Arguments for the Creation of a Moon Archives

by Jim Burke

1. Introduction

Throughout history, apocalyptic visions have haunted humanity. Beyond the fear of death and what may be beyond death, lies the hidden fear of extinction. During the great pandemics of the middle ages, at some times and places civilization nearly collapsed. winston Churchill wrote of the time of the black plagues: "Vile practices flourished, and demonic visions glare at use from th broken annals." Destuction, not only of humans but of all their records and their hopes, is a recurring theme in the dark literature of the nuclear age.

Now it is becoming evident that even greater horrors may befall us. Just as we were beginning to breathe free with the ending of the cold war, scientists began to realize that life on Earth is threatened by the thousands of small bodies, asteroids and comets, whose orbits cross that of the Earth. Unequivocal geologic evidence, available now not only on Earth but also on the MOon and planets, shows that giant impacts are a common feature in the ongoing evolution of the solar system. And, in July 1994, we witnessed the titanic immolation of Comet Shoemaker-Levy 9 at Jupiter.

In parallel with the doomsday themes of pessimists, some authors have imagined the course of recovery after a civilization-destroying event. Here I examine the possibilities and offer a relatively modest recommendation. I believe humans should begin building a great archive of their knowledge and their wisdom on the Moon.

2. Probabilities

The geological and astronomical records say that on average Earth takes a city-destroying hit every 10,000 years, a country-smashing one every 100,000 years, and a devastating species-eliminator every few million years. (Lewis, 1994) These times are long in comparison with most human planning horizons, but one must remember that they are statistical: any of these events could happen tomorrow.

3. After the deluge

In the science-fiction classic, Erth Abides, George R. Stewart describes the lives of a few survivors after a plague that wiped out most of humanity. At the end of the book the aged protagonist, having become a tribal cheif, rests wearily in the warm sunlight against the south wall of Berkeley's great Bancroft Library, dreaming an old man's dreams about the million volumes inside, that now no one will ever read. And in his more modern, bitter and yet hopeful novel, The Postmand, David Brin explores the life and times of a thermonucler holocaust survivor who, accidentally wearing a mailman's uniform, is received with pitiful joy when he wanders into small, primitive surviving settlements in Oregon's Willamette Valley. The starving inhabitants take the postman's arrival to mean that life and culture exist east of the Cascades -- but the reality is that all the rest of the continent is dead. Unable to accept the truth, the people write letters, the postman begins delivering them up and down the valley, and gradually the information structure that we call civilization revives.

4. A salvage plan

Even the greatest of the impact events impritned in the geological record of Earth did not kill all living creatures. There could be a bigger impact, such as the one that excavated Mare Imbrium on the Moon 3.9 billion years ago, but such an event now appears very unlikely, because the gravity of the solar system's larger bodies has largely cleaned out the spaces between the planets. Much more probably are events such as the one that ended the reign of the dinosaurs and wiped out more than nintey per cent of Earth's species, 65 million years ago. These cataclysms are caused by small objects -- comets and asteroids -- coming into the inner solar system from the great spaces near Jupiter and beyond. Dynamical studies (Wetherill, 1989) show that these bodies have short lifetimes on a cosmic scale, beign removed by collision with a planet or else by ejection from the solar system. Since hundreds of thousands of them are now known, their population must be continually replaced by some mechanism, most likely the gravity of giant Jupiter. If a typical one of these objects hit Earth (most likely in an ocean because water covers such vast regions), life would be sorely threatened. Agriculture and civilization would almost surely collapse during the post-impact "winter" (Sagan, 1994), but some humans might surviv by returnign to a pre-industrial life style. Eventually Earth's climate might recvoer, as it did after the Dinosaur wipe-out, and humans might be able to rebuild. Suppose that, in their effort to do so,. they had access to information about how to make tools, how to enjoy symphonies? Would not the recovery be greatly aided? What I propose is to put the needed information out of harm's way -- on the Moon -- and to build deeply sheltered retreival systems (or at least instructions for making them) in many places on Earth. Then, like a proto-human striking sparks into tinder and carefully nurturing a tiny flame, our race could start an exponential process of recovery.

5. Techniques

Most informatics experts will agree that there is o insoluble technical probelm in bulding an enormous archive on the Moon. Storage media are efficient, robust, and cheap. Transmission is almost trivial: Especially if one proceeds slowly and uses bandwidth efficiently, a modest radio link, operating continuously year afte year, could transfer to the lunar archive the contents of every library on Eart. Perhaps the ost daunting technical problem is the conversion of knowledge and wisdom from paper to radio-transmittable form. And, of course, the method and principles of storage must be thought out so as to aid recovery of the informatin back to Earth under any of several conceivable post-impact scenarios.

No one need go to the Moon to set up the archive there: Robotic spacecraft no more complex (but perhaps much larger) than those sent to the Moon in the sixties can surelydo the job. Once landed the lunar library must, of course, be protected from degradation due to long-term exposure to the lunar environment, and here "long-term" probably means at least centuries. Why? Well, we are today benefiting from the works of Bach and Shakespeare, and our distant descendants are entitled to the same consideration from us. Since no one can tel when the disaster will occur, the archive should be built and augmented and refreshed continuously -- but its core, the tool kit for first rebuilding actions, should be stable, the best-protected and the easiest part to retrieve.

6. Non-technical considerations

Who decides what to send? Who will object if religions are represented in the collection? What sort of civilization do we want the survivors to create? How much smut and pornography, how many recipies for crime, how much tasteless trash, how much advertising copy, how much television soap opera, should go? Surely there will arise two main schools of thought, one saying let the archive mirror humanity and the other comprising thought police. Accepted international space law contains requirement son the registration fo launchings, liability in case of spaceborne damages, and contamination and pollution of outer space, but it is silent on the subjects of propaganda and prurience -- issues sure to arise once the concept of a lunar archive is implemented. What a fascinating future awaits the humanities scholars who will be pressed into service along with the spaceflight engineers and informatics experts, in guilding the public debate about how to preserve what we most reasure and what is most at risk. Even if the archive is not completed before the comet hits, this

great debate initself may serve to re-energize thinking about wh we are, in our many cultures, what we have in common, and what some of us have created that may be of most value (or harm!) to us all. The cost of the initial steps is minor, and because much thought will be needed before action, the technology will not be a priority problem at first. But I hope there will come a time, when public knowledg,e enterprise and yes, fear, will result in a mobilization to place our history's treasures in safety on the Moon.

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