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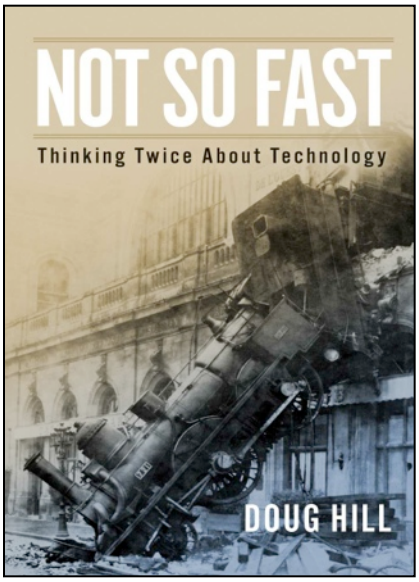
NOT SO FAST:
THINKING TWICE ABOUT TECHNOLOGY
By Doug Hill

Chapter 5 Excerpt: A Momentary Interruption



There's a little-known episode that occurred at the crest of the counterculture's influence that speaks directly to both its predominate technophobia and its quieter dreams of technological salvation. It's worth recounting in some detail, I think, because the 60s were an era with grand ambitions and little appetite for compromise. Disagreements tended to be cast in the starkest of terms—you were either part of the problem or part of the solution. Beliefs for or against technology fit that pattern. It was a moment when the forces of enthusiasm encountered, for a change, an opposition with an equal or greater voice.

The episode in question concerns a flurry of excitement that surfaced in the mid-1970s over the possibility of establishing human settlements in outer space. The campaign's leading proponent was Gerard O'Neill, a physicist and professor at Princeton University. Two of his more outspoken supporters were people whose influence would continue to be felt in technology circles for years to come: Eric Drexler and Stewart Brand. Brand at this point was publishing a spinoff publication of the *Whole Earth Catalog* called the *CoEvolution Quarterly*. Drexler was a graduate student at MIT who within the next decade would become one of the leading researchers in the burgeoning field of nanotechnology. Thanks to his 1986 book, *Engines of Creation: The*

Coming Age of Nanotechnology (quoted in my opening chapter), he would also become nanotech's leading proselytizer.

O'Neill formulated his space colonies idea at Princeton in the late 60s and gradually gained adherents over the next several years through a series of conferences, articles, interviews, lectures, and public forums. In July of 1975 he testified before the House Sub-Committee on Space Science and Applications and in January of 1976 he appeared before the Senate Sub-Committee on Aerospace Technology and National Needs.

Stewart Brand heard him speak at a World Future Society conference in the spring of 1975 and was converted, he later wrote, from "mild interest in the Space Colonies to obsession." Eric Drexler became a passionate supporter of the space colonies concept after reading a 1974 article O'Neill wrote in *Physics Today*. He soon joined a communal group called the L5 Society that dedicated itself to realizing O'Neill's dreams; the group's name was taken from the orbital address the first space colony would occupy. Drexler was a true believer; he told Stewart Brand, "I probably won't die on this planet."

O'Neill's plan called for the construction of a series of permanently inhabited, self-supporting space colonies. Each colony would consist of gigantic rotating cylinders with attached appendages that would accommodate different areas for living quarters, light industry, heavy industry, and agriculture. The land area of one cylinder, O'Neill said, could be as large as 100 square miles. Mirrors and shades could adjust ambient sunlight as needed to provide ideal conditions for each area. By varying the rotation of the cylinders, the level of gravity in different areas of the colony could also be adjusted "from zero to more than earth normal" and varied according to the needs in each area. Lower gravity in the area set

aside for industrial operations, for example, would enable construction to be completed without the use of heavy cranes. An enclosed atmosphere would provide an oxygen level consistent with that at sea level on Earth. Because the colonies remained in permanent orbit, they would be able to take advantage of round-the-clock sunlight for the production of solar energy.

O'Neill emphasized that the colonies' start-up costs would quickly be recouped through the sale of solar energy and of metals, mined first from the Moon and then from asteroids, and that those operations would quickly make the colonies hugely profitable. The first colony could be established within 15 years with a population of about 10,000, he said. From there inhabitants would increase steadily to about 250,000 by the year 2000.

O'Neill's presentations to Congress were dominated by charts, graphs, and diagrams, all clearly intended to make the project seem as practical and level-headed as possible. Nonetheless, plenty of specifics were left unexplained. He did promise that no breakthrough technologies were required in order to make the space colonies a reality; essentially what we're talking about, he said, is "civil engineering on a large scale in a well-understood, highly predictable environment." The few details he let slip about what living conditions would be like on the colonies were somewhat less pedestrian. In order to attract settlers they'd need to provide "earth-like" conditions similar to those of "some quite attractive modern communities in the U.S. and in southern France," he said. Lakes and streams suitable for swimming and boating, abundant vegetation and animal life, and hillside terraces were mentioned. O'Neill noted that, because levels of gravity could be varied, a short walk up a hillside could bring a resident to an area where "human-powered flight would be easy" and "sports and ballet could take on a new dimensions."

O'Neill kept glimpses such as these to a minimum. Stewart Brand, by contrast, felt no need to be circumspect, at least at first. The fall 1975 issue of *CoEvolution Quarterly* devoted more than 20 pages to O'Neill's plan. Brand introduced the package with a glowing endorsement. "Space Colonies," he wrote, "show promise of being able to solve, in order, the Energy Crisis, the Food Crisis, the Arms Race, and the Population Problem." Which was not to say they wouldn't also be fun.

"Since the cylinders are big enough to have blue skies and weather," Brand wrote, "you might design a cylinder pair to have a Hawaiian climate in one and New England in the other, with the usual traffic of surf boards and skis between them (travel in Space is CHEAP — no gravity, no friction)." He also mentioned the unpowered human flight feature, adding that the reduced gravity within some areas of the colony cylinders would allow you to dive into a swimming pool in slow motion. Space colonies, Brand concluded, were "readily possible—maybe inevitable—by 2000 AD."

CoEvolution Quarterly's coverage included a paper by Eric Drexler on the potential of mining asteroid belts. It contained the somewhat startling suggestion that the process might involve "sending out a work crew equipped with about one thousand 100 megaton hydrogen bombs." The bombs would be used to propel steel harvested from asteroids back to an orbit close to Earth, where it could be processed and then sold for billions of dollars profit. "If this proposal is to go it will need public and international acceptance of the detonation of hydrogen bombs in deep space," Drexler conceded. "This is, from physical grounds, an entirely safe thing to do because with the solar wind and the plasma environment of the solar

system, one expects to receive, essentially, no materials of a radioactive nature or any other nature from the debris."

A theme that surfaced repeatedly in Brand's thoughts about the colonies and often in comments from others was that they represented the opening of a new frontier. For Brand, outer space was "Free Space," an "Outlaw Area too big and dilute for national control." O'Neill, too, frequently employed the frontier motif. "The human race stands now on the threshold of a new frontier," he told the World Future Society, "whose richness surpasses a thousand fold that of the new western world of five hundred years ago." The book O'Neill subsequently published on his plan bore the title, *The High Frontier*.

The idea that space was a new frontier waiting to be exploited was precisely what disturbed those who found O'Neill's ideas appalling. America had traveled that route before, they thought, with less than salutary results. Tens of thousands of native peoples had been murdered or exiled while a great wilderness was despoiled. Why should we think humankind would behave any more responsibly in outer space? The lines had been drawn for a war of words that would erupt in the next edition of *CoEvolution Quarterly*.

"Something about O'Neill's dream has cut deep," Brand wrote in introducing the debate. "Nothing we've run in *The CQ* has brought so much response or opinions so fierce and unpredictable and at times ambivalent."

The reaction prompted Brand to solicit comments from his wide network of contacts and from his readership at large, and it was clear that he was surprised and to some extent chastened by the feedback he received. "It seems to be a paradigmatic question to ask if we should move massively into Space," his

introduction to the published collection of letters continued. "In addressing that we're addressing our most fundamental conflicting perceptions of ourself [sic], of the planetary civilization we've got under way…Is this the longed-for metamorphosis, our brilliant wings at last, or the most poisonous of panaceas?"

Brand said in his introduction to the "Debate" issue that overall the reactions he'd received strongly favored the idea (Eric Drexler wrote two of them). That would change. In any event, it was hard not to be struck by the less favorable responses, both because they were so at odds with Brand's optimism and because of the names attached to them.

"Such proposals are only technological disguises for infantile fantasies," wrote Lewis Mumford.

"A lot of people who want to get into space never got into the earth," Ken Kesey said. "It's James Bond. It's a turning away from the juiciness of stuff. That's something that's lost its appeal for me."

"Yes, Stewart, I'm all for it," wrote E. F. Schumacher, author of *Small Is Beautiful*. "I am prepared to nominate, free of charge, at least five hundred people for immediate emigration. For every one of these emigrants, once they are well and truly gone, I am prepared to donate $1,000.00 US dollars for the furtherance of the work that *really* needs to be done, namely, the development of technologies by which ordinary, decent, hardworking, modest, and all-too-often-abused people can improve their lot. With the above mentioned emigrants out of the way, it will be a great deal easier to obtain support for this work."

To be sure, there were positive responses, such as astronomer Carl Sagan's endorsement of the frontier idea. "The earth is almost fully explored and culturally homogenized," he said. "There are few places to which the discontent cutting edge of mankind can emigrate. There is no equivalent of the America of the 19th and 20th centuries. But space cities provide a kind of America in the skies, an opportunity for affinity groups to develop alternative cultural, social, political, economic and technological life-styles."

Futurist Buckminster Fuller, a particular hero of Brand's (the first issue of the *Whole Earth Catalog* credited Fuller as its inspiration) was enthusiastic. "To all who are living in cosmic realism," he wrote, "the immediate inauguration of additional Earth-Moon, around-the Sun flying formations of our team could not be more humanly normal. It is just as normal as a child coming out of its mother's womb, gradually learning to stand, then running around on its own legs."

The writer who emerged as the staunchest and angriest opponent of the space colonies idea was a longtime friend of Stewart Brand and a longtime contributor to the *Whole Earth Catalog* as well as *CoEvolution Quarterly*: the novelist, poet, farmer, and activist Wendell Berry. His responses—and there would be several as the controversy unfolded—seemed to burn with a sort of holy outrage, fueled not only by the implications of O'Neill's proposals but also by a sense of betrayal that Brand would so uncritically endorse them.

"Mr. Gerard O'Neill's space colony project is offered in the Fall 1975 *CoEvolution Quarterly* as the solution to virtually all the problems rising from the limitations of our earthly environment," Berry began.

> That it will solve all of these problems is a possibility that, even after reading the twenty-six pages devoted to it, one may legitimately doubt. What cannot be doubted is that the project is an ideal solution to the moral dilemma of all those in this society who cannot face the necessities of meaningful change. It is superbly attuned to the wishes of the corporation executives, bureaucrats, militarists, political operators, and scientific experts who are the chief beneficiaries of the forces that have produced our crisis.
>
> For what is remarkable about Mr. O'Neill's project is not its novelty or its adventurousness, but its conventionality. If it should be implemented, it will be the rebirth of the idea of Progress with all its old lust for unrestrained expansion, its totalitarian concentrations of energy and wealth, its obliviousness to the concerns of character and community, its exclusive reliance on technical and economic criteria, its disinterest in consequence, its contempt for human value, its compulsive salesmanship.

Berry was especially incensed by the idea that space was a new frontier. O'Neill and his supporters, he said, were only the latest in a long line of exploiters, from buffalo hunters to strip miners, who endorsed the myth that the ruin of one place can be corrected by hastening the ruin of another. O'Neill wanted to become an inheritor of the frontier mentality, Berry said, without inheriting the tragedy of that mentality.

For Berry the question that needed to be addressed more than any other was the question of restraint. "Mr. O'Neill," he said, "has apparently never thought to ask what good might be accomplished by the proliferation in space of a mentality that

cannot forbear to do anything at all that is possible." Berry noted in that regard Eric Drexler's proposal that a work crew be sent off to deep space bearing a thousand 100-megaton hydrogen bombs. The thought of it, he said, was nothing short of "monstrous."

As I say, Brand was clearly stung by the negative responses the space colony issue received. He wrote a two-page editorial that tried to answer some of the major criticisms while maintaining his faith in the idea. Even if they fail, building the colonies will be important, he said, because then we will know, once and for all, that Earth is all we have. (He didn't say what would keep us from trying other space settlement alternatives at some point in the future.) He insisted that space really *is* a new frontier because it really *is* unlimited, and as far as we know we won't be shoving any indigenous peoples aside when we go there.

Brand also quietly modified some of his earlier statements. Whereas he'd proclaimed in his introduction to the original space colony issue of *CoEvolution Quarterly* that "Space colonies show promise for being able to solve, in order, the Energy Crisis, the Food Crisis, the Arms Race, and the Population Problem," by the time the *Space Colonies* book had been published, the sentence read that those were problems "the most dogmatic Space Colony proponents" claimed could be solved.

The defense that Brand seemed to find most appealing was that the space colonies idea was *exciting*. It would stimulate ideas, discussion, and *movement*, especially among young people. He mentioned how many people attended *Star Trek* conventions, and how many read science fiction. Now was the time to get people who aren't engineers into the act, he said, and that includes artists, novelists, poets, filmmakers, historians, and anthropologists—people "who can

speak to the full vision of what's going on." In today's terminology, Brand was essentially calling for a crowd-sourced bridge of the classic/romantic split.

Wendell Berry was having none of it. He wrote a second letter, longer and angrier than the first, more or less dismissing Brand's justifications as hopelessly naïve. The only reason he was writing the second letter, he said, was that he intended to disassociate himself from *CoEvolution Quarterly*, and that the gentlemanly thing to do was to explain his reasons for doing so.

That prompted a gracious reply from Brand, again defending his support of the project (though with noticeably less conviction), declaring his affection and admiration for Berry, and urging him to reconsider. The mail he was receiving had turned dramatically against the space colonies proposal, Brand said, so Berry shouldn't quit while he was ahead. "Besides," he added, "we've other fish to fry."

Berry's response was also gracious, but unbending. The stakes at issue were too important, he said, to shake hands and still be friends. He suggested he might reconsider if Brand would truly adopt the neutral editor's role he claimed he'd always intended to play in the debate, rather than serve as an advocate for O'Neill's "audacious scheme."

"I hope very much that you and I will have other fish to fry," Berry concluded. "But it's hard to have an appetite for fish when you've already got a bone stuck in your throat."

End of Excerpt

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