RECLAIMING THE FUTURE:

SPACE ADVOCACY AND THE IDEA OF PROGRESS

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ABSTRACT

The idea of progress is clearly central to American national identity, yet the popularity and credibility of the idea has undergone significant fluctuations over the course of American history. This paper assesses how the onset of space travel stimulated an attempted revitalization of ideas about progress that, by the late 1960s, were coming under increased attack. The idea of progress has typically advanced three claims: 1. There are no fundamental limits on the human capacity to grow, however growth is defined; 2. Advancements in science and technology foster improvements in the moral and political character of humanity; and, 3. There is an innate directionality in human society, rooted in societal, psychological, or biological mechanisms, that drives civilization toward advancement. American believers in progress quickly embraced space travel, viewing it as a vindication of the doctrine's original claims about the near-inevitability of human improvement. With space travel understood in this fashion, the fate of the space program took on a far greater meaning than developments in other areas of technological endeavor, as it became symbolic of the entire directionality of human civilization. The early and astonishing success of Apollo, followed almost immediately by signs of disarray, served to stimulate a new vision of progress, and then quickly threaten it. In this context, a space advocacy literature arose that was simultaneously grandiose about the human future yet intensely fearful about missed opportunities. This confluence of both ambition and anxiety continues to characterize both the pro-space movement and the larger debate about the American future in space.

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> Into the mood of the American people . . . the idea of progress fit with extraordinary precision. . . . It remains, and will remain, a fundamental tenet of American society, and while vigor is left in the race it will operate with all the force of a dynamic idea rooted in purpose, will, and opportunity.
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> – Charles Beard, 1932[1]

Americans have been more deeply wedded to the idea of progress than perhaps any people on the face of the Earth. The key claim of the idea of progress – that human civilization has moved and will continue to move in a desirable direction – has been central to American culture and identity for virtually all of the nation's history.[2] Indeed, many would argue that a profound faith in progress has been one of the key features distinguishing Americans from people elsewhere, and a recurring source of the country's distinctive appeal across the globe. What happens, then, when the idea of progress starts to lose credibility? How do Americans react when they become fearful that the direction of society has become negative, rather than positive? The period of the late 1960s and early 1970s provides an example of a time when the American faith in progress started to unravel. While belief in progress has arguably recovered partially, most observers would still view the late sixties as a turning point after which the idea came under siege

in ways that had not been experienced previously. The argument of this essay is that the rise of new forms and doctrines of space advocacy reflects exactly this crisis in the idea of progress. If the forward march of humanity (with America noticeably in the lead) had been halted, something had to be done. A movement into space was proposed as the solution. Thus was born the modern pro-space movement, and the contemporary fusion of the idea of progress with ideas about space travel, space development, and, most of all, space colonization.

Over the last forty years, space advocates have constructed a set of doctrines that addresses all the key components found in the idea of progress since it first took modern form during the Enlightenment. This new pro-space ideology was a reaction to the problems that had become apparent by the time of the first Moon landing; namely, environmental crises, limits to economic growth, and fears of cultural decay. Space advocates proposed solutions to these problems, and others. They concluded that an expanded space program was the essential condition to revive both the idea and reality of progress. The irony was that *they embraced this belief at the very moment that the Apollo program was coming to a close*, and the future of NASA and space travel becoming increasingly uncertain. Thus, a strong edge of anxiety and urgency was introduced into the writings of space advocates. The means to ensure progress had been found, but would soon be lost forever if government policy was not properly adjusted. This combination of *certainty* about the path toward redemption alongside *anxiety* about the possibility of missing a singular opportunity energized the new pro-space literature, and encouraged the growth of an accompanying space advocacy movement.

THE IDEA OF PROGRESS

Despite the many controversies over whether progress is actually taking place, there is little dispute about how to define the idea itself. J. B. Bury's classic formulation of 1920, with its succinct assertion that the idea "means that civilization has moved, is moving, and will move in a desirable direction," remains as useful as any proposed since.[3] But theories of progress have always tried to do far more than simply attach a normative gloss to the passage of time. By necessity, they have embraced a set of larger claims, captured in the following mutually reinforcing and interlocking premises:

> **1. NO LIMITS.** There are no fundamental limits – nor should there be – on the collective human capacity to grow, no matter how growth is defined (which may be in terms of knowledge, wealth, power, population, or morality). Progress is endless (or at least indefinite for all practical purposes).
>
> **2. ALL GOOD THINGS GO TOGETHER.** Advancements in science and technology, and the resulting mastery over nature, expand our knowledge, wealth, and power, and, in so doing, bring improvements in the moral, political, and spiritual character of the human race. The elements of progress are linked to one another and mutually reinforcing.
>
> **3. INNATE DIRECTIONALITY.** There exist developmental tendencies, rooted in societal, psychological, or biological

> mechanisms, that make it far more likely that human civilization will move "upward," toward greater control and understanding of nature and ourselves, rather than "downward" toward chaos and entropy. Progress is, if not inevitable, always highly probable.

Whether one was a liberal who embraced science, markets, and technology, a Marxist who saw class conflict at work in capitalist society, or an evolutionist who focused on the winnowing effects of natural selection, the three premises above were always addressed either directly or implicitly in the great nineteenth century theories of progress.

Unfortunately for defenders of progress, all three of these premises became less convincing during the course of the twentieth century.[4] Major limits on economic, demographic, and even intellectual growth were identified, and their importance was widely proclaimed in both elite and popular culture. A belief that there are innate human tendencies toward progress was undermined by the evidence that humans were inherently violent or even self-destructive due to deep-rooted psychological or biological drives. Science and technology, it was suggested, have advanced far out of proportion to the capacity of humans to control them rationally, making total self-destruction as likely as benign development. Advancements in humanity's control over nature were thus no longer necessarily viewed as automatic *improvements*, and could even be seen as detrimental, contributing to the further estrangement of humanity from its natural environment. For many, gains in science, economics, and technology seemed to have corrupted humanity, producing a culture of widespread pornography, greed, and violence, and a political sphere dominated by the trivialized discourse of mass marketing. Summarizing a vast literature, physicist and historian Gerald Colton concluded in 1980: "Future historians will probably record that from

the mid-twentieth century on, it was difficult for anyone to retain faith in the idea of inevitable and continuing progress. People increasingly use the word in quotation marks or with mocking sarcasm or speak not of progress in civilization but in barbarism."[5]

ENTER THE SPACE ADVOCATES

It is in this context that the space advocates enter the debate, with their own agenda to revitalize the idea of progress and, in so doing, to buttress a central component of American national identity. While space advocacy ideologies and organizations have existed in various forms since the first decades of the twentieth century, the 1970s saw the formation of a pro-space movement that was determined to build upon the successes of Apollo by creating the setting for an imminent migration into space on a massive scale. The most notable of these new advocates was Princeton physicist Gerard K. O'Neill, who foresaw the creation of an expanding human civilization in space by the early 1990s. At the core of his vision was the establishment of gigantic rotating colonies, shaped liked a sphere or cylinder, in which tens of thousands inhabitants living on the interior surface would experience the sensation of gravity produced by centrifugal force. With sunlight beamed in by massive mirrors, these colonies could provide park-like conditions for their inhabitants and a lifestyle that resembled that of a comfortable American suburb. The economic rationale for this massive endeavor would come from the construction of enormous grids for collecting solar energy, which would then be converted into microwaves and beamed down to receptors on earth. In this manner, O'Neill anticipated that the movement into space could provide clean, limitless, and inexpensive power for a world that was facing worsening shortages of energy and raw materials. The Space Shuttle, which promised to soon provide low-cost access to space, would be one of several vehicles that would ferry construction crews to

space, eventually arriving at Lagrange point 5 (L-5), the location where the balancing of the gravity of the earth and moon would allow a colony to remain stationary.

This bold vision of a profitable and practical future in space prompted the formation of an interest group called the L-5 Society, which was set up in 1975 in order to promote the creation of O'Neill-style colonies as soon as possible. The group embraced the slogan "L-5 in 1995" and proclaimed that its goal was "to disband the Society in a mass meeting at L-5." Within a few years, the organization had attracted considerable attention, and the O'Neill vision of a new human future in space was the object of serious study in Congress and NASA. By the mid-1980s, however, the limited success of the Space Shuttle, as well as the subsidence of energy prices and the avoidance of other predicted catastrophes, encouraged the postponement of the space colonization dream to a rather more distant future. By 1987, a demoralized L-5 Society had merged with the National Space Institute, a more subdued pro-space group established in 1974 with closer ties to NASA, and together formed the National Space Society, which continues as an active pro-space group to the present day. While the NSS has eschewed the vision of L-5 colonies as the only desirable means to populate space, and toned down the messianic rhetoric that made the L-5 Society somewhat notorious, it remains committed to the goal of "people living and working in thriving communities beyond the Earth."[6]

While NSS and its supporters delayed their dreams, a second group of space advocates emerged in the 1990s with much of the same elan that had characterized the pro-space partisans of the 1970s. For these activists, the plan was to colonize Mars, rather than to create artificial spheres in space. As such, their program was simpler: they advocated immediate steps to begin the settlement of the red planet, hoping to send the first humans in the early decades of the

twenty-first century. Supporters of Mars colonization believe that the long-term project of developing a human civilization on Mars will promote social cohesion and economic growth on Earth, and create a new branch of civilization that will rival in its accomplishments anything that mankind has done previously. The most enthusiastic proponent of this plan has been the engineer and author Robert Zubrin, who wrote the 1996 book *The Case for Mars* and was instrumental in the founding of the Mars Society, an organization dedicated to making Mars settlement the main goal of America's space policy.

A third contemporary pro-space group is the Planetary Society, founded by scientists Carl Sagan, Bruce Murray, and Louis Friedman in 1980 to encourage "the exploration of the solar system and the search for extraterrestrial life." With more than 100,000 members from numerous countries, it is the largest single pro-space interest group, but has largely promoted exploration as a value in its own right, showing little interest in the grandiose vision of space industrialization and colonization endorsed by NSS and the Mars Society. Nonetheless, the society has strongly supported the value of a human mission to Mars and has worked closely with other space groups to support President Bush's Vision for Space Exploration. And Sagan himself became a prominent advocate of the larger goal of space colonization in his writings of the 1990s, providing influential and eloquent support for a continued human role in spaceflight and the long-term goal of space migration.

SPACE DEVELOPMENT AND THE IDEA OF PROGRESS

Although the various pro-space intellectuals and space advocacy groups often endorse different practical programs and strategies, they use similar arguments in justifying their vision of

the human future in space. As they have attempted to persuade a skeptical public of the desirability of their (rather expensive) programs, they have come to address all three of the classical premises of the idea of progress.

1. No Limits

The modern view of progress is resolutely opposed to the idea of limits, including limits in space and time on the growth of the human species. It is perfectly logical, therefore, that many authors see the rise in recent decades of the idea of "limits to growth" as signaling the decisive end of the idea (and reality) of progress in our time. "The belated discovery that the Earth's ecology will no longer sustain an indefinite expansion of productive forces deals the final blow to the belief in progress," Christopher Lasch confidently asserts.[7]

Space advocates will have none of this. Responding to the first appearance of the "limits to growth" idea, pro-space intellectuals of the 1970s were eager to assert that space could be the source of limitless new reserves of energy and natural resources. In promoting his scheme of magnificent L-5 colonies, Gerard K. O'Neill wrote:

> The human race stands now on the threshold of a new frontier, whose richness surpasses a thousand fold that of the new western world of five hundred years ago. That frontier can be exploited for all of humanity, and its ultimate extent is a land area many thousands of times that of the entire Earth. As little as ten years ago we lacked the technical capability to exploit that frontier. Now we have that capability, and if we have the willpower to use it we

> cannot only benefit all humankind, but also spare our threatened planet and permit its recovery from the ravages of the industrial revolution.[8]

Based on his calculations (which assumed a robust and cost-efficient space shuttle fleet), O'Neill thought it quite possible for a space colony to be "in place, with its productive capacity benefitting the Earth, before 1990."[9]

More recent space advocates have also been insistent that the development of space resources would overcome all resource constraints. Robert Zubrin, in his 1996 vision of Mars colonization, writes: "We can establish our first output on Mars within a decade, using well-demonstrated techniques of brass-tack engineering backed up by our pioneer forebears' common sense." Once settled on Mars, the colonists would find the opportunities for growth to be immense: "Virtually every element of significant interest to industry is known to exist on the Red Planet." Eventually, the Mars colonists would venture off to the nearby asteroid belt, where they would find vast mineralogical resources just waiting to be tapped. The ultimate outcome would be a "triangle trade" similar to that which existed between Britain, the North American colonies, and the West Indies during the 18th century. In the twenty-first century version, Earth would supply "high technology manufactured goods to Mars," Mars would supply "low-technology manufactured goods and food staples to the asteroid belt," and the workers in the asteroid belt would send precious metals back to Earth. The new Martian civilization would also be a "hotbed of invention," producing "wave after wave of invention in energy production, automation and robotics, biotechnology, and other areas." As a result, Mars colonization "will dramatically advance the human condition in the twenty-first century."[10]

Space advocates argue that even if such activities eventually deplete the resources of nearby planets and asteroids (an unlikely eventuality for thousands of centuries), humans can simply move on to other solar systems. Carl Sagan suggests that human communities might migrate from planet to planet, exhausting the resources of each before moving on, much as earlier nomadic human communities exhausted local agricultural and animal resources and then migrated elsewhere. "We might call it 'pioneering' or 'homesteading'," Sagan observes, while acknowledging that "a less sympathetic observer might describe it as sucking dry the resources of little world after little world. But there are a trillion little worlds in Oort Comet Cloud."[11] Zubrin puts it simply: "The universe is vast. Its resources, if we can access them, truly are infinite."[12]

The only danger these theorists see, not surprisingly, is the possibility that mankind will fail to grasp the opportunities before it. Zubrin is emphatic that humanity needs to be constantly on the move, constantly growing, or it will stagnate and die:

> The key is not to let the process stop. If it is allowed to stop for any length of time, society will crystallize into a static form that is inimical to progress. That is what defines the present age as one of crisis. Our old frontier is closed. The first signs of stagnation are clearly visible. Yet progress, while slowing, is still extant: Our people still believe in it and our ruling institutions are not yet incompatible with it.[13]

There is hope for the future, Zubrin avers, but only if the people act at this crucial movement to reverse decline by opening a new frontier. The stakes, in his view, could hardly be any higher:

"The creation of a new frontier thus presents itself as America's and humanity's greatest social need. *Nothing is more important*: Apply what palliatives you will, without a frontier to grow in, not only American society, but the entire global civilization based upon values of humanism, science, and progress will ultimately die."[14]

Zubrin specifically endorses the theories of Frederick Jackson Turner, agreeing that what makes America free, egalitarian, and innovative can all be traced to the existence of a frontier. Without a frontier, America will lose those traits. As evidence of decline, Zubrin cites the "increasing fixity of the power structure and bureaucratization of all levels of life; impotence of political institutions to carry off great projects; the proliferation of regulations affecting all aspect of public, private, and commercial life; the spread of irrationalism; the banalization of popular culture; the loss of willingness by individuals to take risks, to fend for themselves or think for themselves; economic stagnation and decline; the deceleration of the rate of technological innovation . . ." Despite his purported faith in progress, science, technology, and the American Dream, Zubrin believes that the contemporary United States is in deep trouble: "Everywhere you look, the writing is on the wall."[15] But, he is not too worried since he knows the real explanation for his long list of maladies: the frontier is gone. Once we get it back, all those measures of societal health will reverse direction and start trending upward again. Zubrin is confident of this because he embraces the assumption that all facets of civilization will either rise or decline together as a function of the presence or absence of a frontier experience.

Even the limits posed by celestial threats to the Earth can be overcome, space advocates say, but only if we colonize space quickly. Since the 1970s, space advocates have become increasingly fond of justifying space or Mars colonization on the grounds that it is the only means

to ensure the survival of the human race in a universe where an asteroid could slam into the Earth at any moment. Space advocates emphasize that the dinosaurs became extinct because they failed to master their environment – without a space program, they were left at the mercy of untoward celestial encounters. Such encounters await Earth again in the future, space advocates note, and suitable preparation is therefore required. As Sagan puts it, we live in a solar system marked by "routine interplanetary violence." He estimates that "the chance is one in a thousand that much of the human population will be killed by an impact in the next century."[16] It was this possibility that prompted Sagan, long a skeptic of human spaceflight, to finally endorse an active program of space colonization in the near-future. He writes: "The asteroid hazard forces our hand. Eventually, we must establish a formidable human presence throughout the inner solar system. On an issue of this importance I do not think we will be content with purely robotic means of mitigation."[17]

Sagan notes that as humanity spreads to other planets it will then possess a form of "planetary insurance" against the possibility that an asteroid deflection system might break down, or that other catastrophes on Earth might destroy humanity.[18] When life is spread widely, he writes, it can never be killed. Thus, Earthlife will become immortal, or at least will find the means to survive as long as the universe itself. In this sense, space advocates see their own agenda as ultimately more life-affirming than any conceivable program of political action on the agenda today. As former astronaut John Young puts it: "Knowing what we know now, we are being irresponsible in our failure to make the scientific and technical progress we will need for protecting our newly discovered severely threatened and probably endangered species – us.

NASA is not about the 'Adventure of Human Space Exploration,' we are in the deadly serious business of saving the species."[19]

But, alas, time is short. Although all space advocates will acknowledge that the odds of a massive asteroid collision in the next century are extremely slim, they nonetheless argue for taking immediate steps to establish a permanent human presence in space. Their reasoning is that humanity may be going through a "critical period" in which it simultaneously has the capability both to destroy itself and yet also to establish a beachhead in outer space.[20] There may be a narrow window in human history, space advocates argue, in which humanity has the opportunity to move into space. This window has only recently been opened, and it may swing shut quite soon, due to the surprise arrival of an asteroid, nuclear war, biological war, or a general societal breakdown. The lesson: act now, while you can, or forever be sorry. As Sagan writes: "The more of us beyond the Earth, the greater the diversity of the worlds we inhabit, the more varied the planetary engineering, the greater the range of societal standards and values — then the safer the human species will be."[21]

Thirty years after he first walked on the Moon, Neil Armstrong commented upon the Apollo program's significance: "The important achievement of Apollo was a demonstration that humanity is not forever chained to this planet. Our visions go rather further than that and our opportunities are unlimited."[22] In this statement he expressed the abiding faith in an unlimited future that has historically been central to the idea of progress, and which space advocates insist, contrary to a host of critics, remains equally valid today.

2. All Good Things Go Together

In a review of Enlightenment ideas about progress, political theorist Nannerl Keohane writes: "In its most robust and purest form, the belief in progress affirms that increases in human knowledge, the establishment of human control over nature, and the perfecting of the moral excellences of the species will guarantee one another, with a concomitant increase in human happiness." But it is precisely this faith, she argues, that "good things come in clusters" that is "the Enlightenment addition to the theory of progress that is most problematical today."[23] The space advocates, however, are not worried. In general, they see advances in one area – science and technology – as contributing only to advances, not problems, in other spheres of human life. Space advocates cheerfully maintain the old, untroubled conviction that "good" things and ultimate values do not collide, but rather *reinforce* each other. The human movement into space, consequently, is not expected to bring any unforeseen problems, but will instead only contribute to massive improvements in other aspects of human existence.

"Space colonization appears to offer the promise of near-limitless opportunities for human expansion, yielding new resources and enhancing human wealth," concluded a 1977 NASA study of the possibility of space settlements. "The opening of new frontiers, as it was done in the past, brings a rise in optimism to society," the study asserted. "It has been argued that it may also enhance the prospects of peace and human well-being. Just as it has been said that affluence brings a reduction in the struggle for survival, many have contended that expansion into space will bring to human life a new spirit of drive and enthusiasm." The benefits of space colonization will be experienced by all, for "successful exploitation of the extraterrestrial environment is expected to enhance the standard of living not only of the population in space but the population remaining

on Earth as well." Indeed, the opening of space is so significant that "this new vista, suddenly open, changes the entire outlook on the future, not only for those who eventually want to live in extraterrestrial communities but also for those who want to remain on Earth."[24] The NASA authors clearly see this change in outlook as a transformative one – a shift from a negative, cramped view of the future, to a future where limits are overcome and countless new opportunities are created. The opening of the space frontier, they suggest, will improve human civilization in all respects – not just by bringing economic and technological advancement, but also by enhancing the spiritual, political, and cultural health of all humanity.

Others have argued that the diffusion of human beings off the planetary surface will open up new opportunities for social experimentation, opportunities that were last seen, they suggest, in the original settlement of the New World and the American frontier. "On Earth it is difficult for . . . people to form new nations or regions for themselves," science author T.A. Heppenheimer observed. "But in space it will become easy for ethnic or religious groups, and for many others as well, to set up their own colonies . . . Those who wish to found experimental communities, to try new social forms and practices, will have the opportunity to strike out into the wilderness and establish their ideals in cities in space." In a burst of multicultural enthusiasm, Heppenheimer even suggests that "we may see the return of the Cherokee or Arapaho nation — not necessarily with a revival of the culture of prairie, horse, and buffalo, but in the founding of self-governing communities which reflect the Arapaho or Cherokee customs . . . "[25] Carl Sagan also sees more cultural diversity as humanity establishes new civilizations on different planets and other celestial bodies: "Each society would tend to be proud of the virtues of its world, its planetary engineering, its social conventions, its hereditary predispositions. Necessarily, cultural differences would be

cherished and exaggerated. This diversity would serve as a tool of survival."[26] Zubrin likewise claims that Mars colonization will promote cultural diversity in a world where it is increasingly threatened by proximity and over-crowding.

Space migration will also enlarge the pool of positive images of the future available to humanity – images that space advocates consider essential to motivate and guide purposeful activity. Many space advocates complain that optimistic images of the future have been displaced in recent decades by far more negative views. Sagan writes: "Where are dreams that motivate and inspire? Where are the visions of hopeful futures, of technology as a tool for human betterment and not a gun on a hair trigger pointed at our heads?" A rare exception to the spread of gloomy visions, according to Sagan, was the space program of the 1960s: "Apollo conveyed a confidence, energy, and breadth of vision that did capture the imagination of the world . . . It inspired an optimism about technology, an enthusiasm for the future . . . With Apollo, the United States touched greatness."[27] With a renewed commitment to space, the psychological and cultural health of America and humanity in general would surely improve.

Space advocates also foresee a new era of peace and mutual understanding arising as a result of space travel. Sagan writes that "the unexpected final gift of Apollo" was "the inescapable recognition of the unity and fragility of the Earth." Sagan continues: "I'm struck again by the irony that spaceflight – conceived in the cauldron of nationalist rivalries and hatreds – brings with it a stunning transnational vision. You spend even a little time contemplating the Earth from orbit and the most deeply ingrained nationalisms begin to erode. They seem the squabbles of mites on a plum."[28] Another space enthusiast, Frank White, argues for the existence of what he calls an "overview effect" in which humans who are launched into space achieve a

veritable breakthrough in human consciousness. Those living in space "will be able to see how everything is related, that what appears to be 'the world' to people on Earth is merely a small planet in space, and what appears to be 'the present' is merely a limited viewpoint to one looking from a higher level. People who live in space will take for granted philosophical insights that have taken those on Earth thousands of years to formulate. They will start at a place we have labored to attain over several millennia." Space dwellers will become aware that "we are one; we are all in this together; war and strife solve nothing." White also suggests that "the multiplier effect means that sending a limited number of people into space can lead to a broad-based social transformation. The experiences of the few become new information for the many, serving as fuel for social evolution."[29]

Sagan argues that the need to detect and deflect threatening asteroids will encourage the formation of some form of world government. Since the technology needed to deflect asteroids is potentially very dangerous, not least of all because it could be used to send asteroids hurtling *into* the Earth instead of away, it will be necessary to develop much stronger international institutions to develop and control this capability. "The existence of interplanetary collision hazards, when widely understood, works to bring our species together . . . the small near-Earth worlds provide a new and potent motivation to create effective transnational institutions and to unify the human species. It's hard to see any satisfactory alternative."[30] With similar esprit, the Planetary Society once stated in its official web site that it hoped to "reach out into the low-energy universe, investigate and understand its many splendors, travel to and perhaps settle its distant shores, seek those unfound 'others' and, in the process, *advance the cause of world citizenship here at*

home."[31] World citizenship – it has that universalistic ring that has informed theories of progress from the very beginning.

The only real impediment to the realization of these noble dreams, Sagan and other space advocate suggest, is the rise of ungrounded fear of science. Writing in the 1990s, Carl Sagan describes a "demon-haunted world" where popular understanding of science is under siege by believers in alien-abductions, astrology, crop-circles, crystal power, and so on. "We risk becoming a nation of suckers, a world of suckers, up for grabs by the next charlatan who saunters along," Sagan warns.[32] His own message is simple: the more science and technology, the better. Sagan writes: "There's no turning back from science. Many will have to become scientifically literate. We may have to change institutions and behavior. But our problems, whatever their origins, cannot be solved apart from science."[33] The faith in science is fundamental, for the space advocates believe, as believers in progress always have, that science and technology will have predominantly beneficial effects for humanity. Accordingly, moving into space will not have any unintended, negative consequences for either the humans living there or those remaining on Earth. Sagan sums up the prevailing view with his usual flair: "I think that, after some debugging, the settlement of the Solar System presages an open-ended era of dazzling advances in science and technology; cultural flowering; and wide-ranging experiments, up there in the sky, in government and social organization."[34] Zubrin similarly concludes that "Mars may someday provide a home for a dynamic new branch of human civilization, a new frontier, whose settlement and growth will provide an engine of progress for all of humanity for generations to come."[35] In such words we see a virtually perfect expression of the faith that all good things go together, and that profound and tragic choices between equally valued goals can be easily avoided.

3. Innate Directionality

Supporters of the idea of progress have usually insisted that there is some kind of mechanism or force – perhaps even a divine force – that keeps history on track, moving it forward toward betterment. In their own revitalization of the idea of progress, space advocates have also identified certain innate developmental tendencies that, in their view, are likely to drive history forward. As has historically been common with theorists of progress, the most popular mechanism is one based on the idea of evolution through natural selection. Carl Sagan suggests that a human expansion into space is ultimately rooted in those traits that tens of thousands of years of natural selection have ingrained in mankind. Humans began as nomadic hunters and foragers, and those who were the most adventuresome, who courageously sought new sources of food and water, were the ones who survived. "Even after 400 generations in villages and cities, we haven't forgotten. The open road still softly calls, like a nearly forgotten song of childhood . . . This appeal, I suspect, has been meticulously crafted by natural selection as an essential element in our survival." The exploratory urge is simply built-in to humanity, although not everyone possesses it in equal measure. "Your own life, or your band's, or even your species' might be owed to a restless few – drawn, by a craving they can hardly articulate or understand, to undiscovered lands and new worlds." This is the drive – the causal mechanism – that, almost inevitably, will eventually lead to an expanding human civilization in space. "We're the kind of species that needs a frontier – for fundamental *biological* reasons," Sagan writes.[36] And it is in space, nowhere else, that the best and final frontier can be found.

The same kind of evolutionary reasoning is employed by historian Louis Halle, who writes in *Foreign Affairs* in 1981 that there is "reason to believe that, in its progressive evolution, life

has at last reached the point where it is about to expand into outer space, *as if it had been programmed in advance*. For, as evolution has a direction, it has an implicit destiny in that direction; although it may fail to realize that destiny as an infant may be killed by an accident before it had realized its own *destiny* of achieving adulthood."[37] Halle specifically endorses O'Neill's then-popular plan for space colonies, and suggests that the movement into space is functionally similar to the movement of life from the seas onto dry land some 350 million years ago. Wernher von Braun similarly exclaimed that the first Moon landing was "equal in importance to that moment in evolution when aquatic life came crawling up on the land."[38] Neil Armstrong himself joined in the naturalistic imagery, telling the *New York Times* that humans must move into space "just as salmon swim upstream."[39]

Such views typically reveal a classically teleological style of reasoning, so popular in theories of progress, in which all of human history is seen as motivated and guided by an ultimate purpose or final end. This doctrine imputes a certain consciousness and directionality – a telos – to a process that, on the face of it, might seem dominated by arbitrariness and accident. As one critic has noted, such thinkers claim that space migration "must be understood as an evolutionary stage, a natural development, not just comparable to but homologous with the emergence of life on Earth from the water, or the separation of a child from its mother."[40] It is not surprising, then, that the directionality identified by space advocates often shades off into a prediction of outright inevitability. "Maybe not right now, or next year, or even in 1990, but the space solution is inevitable, and, as shocking as it might at first appear, it is too late to debate the right-or-wrong of it," former NASA astronaut Bryan O'Leary informs us in his 1981 work, *The Fertile Stars*. "It is fruitless to make value judgments about whether we *should* go into space," O'Leary continues,

"whether mining the Moon and asteroids is the *right* thing to do, or whether we *ought* to build space shuttles or receive solar power from space – for we are in space to stay."[41] Still, O'Leary does spend the rest of his book rehearsing the various arguments – both economic and spiritual – for why space colonization should, in fact, be pursued. Much like other theorists of progress, O'Leary is convinced of the inevitability of his dream, but sees no contradiction in calling for conscious action to bring about its realization.

DISCUSSION

In truth, most of the claims of the new pro-space ideology of progress do not withstand critical scrutiny. A massive program of space development and colonization was not and is not a rational response to rising energy costs. There are no known resources at the present time that could be obtained more profitably in space than on Earth. Likewise, arguments that America is stagnating scientifically, culturally, or economically, and therefore needs the stimulus of a major space endeavor, have no backing in hard evidence. The notion that a frontier is crucial for freedom or innovation is not a finding accepted by either historians or social scientists. Claims that space travel will broaden human sensibilities, thus reducing nationalist and chauvinist impulses, are about as convincing as the belief, once widely held, that the view from high-flying airplanes would alter consciousness in a more cosmopolitan direction. New forms of diversity and social organization in space might eventually occur, but any effort at space colonization in the near-term is likely to involve a degree of regimentation and control that is hardly conducive to social experimentation. The oft-mentioned need to deflect asteroids could be handled effectively by robotic spacecraft, or by small piloted missions. And if there is a compelling need for an off-planet civilizational "back-up" source, a small base on the Moon would suffice (no massive colony

required). Finally, claims that humanity is programmed to explore the universe fall prey to the fallacy of composition: just because *individuals* like to explore does not mean that the larger group of which they are a part (in this case, the human race) has a need to *collectively* explore. As some space advocates themselves point out, history is full of examples of human societies that decided to stay put, choosing to remain within a viable local habitat indefinitely. There is no known innate human tendency that will require human beings to explore space, any more than there is a program forcing humans to settle Antarctica or the sea floor. To the extent that space migration does occur, it will be as a result of conscious human decisions, just as human migration has been in the past.

Without question, then, much of the pro-space literature is deeply flawed.[42] Ironically, it is also in tension with other forms of technological optimism. For those committed to the notion that humanity must move into space to survive, signs of growing success on Earth are disconcerting. If advances in bio-technology, artificial intelligence, and nano-technology allow humanity to prosper on Earth to a greater extent than ever before, the urgency of the space endeavor is lost. In fact, if one has faith that terrestrial technology will continue to advance, the idea of spending billions of dollars on unprofitable space ventures becomes even less attractive. Why not just wait until new technologies reduce the cost of space flight to reasonable levels? At that point, normal market mechanisms (such as tourist demand) may allow major increases in human space flight without government intervention. But then, of course, no grandiose ideology of progress will be required, any more than such an ideology was required to people the formerly arid deserts of the American southwest once water and air conditioning became widely available.

Despite all this, pro-space ideology retains the power that only a full-blown theory of progress can possess. NASA's own discourse, not to mention that of President George W. Bush and other politicians, frequently invokes the language of progress, with talk of destiny and inevitability, the overcoming or abolition of limits, and the virtuous cycles of knowledge and goodness that space development will surely bring forth. It is reasonable, therefore, to expect that the discourse surrounding space will remain one of the primary expressions of the idea of progress for a very long time to come.

CONCLUSION

The rise of a post-Apollo space advocacy literature, and its integral relationship to the idea of progress that has been at the core of Western civilization, surely counts as one of the more provocative societal consequences of the success of space travel. While its concerns are currently on the margins of public debate, the potency of the modern space advocacy synthesis suggests that it will continue to draw adherents and influence the thinking of policymakers. In comparison to earlier doctrines of progress, pro-space ideology is more grandiose, with its vision of planetary engineering and cosmic expansion, yet also more fearful, with its suggestion that the end times may be near if the space frontier is not soon conquered. This peculiar confluence of ambition and anxiety is likely to continue to infuse both the pro-space movement and the larger debate about the American future in space. Given the deep commitment of Americans to ideas about progress, such ideological concerns are as likely to affect policy as any rational assessment of scientific or economic need. As the development of the American space program itself attests, the capacity of the idea of progress to drive politics – and history – in unexpected directions should not be underestimated.

NOTES

1. Charles Beard, "Introduction," in J.B. Bury, *The Idea of Progress: An Inquiry Into Its Origins and Growth* (New York: Dover Publications, 1932), pp. xxxvi-xxxvii.

2. The definition here is derived from Bury, *Idea of Progress*, p. 2. For the importance of the idea of progress in America, see Clarke A. Chambers, "The Belief in Progress in Twentieth-Century America," *Journal of the History of Ideas* 19, no. 2 (1958); Hugh De Santis, *Beyond Progress: An Interpretive Odyssey To The Future* (Chicago: University of Chicago Press, 1992); Samuel Huntington, *American Politics: The Promise of Disharmony* (Cambridge: Harvard University Press, 1981), pp. 259-262; Christopher Lasch, *The True and Only Heaven: Progress and Its Critics* (New York: W.W. Norton, 1981); Seymour Martin Lipset, *American Exceptionalism: A Double-Edged Sword* (New York: W.W. Norton, 1996), p. 37; and Robert Nisbet, *History of the Idea of Progress* (New York: Basic Books, 1980).

3. Bury, *Idea of Progress*, p. 2. For contemporary variations, see Nisbet, *History of the Idea of Progress*, p. 4 and Charles Van Doren, *The Idea of Progress* (New York: Praeger, 1967), p. 7.

4. For discussions of the declining faith in progress, especially among intellectuals, see Gabriel Almond, Marvin Chodorow, and Roy Harvey Pearce, eds. *Progress and Its Discontents* (Berkeley: University of California, 1982); De Santis, *Beyond Progress*; John Horgan, *The End of Science: Facing the Limits of Knowledge in the Twilight of the Scientific Age* (New York: Broadway Books, 1996); Lasch, *True and Only Heaven*; Leo Marx and Bruce Mazlish, eds. *Progress: Fact or Illusion?* (Ann Arbor: University of Michigan Press, 1996); and Nisbet, *History of the Idea of Progress*.

5. Joel Colton, "Foreword," in *Progress and Its Discontents*, ed. Almond, Chodorow, and Pearce,

p. xi.

6. National Space Society, "Statement of Philosophy," available on-line at *http://www.nss.org/about/philosophy.html* (accessed 7 October 2006).

7. Lasch, *True and Only Heaven*, p. 529.

8. Gerard K. O'Neill, *The High Frontier: Human Colonies in Space* (New York: Bantam Books, 1977), p. 8.

9. Ibid., p. 10.

10. Robert Zubrin, *The Case for Mars: The Plan to Settle the Red Planet and Why We Must* (New York: The Free Press, 1996), pp. xix, xi, 236, 225, 301.

11. Carl Sagan, *Pale Blue Dot: A Vision of the Human Future in Space* (New York: Ballantine Books, 1994), p. 321.

12. Zubrin, *Case for Mars*, p. 305.

13. Ibid.

14. Ibid., p. 297, emphasis added.

15. Ibid.

16. Sagan, *Pale Blue Dot*, p. 259.

17. Ibid., p. 264.

18. Ibid, p. 310. For a similar formulation, see William K. Hartmann, Ron Miller, and Pamela Lee, *Out of the Cradle: Exploring the Frontiers Beyond Earth* (New York: Workman Publishing, 1984), pp. 37-42.

19. John Young, "The Big Picture," on-line at *http://members.aol.com/ramjetwww1/private/Space/Young.html* (accessed 16 September 2006).

20. Sagan, *Pale Blue Dot*, p. 312; see also J. Richard Gott III, *Time Travel in Einstein's Universe: The Physical Possibilities of Travel Through Time* (New York: Houghton Mifflin,

2002), p. 231.

21. Sagan, *Pale Blue Dot*, p. 310.

22. Reuters, "Moonwalkers Gather to Remember Apollo 13," *The Daily Yomiuri (Tokyo)*, 18 July 1999.

23. Nannerl Keohane, "The Enlightenment Idea of Progress Revisited," in *Progress and Its Discontents*, ed. Almond, Chodorow, and Pearce, p. 26 and p. 37. Keohane's discussion is based on the more extensive critique developed in Isaiah Berlin, *Four Essays on Liberty* (Oxford: Oxford University Press, 1969).

24. Richard D. Johnson and Charles Holbrow, eds. *Space Settlements: A Design Study* (Washington, D.C.: National Aeronautics and Space Administration Special Publication-413, 1977) pp. 175-176; also available on-line at *http://www.nas.nasa.gov/About/Education/SpaceSettlement/75SummerStudy* (accessed 16 September 2006).

25. T. A. Heppenheimer, *Colonies in Space* (New York: Warner, 1978), pp. 279-280.

26. Sagan, *Pale Blue Dot*, p. 317; for similar views, see Freeman Dyson, *Disturbing the Universe* (New York: Harper and Row, 1979), pp. 233-234.

27. Sagan, *Pale Blue Dot*, p. 70 and p. 171.

28. Ibid., p. 171, and pp.174-175.

29. Frank White, *The Overview Effect: Space Exploration and Human Evolution* (Boston: Houghton Mifflin, 1987) p. 4, p. 50, and p. 53.

30. Sagan, *Pale Blue Dot*, p. 263.

31. The Planetary Society, "Facts About The Planetary Society's History," *http://www.planetary.org/society/society-history.html* (accessed 24 May 2000), emphasis added.

32. Carl Sagan, *The Demon-Haunted World: Science as a Candle in the Dark* (New York: Ballantine Books, 1996), p. 39.

33. Sagan, *Pale Blue Dot*, p. 317.

34. Ibid., p. 318.

35. Zubrin, *The Case for Mars*, p. 1.

36. Sagan, *Pale Blue Dot*, p. xiv and p. 230, emphasis added.

37. Louis Halle, "A Hopeful Future for Mankind," *Foreign Affairs* (Spring 1981); see also Louis Halle, *Out of Chaos* (Boston: Houghton Mifflin, 1977).

38. Quoted in William Sims Bainbridge, *The Spaceflight Revolution* (New York: John Wiley and Sons, 1976), p. 1.

39. Quoted in Marina Benjamin, *Rocket Dreams: How the Space Age Shaped Our Vision of a World Beyond* (New York: Free Press, 2003), p. 57.

40. David Lavery, *Late for the Sky: The Mentality of the Space Age* (Carbondale: Southern Illinois University Press, 1992), p. 108.

41. Brian O'Leary, *The Fertile Stars* (New York: Everest House, 1981), p.18, emphasis in original.

42. Fascinating discussions and critiques can be found in Benjamin, *Rocket Dreams*; Stewart Brand, ed. *Space Colonies* (San Francisco: Walker Press, 1977), De Witt Douglas Kilgore, *Astrofuturism: Science, Race, and Visions of Utopia in Space* (Philadelphia: University of Pennsylvania, 2003); Roger D. Launius, "Perfect Worlds, Perfect Societies: The Persistent Goal of Utopia in Human Spaceflight," *Journal of the British Interplanetary Society* 56 (2003); Roger D. Launius, "Perceptions of Apollo: Myth, Nostalgia, Memory, or All of the Above?" *Space Policy* 21 (2005); Lavery, *Late for the Sky*; and Howard McCurdy, *Space and the American*

Imagination (Washington, D.C.: Smithsonian Institution, 1997).