emanating from the mirky corners of our minds. Eliminating famine, pestilence, and death from the definition of “evil”, for they originate outside of human Will, leaves us with phenomena that originates deep within consciousness, associated with the Id (Freud 2010). We attempt to control malevolent actions through self-control, education, religious restrictions, treaties, national social programs, and the legal canon. These efforts have helped but not contained that which too often manifests as harm between people and to our shared environment. While advanced technology enhances the quality of our lives, it also enables our worst tendencies to be magnified. Where did this source of “evil” within come from?

We need to briefly go back in time to understand the root problem we face—and this must be understood before we can frame a constructive response. In fact, we need to go back to the mid-Pleistocene when *Homo sapiens* first emerged and examine why the Darwinian natural selection process favored our species. While continuing to evolve, the dynamics of human lives were relatively predictable for the first million years, being the crucible shaping our modern consciousness. We emerged from other primates with natural selection sculpting all sentient beings in similar ways. Higher intelligence with reflective capabilities led to the dominance of *Homo Sapiens* among primates for this enhanced adaptation. Adaptive evolution results in new heritable genetic traits improving relative fitness. Fitness, evolutionary theory concludes, relates to successful reproduction more than longevity. Improved fitness leads to successful competition within a species, as well as between species, for life-sustaining resources (e.g., food, water, territory, etc.). In a population of a species, individuals will vary in the traits of improved fitness, leading to differences in reproductive success. For humans, with their social constructs, this results in a naturally based hierarchy reinforced by status, opportunity, and resource control. Therefore, the natural selection process became a central mechanism in sociocultural structures. It is the root of our strength as a species as well as our weakness in the face of today’s tribulations—ranging from racism, sexism and xenophobia to overpopulation and environmental degradation.

Characteristics of the Paleolithic Age included people living in small societies (e.g., families and clans), subsisting on hunting, scavenging, gathering, and fishing (Scarre 2018). Population density was low, yet competition for resources was fierce because scarcity was omnipresent. Humans engaged in cooperating for many group activities, for it brought adaptive advantages (Loye 2004). Unfortunately, in lean times the negative emotions cited earlier became more manifest, leading to increased competition for resources, often leading to violence within and among tribal clans (Whittle 2003). While fluctuating over time, average life expectancy was about 25-35 years. With such short lives, reproduction became more central to human existence than witnessed today,

although we continue to obsess over sex. Along with being a tribal species, our decision-making time horizon was short-term, concerned with the needs for food, shelter, and clothing while maintaining a stable familial/tribal environment (Ygua 2019).

The human genome was forged on the African savanna during pre-history, fixated on reproduction and adapted to increase the likelihood of achieving immediate benefits for a limited group in a relatively short span of time (Wilson 2012). Our genetic legacy makes us value certain attributes in others: beauty, strength, athletic prowess, sexuality, dominance, acquisitiveness—to name a predominant few. In partners we also are attracted to body symmetry, for on an unconscious level we perceive this to be an indicator of health and reproductive promise (Barbe 1995). All this we rationalize into sociocultural constructs, yet they have little to do with what is important in solving our environmental problems or sociopolitical shortcomings. In this regard, today they represent debilitating distractions, drawing attention and resources away from where needed to support human sustainability.

We succeeded because we are highly intelligent, industrious, aggressive, cooperative, adaptable, and a fecund species. Individual failings were countered by the dominance of the group, with group failings being neutralized by more successful groups. Any destruction was counterbalanced by our fecundity as well as the seemingly inexhaustible planetary supply of resources and environmental sinks. In the end we can say that the human mind evolved primarily to deal with a simpler context of existence than the one we face today, that the crux of our global problems do not arise from governments or commercial enterprises but rather from the collective impact of individual humans living their lives. We are unaware of the 5th horseman of the Apocalypse for he is part of our inner selves, concealed within mental proclivities, cultural constructs, and sociopolitical institutions.

3. The Cycles of Civilization: Additional Consequences of the 5th horseman

Ancient civilizations first began to emerge in the Middle East some six thousand years ago and then later in the Indus River Valley, the Mediterranean, and the Americas. Those noted in the history books are the federations proving more successful than others, dominating the collective dynamic with superior adaptive form. Humans brought their mental proclivities into these new, expansive, sociopolitical constructs, shaping and changing them in a similar pattern. The cycle of civilization has happened before and is happening today. If we wish to end this cycle in the future, it is important to understand the underlying processes. Following Edward Gibbon's treatise, *The Decline and Fall of the Roman Empire*, academics took a genuine interest in the causes of the rise and demise of all empires (Gibbon 1776-1788). Earlier civilizations followed a similar pattern of development illustrated by what Theodor Mommsen defined as genesis, growth, senescence, collapse, and decay (Mommsen 1854-1856). In the case of Rome, Gibbon suggested decay of the elite was brought on by the "natural and inevitable effect of immoderate greatness". Arnold Toynbee refined Gibbon's ideas by adding that the political elite became increasingly parasitic, leading to an increasingly marginalized majority who undermine the integrity of empire (Toynbee 1939). Joseph Tainter's study of Rome connects increasing sociopolitical complexity to institutional rigidity and fragility as a major factor in decline (Tainter 1988). For many ancient, albeit smaller, civilizations, Jared Diamond suggests a quintet of external factors led to decline: environmental degradation, climate change, dependency upon external trade, intensifying levels of internal and external violence and, finally, societal responses to all these factors (Diamond 2005). In his study of the British empire Mancur Olson argued that special interest groups accumulate around the central power structures, drawing off resources, impeding the ability of central authorities to respond appropriately to growing threats to the integrity of empire (Olson 1982).

There exists a rich academic literature analyzing the causes of the rise and fall of civilizations. Galtung and Inayatullah's compendium on the work of twenty macrohistorians expands understanding of the multiple facets of the cycles of civilization (Galtung and Inayatullah 1997). In their book, the authors present a rich comparative analysis of transhistorical and cross-cultural assessments of sociocultural and political changes across the cycles. Their comprehensive review results in defining twelve different "sciences" focusing upon observed changes in the human condition over time. All macrohistorians cite the existence of stages and patterns in the cyclical development of civilizations as common themes. For instance, Oswald Spengler argues for a global view centered upon the cyclical rise and decline of civilizations. Spengler postulated that we have entered the long-run path of decline, echoing similar stories in antiquity (1929).

While the current paper only utilizes the findings presented in the previous paragraph, there is a wealth of additional work that could be drawn upon to underscore the author's thesis. Each identified cause of decline, except one of Diamond's, was rooted in human behavior during past cycles. Yet unlike the past, the one external cause identified by Diamond, climate change, has indeed been triggered by contemporary human actions. This collective work suggests that sociopolitical patterns of relationships and outcomes forged within Neolithic tribes became writ large with greater complexity when brought into the extensive form we call civilization.

What are the current factors propelling civilization through the climatic period toward the stages of collapse and decay? A multidimensional malaise is growing today that can be briefly summarized and cross referenced with the elements of decline previously identified. Echoing Gibbon's conclusion on the effects of "immoderate greatness," global inequality in both income and wealth is higher than at any other time since modern measures of inequality have been calculated. This is supported by the fact that inequality has been increasing across the world for decades. Today the richest 1 percent of people in the world control 44% of global wealth (Credit Suisse 2020). The pandemic accelerated this trend. By the end of 2020 the wealth of billionaires had increased by \$3.9 trillion while combined global workers' earnings dropped \$3.7 trillion (Oxfam 2021; ILO 2021). These global statistics reflect the manifestation of human-defined, systemic mechanisms imbedded within civilization that propel inequality over time.

Lobbying is a global multi-billion-dollar business that can lead to unfair competition, undue influence, and regulatory capture (OECD 2013). In the United States alone there are over 10,000 lobby groups at the federal level, having spent \$3.4 billion in their efforts in 2019, reflecting a growing industry influence on Washington politics (Bloomberg 2020). It is sometimes argued that regulating the lobby industry is impossible due to its complexity and legally guaranteed freedom of speech. The lack of transparency is noted as a problem, yet it is equally clear that many politicians and lobby groups prefer opacity to clarity concerning their motivations and actions. Like the courtesans of old empires, most modern lobby groups are there to advance and protect partisan interests, not the public good—although their arguments are often framed as doing so. These developments reflect Mancur Olson's study of special interest groups, with their tendency to encrust political power structures, diverting public resources while restraining politicians' policy responses through a web of accumulated laws and regulations.

Gibbon and Toynbee's suggested that as the political elite became increasingly parasitic the marginalized majority respond by undermining the integrity of the existing socioeconomic system. Witness the 21st century rise of reactionary, populist political groups on both the right and left within advanced democracies. The tenor of political conflict has shifted from the 20th century ideological context to one reflecting nationalistic, socially conservative groups versus urbane, socially progressive, globalized groups. Across the world, from Donald Trump in America to Rodrigo Duterte in the Philippines and Jair Bolsonaro in Brazil, populism is moving from the fringes into the mainstream, becoming a prominent feature of the global political landscape. Democratic norms are being upended with support of traditional democratic parties diminishing. The new populist politicians present themselves as supporting the true interest of the people, exploiting pervasive discontent to often provoke violence against specific groups (e.g., women, minorities, immigrants, Jews, Muslims, etc.). Whether a cultural backlash, a reaction based on socioeconomic stress, or a bit of both, the ultimate foundry of reactionary discontent is the persistent increase in social, economic, and political inequality in context of an insensitive, powerful, increasingly insular elite that has captured the machinery of economics and politics (Norris and Inglehart 2018; Fukuyama 2018; Goodhart 2017; Guiso et al. 2017; Gidron and Hall 2017).

Laws, rules, regulations, and unofficial social norms have become so complex that most perceive them as an impediment to navigating life's journey. The Economic Complexity Index (ECI 2022) captures the fact that as a country's income and wealth increases, so does its socioeconomic complexity. Laws, rules, and regulations smooth transactions between people and groups—especially in the impersonal world we live in today. Efficiency and accountability in life's transactions comes with a cost, one that often exceeds that necessary to support the public good. Lobbying at all levels of government by various industries has as one of its goals to extract and direct a portion of economic transactions to constituent members. While the resulting, partisan "red tape" helps protect the public, it has been shown in many cases to produce negative consequences in government agencies, corporations, other large organizations as well as upon employee and citizen

wellbeing (Hodgson 2003; DeHart-Davis and Pandey 2005; Brewer and Walker 2010). When bureaucratic overreach becomes pathological, complexity reflected in red tape impedes socioeconomic progress (Sanjay et. al. 2020). This is what Joseph Tainter observed as a cause of decline in the Roman Empire and it can be argued to be happening again today.

Unique factors impacting the trajectory of civilization today are environmental destruction and climate change. The story of Easter Island, or Rapa Nui, may not seem a relevant case study for forecasting modern global outcomes, but the story told by Jared Diamond is exceptionally relevant (Diamond 2005). Briefly, when the first Polynesians paddled onto the shore of this island it was a veritable paradise, with abundant resources enabling early settlers to flourish. Over time population rose, resources diminished, and inter-tribal warfare intensified until resources and population collapsed. When the denuded, wind-swept island was eventually encountered by European sailors, the few remaining inhabitants were scrapping out a subsistence existence from depleted soil and shrunken resources. Our planet is a large, closed set of ecosystems, with planetary boundaries seemly beyond the horizon. Concerned scientists have attempted to sketch our planetary boundaries in the hope of defining the potential operating space for humanity. Research papers prepared for the Stockholm Resilience Centre suggest we are nearing numerous tipping points into radically different planetary states with unknown ecosystemic features (2015). In the past several years there have been significant advances in scientific understanding from paleoclimate, observational, and model-based studies. This advanced understanding has been recently summarized in a new study suggesting the rapid approach of active tipping elements which will cause substantial Earth system impacts (Armstrong-McKay et. al. 2022). Earth systems are frustratingly complex, so the results are tentative yet worrying. The bottom line is that planetary boundaries do exist, and while farther away than the shorelines had been for the Easter Islanders, they are no less limiting to global civilization. With the human population forecast to rise another 25% in coming decades, we may well hit some of these fuzzy planetary boundaries this century. Like Adam Smith's invisible hands of the market, Earth itself has an invisible set of hands that after nurturing human life into existence has until recently stayed out of our way as we followed the well-worn path of species development. Humans have gone far beyond the evolutionary success of other species and Mother Earth has finally decided to use her powerful invisible hands—the laws of physics operating within her deeply evolved planetary systems—to guide us in an increasingly challenging direction.

These unprecedented environmental consequences are unfolding while the other noted factors pressuring civilization proceed unabated, accelerating the climatic stage of development unlike anything witnessed for a major civilization in the past. Toby Ord's book *The Precipice: Existential Risk and the Future of Humanity* spells out environmental as well as other risks not mentioned here that increase the possibility of global catastrophe (Ord 2019). Ord believes the current predicament will unfold within the next few centuries, with about a 17% probability of noted risks leading to a catastrophe for humanity within a century. Ord does not take into consideration the work of macrohistorians on the cycles of civilization in his study but, when one does, the probability undoubtedly rises significantly while the timeframe for a cataclysm becomes shorter. One distinctive feature in the current historical cycle is that its span has become global, reaching into all corners of the world, engendering major stress on earth's planetary boundaries. It is this materially intensive, as well as extensive, human activity that has become another conundrum initiated by the 5th horseman. It is caused by the collective "us", is unsustainable, yet essential to financially underwriting the social, political, economic, and cultural dimensions of all nations that have embraced the systemic model that emerged from the Industrial Revolution. As time has passed, what has been revealed is that what is good for the individual is not always good for humanity, although Smith's original cliché continues to be enshrined in Western societal beliefs, practices, and policies. Billions of people have joined a commercially enhanced hedonic treadmill, spinning out pollution, loss of biodiversity, climate change, breakdown of oceanic thermohaline circulations and rising seas— listing only the negative planetary effects.

4. Bioengineering's Potential to Transform Our Future

Civilization is a mirror with its reflection being us. We are the foundation and force behind its cycles from beginning to end. We began the current cycle with the noble ideals encapsulated in the Liberal

Tradition. The goals of this humanist philosophy are summarized in a cluster of concepts including liberty, fraternity, opportunity, equality, peace, progress, and the pursuit of happiness. Attaining these goals for the majority has been slipping away this century as civilization moves through senescence toward collapse and decay (Taylor 2017). The essence of the 5th horseman is found within the human, and only by changing the human can we hope to eliminate its destructive power, transcend the terminal cycles of civilization, and save Earth. If negative emotions are the root cause of Earth's and civilization's deterioration, then external biotechnical enhancements alone will not address the flaws in human nature. A transhumanism project must first and foremost emphasize human biology. As Nick Bostrom observed in his article, "In Defense of Posthuman Dignity," there is no stable state to preserve, we must be bold as we examine and transform humanity (Bostrom 2005). This will undoubtedly be a measured process of transformation, but undertaking this journey with focused intent may enable us to finally attain the grand dream born of the Enlightenment.

Bioengineering has been going on since humans first began to take partial control of evolution some 12,000 years ago during what is sometimes called the Agricultural Revolution, by selective breeding of animals and hybridization of plants to suit our needs (Russell 2011). The collective intelligence efforts of the scientific community these past 250 years accelerated human control over the processes of evolution, with most of this occurring outside of the human body. The 2002 announcement that the human genome had been mapped heralded a new stage in efforts to control and guide evolution—one focused on internal biological structure. Today this can be seen in the promise of genetic, biocybernetic, neurological, nanotechnological, epigenetic, and pharmacological engineering of the human being. The array of research agendas across these fields is vast with collective implications hidden in seemingly unrelated projects and advances (Mulhall 2002; Pickering 2010; Church and Regis 2012; Hockfield 2019). Aldous Huxley once said that "It is only by means of the sciences of life that the quality of life can be radically changed... This really revolutionary revolution is to be achieved, not in the external world, but in the souls and flesh of human beings" (Huxley 1969).

The recent progress in the deployment of CRISPR–Cas9 for use in genetic treatment of disease is both enigmatic and transformative, presently little understood or appreciated by the public. The technology is currently used in a set of somatic gene therapies seeking to transform the genetic structure of an individual to affect the goal of eliminating disease-causing genes by inserting new ones (Carey 2012; Doudna and Sternberg 2017). Once an appropriate piece of RNA is identified, the Cas9 enzyme cuts DNA at that precise location, permitting the deletion, repairing or replacement of some specific gene. Progress has been gradual yet enduring, with such genetic diseases as beta thalassemia and sickle cell disease being shown as curable. Many in the scientific community believe that current CRISPR research will lead to treatments for some cancers, hemophilia, Leber congenital amaurosis, HIV, cystic fibrosis, Duchenne's muscular dystrophy and Huntington's disease (Rodriguez-Fernandez 2021). It is currently estimated that this approach to treatment may help the 25-30 million in the United States alone who have one of the more than 6,800 rare genetic diseases. This is where it begins—with little controversy for the effort is focused on eliminating debilitating human diseases.

What is now clear is that the CRISPR–Cas9 technology will prove to be one of the most significant medical developments of the early 21st century (Isaacson 2021). Its potential to transform the human genome has raised unprecedented ethical questions. This arises from the fact that what is learned in the somatic treatment of the genetic code will, in time, permit heritable treatments altering the germline of the human genome—such modifications being passed on from one generation to the next. What is feared is encapsulated in the concept of designer babies, where wealthy parents choose in advance the genotype and phenotype of their child. Such systemic modifications in the human genome may lead to unforeseen outcomes and/or mutations, leading to both greater inequality and, potentially, undesirable impacts on the quality of life for recipients and future generations. If harmful mutations occur, it will be difficult to ethically withdraw once introduced into the human gene pool. The scientific community is hesitant with this new technology for good reason.

United Nations Educational, Scientific, and Cultural Organization's International Bioethics Committee announced that "Interventions on the human genome should be admitted only for preventive, diagnostic or therapeutic reasons and without enacting modifications for descendants" (UNESCO 2021). Despite this, an incident in China is a harbinger of things to come. He Jiankui, a Chinese biophysicist, intergenerationally modified the genomes of twin baby girls such that their

cells would be resistant to infection by HIV (Normile 2018). The reaction within the scientific and bioethics communities to this announcement was scathingly critical, leading to Mr. He's arrest by Chinese authorities as well as being fined and barred from future research-funding. While a powerful message was broadcast to other researchers doing any type of gene-editing work, this instance is but a foreshadowing of what will likely occur in coming decades—most likely within hidden initiatives by nefarious governments. Like nuclear technology, once CRISPR genetic-editing advances, it will lead to proliferation and deployment. Rather than hiding from this fact, it must be acknowledged, controlled, directed, and kept in the light. There is a solid ethical foundation as we move toward germline enhancements—but this is insufficient by itself to guide research (Beauchamp and Childress 1994). The question then becomes: How can this technology be channeled to serve humanity's future?

Before answering this question, we must acknowledge the Frankensteinian specter haunting bioengineering. The early 20th century Eugenics movements sought to create better people based on subjective ideas of what this would entail by those with power within the movement. The famous statistician Francis Galton (1822- 1911) coined the term and defined the movement as the interdisciplinary study of all human aspects associated with the goal of improving inborn human "qualities" of future generations. There are important lessons in the eugenics story worth remembering. Along with life-enhancing promise, science can be used to destroy life, promote narrow-minded purposes, and become another manifestation the 5th horseman. When power over the direction of scientific research and technological development becomes concentrated in the hands of well-funded, fanatically misguided groups, its potential can be twisted down dark, destructive pathways. Science gave us antibiotics as well as Cyclon B, atomic power, and the nuclear bomb. Consequently, the specter of Eugenics hangs over bioengineering today. There is no doubt that in time advanced CRISPR knowledge could give us a better human or a monstrous caricature of a Hollywood action figure. Eugenic thinking and experiments of the late 19th and early 20th century were centered on what made people different. Genetic and biocybernetic research is currently, and should forever be, based on how people are similar—addressing shared human diseases, disabilities, and other biological shortcomings. The German Nazis wanted to eliminate all differences other than those associated with some ideal of the perfect German—down to blond hair and blue eyes. As we move along the germline bioengineering pathway, focus must remain on improving that which enhances individual fulfillment, communal human existence, and life on Earth.

To accomplish this, bioengineering and guiding bioethical principles must be limited to enhancing successful, adaptive traits that all people share: health, longevity, intelligence, and attention. The standard of success for each new modification of the human genome should be that one of these four traits is improved without diminishing any of the others. No benchmark other than this need be implemented as germline research progresses. In time, we will have individuals that look forward to long, healthy, productive lives, with focused, high intelligence bent toward solving the problems of individual, communal, and global life. The already highly successful adaptation of collective intelligence will be turbocharged by networks of such enhanced participants.

Time will not be spent here fully unpacking each of these four broad dimensions of human enhancement, yet some have argued that you can have an intelligent, attentive, physically healthy, long-living person who could still be deeply malevolent. There are two issues to consider. First, by health the author means not only physical health but also mental health. Scientists have identified many psychiatric disorders having a genetic basis. Presently, these include autistic spectrum disorders, attention deficit hyperactivity disorder (ADHD), alcohol dependence, anorexia nervosa, bipolar disorder, major depression, obsessive compulsive disorder, schizophrenia, and psychopathy (Pettersson et. al. 2019). The current understanding is that psychopathy generally comes from genetic factors, such as parts of the brain not developing fully, while sociopathy results from an interruption in personality development by abuse or trauma in childhood. Therefore, special attention must be paid to the nurturing aspects of child development for transhumans. While we cannot say that an enhanced human will not become malevolent, reducing genetic predisposition to psychiatric disorders, along with a robust support network for healthy nurturing, will minimize the risk of undermining the thrust of the project or the predictions made in this essay.

Second, just as people tend to anthropomorphize many inanimate objects and animals, we tend to project the currently existing mindset of human propensities onto transhumans. In either case it is

a logical fallacy or, more specifically, the Anthropomorphic Fallacy. The fact is that we can never know in advance how these people will think or act. However, knowing the power of intelligence, sustained attention, and deductive/inductive logic in the context of a nurturing environment suggests a high probability that enhanced humans will do a better job guiding evolution than we have.

The longitudinal Minnesota Twin Family Study revealed the significant role that genetics plays in shaping individual differences in traits and behaviors (Bouchard, et., al. 1990). The scientific community agrees that both nature and nurture contribute to human behavior, acknowledging that both are intricately intertwined in shaping the complexity of human behavior. This reality will be difficult to unpack within the goal of human enhancement through bioengineering, making any direct attempt to improve humanity's "moral constitution", as Savulescu and Persson suggest, a difficult or impossible task. The beauty of the approach presented in the current essay is that each of the four human attributes are measurable, permitting calculated, progressive, human enhancement. Arguably, the sociopolitical outcomes alluded to depend upon intelligence, attention, and intertemporal perspective driving moral choices in a sustainable direction while ridding the prevalence of destructive human emotions.

Interestingly, the book *What We Owe the Future* by Will MacAskill argues in detail for a project centered on "longtermism" (MacAskill 2022). One analogy he employs is to consider humanity as a youth with a long, affluent future. He then explores the paths that might unfold with the right versus the wrong decisions. As in the current essay, the wrong decisions by humanity lead to a diminished future, or one which ends tragically. To ensure humanity makes a "trajectory change" that transcends the values it is currently "locked into" requires extending life span. MacAskill argues that looking forward to a long, prosperous life creates a perspective leading to better individual and collective choices. Your author agrees yet believes more is required to accomplish the vision embodied in MacAskill's "longtermism" movement.

5. Discussion: Will Existential Risk Become Existential Catastrophe During the Climatic Stages?

Nick Bostrom concluded in this seminal 2013 paper that attaining sustainability for humanity should be reconceived as a dynamic phenomenon. Putting humanity on a sustainable trajectory is more critical to determine than conceiving of some sustainable state (Bostrom 2013). On the bioengineering path proposed in this essay there will be a continuum of gradual improvements with a growing number of people having the foresight to see what is needed to make collective human existence sustainable along with focused dedication to see the project through. It is suggested here that bioengineering guided as presented will slowly weaken the prevalence of racism, sexism, and ethnocentrism. This is predicted since enhancing intelligence and attention will increase the power of reason while weakening the sway of base emotions and Paleolithic cultural conditioning. It is further suggested that as intelligence and attention is enhanced, the hedonic treadmill will weaken. People will instinctively become more conservationist minded as environmental understanding deepens and temporal perspective lengthens. An increased awareness that ever-rising wealth is not necessary for either happiness or self-fulfillment should likewise arise. As all this unfolds there is a significant chance for the radical emergence of collective wisdom. Wisdom, the soundness of an action or decision based upon the application of experience, knowledge, and good judgment, has historically been associated with older, often faith-based individuals. Imagining an emergent society comprised of predominantly wise individuals, many young, is an exciting vision worth pursuing.

Many readers might conclude at this point that breaking free of these cycles cannot be attained through bioengineering alone, nor would the mindset alluded to in the previous paragraph "naturally arise". This conclusion is correct for there will need to be continued emphasis on self-control through parental nurture, education, religious restrictions, treaties, national social programs, and the legal canon. As Leon Kass once said, "We need to realize that there is more at stake in the biological revolution than just saving life or avoiding death and suffering. We must also strive to protect and preserve human dignity and the ideas and practices that keep us human" (Kass 2002). Given supportive sociocultural contexts, and as more enhanced humans walk the planet, awareness of the big picture of humanity's role in evolution should become more widespread and

compelling. Growing support for the type of social policy and institutional design leading to systemic sustainability can intensify. In other words, a positive feedback loop between evolving sociocultural and political institutions and human enhancement can be created. Consequently, today's institutionalized system perpetuating inequality and injustice should diminish while the forces which have shaped civilization's cycles in the past diminish.

Finally, what about environmental destruction and climate change? It was stated earlier that addressing detrimental forces can only be affected by reducing our numbers and modifying our economic systems to be less environmentally destructive. Enhanced humans may naturally choose smaller families, conservation, and sustainability, but echoing Kass, it will take appropriate socioeconomic policies coordinated across the world to accomplish these other goals. It is suggested here that as the proportion of enhanced humans increases, and the positive feedback loop intensifies, so will the probability of sociopolitical policies being inaugurated that decrease our numbers and environmental footprint.

Without a doubt, biotechnology requires supporting systems and institutions to lead the project safely and wisely. We require an innovative "transition management" initiative based upon a bottom-up strategic vision (Ramos 2014). Russell Blackford once noted that transhumanism is a broad intellectual movement with no body of codified beliefs and no agreed upon agenda (Blackford, et. al. 2011). It is time for this state to change—a more focused movement and set of ontological tenets is required. In examining the futures literature, Roberto Poli concluded "... that some elements of ontology should become part and parcel of the set of categorical tools that any working futurist should have at his or her disposal" (Poli 2011). With these elements in place, we can move toward outlining an agenda for making a preferable future more probable.

The open question is will this make a material difference in the current cycles of civilization, will the stages of senescence, collapse, and decay abate as the transhuman emerges in numbers? Without a doubt, groups of transhumans will energize collective intelligence networks, bringing forth innovative solutions to emergent problems during the later stages of global civilization's decline. A greater propensity to possess emotional intelligence centered upon self-awareness, self-regulation, motivation, empathy, and constructive social skills will help mend fraying social fabric while solutions are found and implemented (Golman 2017). Even if transhumans only make a marginal difference in outcomes this century, it is hoped that this emerging cohort will ease some tensions during decline while envisioning and creating a sustainable foundation for the next civilization.

5.1 Discussion: What if the Ending Phases Remain Untouched by Transhumans?

Resistance to bioengineering progressing as suggested in this paper is strong, so may persist in the decades ahead. Without a doubt, there will be further augmentation from biotechnology and somatic genetic developments. Still, the basic nature of humans with the negative traits of greed, violence, bigotry, hatred, impulsivity, ignorance, and mental illness will remain unaffected—and may intensify as socioeconomic progress stagnates. Further, forthcoming biotechnological enhancements will likely be prohibitively expensive, leading to rising inequality as the wealthy take early advantage. The macrohistorians introduced earlier in this article suggest common features observed during historical cycles. Given their observations, we would expect the rise of an elite increasingly isolated from the majority, perhaps turbocharged by forthcoming biotechnological advancements. We should witness rising clientelism drawing off resources, while associated laws, rules and regulations entangle and stifle social and commercial relations. As in the past, increased infighting, potentially violent, may occur as the marginalized embrace populism and radical solutions to deteriorating conditions. Unlike past cycles, this time there will be continued environmental degradation and climate change, placing intense pressure on economies and people. Further, between 2023 and 2080 over 90% of the United Nations forecasted 2 billion population increase will occur in the less developed parts of the world (UN 2022). Increasing sectarian violence and poverty will likely accelerate human emigration, stressing more developed nations as those on the move appear at their borders. The net effect as we move into the ending cycles of civilization will be the fraying of sociocultural bonds, economic entropy, and increased strife within and between groups and nations. The final stage of civilization often begets violence and societal collapse. Many hope that with enough societal stress governments will pass policies that

constructively address destructive developments. Unfortunately, the protective laws, rules and regulations instigated by well-funded special interest groups will constrain political action. Further, given that the current civilization faces unique issues rooted in our numbers and behavior, any forthcoming polices may be little more than band-aids, at best delaying the inevitable. Barring some techno-fix set of miracles, which is possible yet not probable, we must conclude that humanity's response will continue to be reactive until crisis and collapse are upon us—and then it will likely be too late. The rich and powerful will insulate themselves as much as possible, using their wealth and influence to protect themselves. Toward the end, some from this contingent are the ones most likely to emerge from their boltholes, reclaiming the storyline to begin a new civilization—while renewing the unaltered cycles of history.

6. Conclusion

This paper began by discussing some characteristics of the new geological era we are entering called the Anthropocene, outlining a host of planetary malaises destabilizing Earth systems. It has been argued that the apparent cause of the acceleration in planetary stress is due to accumulating, destructive byproducts of rising population and industry over time. The end-cycles of civilization are identified as an additional existential threat that, if macrohistorians are to be believed, suggests that we are presently entering the terminal stages of senescence, decay, and collapse. Evidence presented in this essay supports their theory. Sociopolitical expression of human negative emotions, specifically fear, anger, disgust, contempt, and greed, are identified as the root cause of this newly identified existential threat. It was argued that human behavior evolved primarily to deal with a simpler context of existence, which today is out of synch with that needed to address our current global challenges. Since the dawn of civilization, societies have attempted to control individual and group destructive actions through self-control, education, religious restrictions, treaties, national social programs, and the legal canon. These efforts are necessary yet have always proven insufficient in breaking the damaging psychosocial forces eroding collective viability from within and without. Historically, the expression of humanity's damaging effects has been mitigated by Earth's seemingly inexhaustible environmental sinks and abundant resources. Today these buffers are stressed and increasingly nonviable. Therefore, what can be done to preserve life on Earth and the evolutionary promise embodied in humanity? A "planned path emergence" approach based on bioengineering under strong bioethical principles is proposed as a solution. Once somatic gene therapy opens the opportunity for germline therapy, any alteration of the germline needs to be limited to enhancing successful, adaptive traits that all people share: health, longevity, intelligence, and attention. The success of this solution rests on the assumption that enhancing the intellectual depth and scope of humans is a viable means to diminish anthropomorphically caused existential risks. It is acknowledged that biotechnology alone will not thwart humanity's tendency toward self-destruction. Supporting initiatives, policies, and institutions are required to deploy biotechnology safely, and nurture is as important as nature in supporting the goals of planetary and human sustainability.

The term "Apocalypse" was chosen for use in this paper on purpose, for it resonates with the environmental and sociopolitical dynamics related to the Anthropocene. Further, as we pass through the stage of senescence toward collapse and decay of global civilization, these ending phases of the cycle add to a sense of impending doom. In the biblical story of the Apocalypse, a time is to come when the faithful will be saved by a returning Jesus Christ who cleanses the Earth and sets up the kingdom of God. Here this story is used as a metaphor: It's not the son of God but rather a cohort of transhumans arising to provide hope for achieving Earth's redemption and potential. Also, unlike the story in Revelations, they will not wield swords to triumph, but rather ethically guided, cutting-edge science within transformed mindsets and institutions.

Most make the mistaken assumption that we are the endpoint of evolution of life on Earth—in fact, the process is omnipresent within space-time. What is changing is that humans are increasingly aware that they are taking control of evolution, even though they have done so for at least 12,000 years. Advanced genomics has sharpened this awareness to the point of discomfort. While this discomfort is warranted, somatic gene engineering leads to germline editing—it is a *fait accompli*. A non-random approach to further human evolution offers the hope that we may develop into a lasting and flourishing branch of life, carrying our potential toward life's unknowable destination. If we hesitate in assuming greater control, we may end up no more than a final twig on the tree of life in the genus *Homo*. Our uneasiness of where synthetic biology and artificial intelligence is taking

us risks immobilization—we cannot let this happen. If wise enough, we have a chance through bioengineering to improve the probability of evolution continuing in our corner of the galaxy with humanity in the vanguard. As we move into our next set of choices it is important to remember that civilization reflects culture, culture reflects beliefs, and beliefs reflect our deepest needs and wants as human beings. If we are to change our fate, we must begin by changing ourselves: We need a better human.

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