



Creating the Nation's first BioPark

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Letter from the Desk of David Challinor
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At a small, lively dinner in Washington recently, the guests discussed the importance of basic research and lamented its political unpopularity. Having spent the major part of my professional career promoting basic research and defending the Smithsonian's budget for this purpose before Congress, I relished and warmed to the topic. One guest, who had been directly involved in building the super conducting super collider in Texas, posed the question of how best to "sell" such projects politically and how to organize and administrate the seemingly random process by which such large projects come to fruition. There are no clear answers.

The discussion, however, led me to think about the Smithsonian's role in basic research and how to justify in these times of fiscal stringency what I consider a moral, but not a legal, obligation for our nation and its institutions to conduct basic research.

First, I will define my terms, although the line between basic and applied research cannot be clearly drawn; both are essential and can be justified independently. The illustration I use to describe what the Smithsonian does is that SI scientists try to answer such basic questions as "Why is the grass green?" whereas applied research scientists at research labs in land grant colleges use the basic knowledge that is available about grass and apply it to such goals as how to make the grass grow faster or slower, taller or shorter, etc. This distinction is important because James Smithson left his fortune to the US for the "increase and diffusion of knowledge among men." His beneficiaries are not just the citizens of the US, where the trust is housed and administered by the SI Regents, but all humans throughout the world -- a legal obligation often ignored in today's political turmoil.

The United States' acceptance of Smithson's legacy imposes important constraints on some kinds of Smithsonian research. For example, engagement in classified research by our scientists would preclude the unrestricted dissemination of its results, thereby violating Smithson's mandate. This issue rarely arises, although the Office of Naval Research once altered the terms of a long-standing research contract with the SI by restricting the publication of its results. Despite negotiations, the Navy would not alter this condition and I instructed the Institution's contracting officer to cancel the contract.



Many of the sciences, particularly the physical disciplines, are expensive and require imaginative and innovative technology. For example, it took about a decade for the Smithsonian to develop the concept, agree on a site, and arrange a joint effort with the University of Arizona to bring first light through the multiple-mirror telescope (MMT) on Mt. Hopkins. In the 1970's Congress appropriated about \$1 million a year to develop the site and build the instrument. Once completed, the \$1 million/year appropriation was used for operating expenses. The question then, as today, is how can the Smithsonian or the astronomers, in good conscience, use public funds "just to gaze at stars?"

Similar questions were asked about the super conducting super collider and the human genome project, both of which were estimated to cost billions of dollars. The former project probably succumbed, not for lack of scientific justification or even because of expense (it would have cost the same as two large nuclear submarines, or \$120 billion), but rather for political reasons. California wanted the super conducting super collider built there, but Bush chose Texas -- a wrong political decision. It was, unfortunately, the wrong project at the wrong time in the wrong place and the world lost the chance to achieve what might have been the final step in our understanding of the nature of matter.

My belief is that the United States has a strong obligation, albeit not a legal one, to carry out just this kind of expensive basic research into the nature of matter, the extent of the universe, and the nature of human and animal genetic inheritance. Perhaps only a handful of countries, five or six, in the world can afford to invest in such large-scale, expensive research (e.g. US, Germany, France, UK, Italy, Japan, Russia). The obligation to involve scientists from smaller or less prosperous countries has heretofore been fulfilled primarily through agreements to support local scientists -- for example, astronomers at observatories built at ideal observing sites in countries that normally could not afford to do so. Harvard will be building a telescope in Chile and Chilean astronomers will be heavily involved. Both US and Russian space vehicles have carried scientists from other countries.

No nation has a monopoly on intelligence and encouraging external participation can only benefit the US as well as the whole world. Such an approach may be idealistic, but space exploration and astronomy are the two disciplines most concerned with the finiteness of our planet and, indeed, the universe. That our planet is fragile may be the most important message to spread to humans to inspire them to care for it. There is no place else for us to go as building huge space stations for permanent human habitat seems to be beyond our present capacity. Love and care for our planet or lose it as a human habitat seems to be the message.

To close this letter, I would like to travel back from the edge of the universe and from inside the nature of matter and share with you what we learned about the death of Kumari, the Zoo's 16-month-old Asian elephant. On Saturday (4/22) the keepers reported she was lethargic and off her feed. Although she was still nursing, she stopped eating fruit and stopped browsing. She seemed to be suffering from a gastrointestinal problem and went on constant veterinary care. By Monday (4/24) she looked to be recovering, but ate only bananas and water and nursed. On Tuesday, the lethargy worsened and she ate very little and only nursed. Blood was drawn and a complete physical exam was conducted. Gatorade was administered to maintain electrolytic balance. Wednesday (4/26) she seemed brighter and more active, but still would not eat solid food. The dam, Shanthi, would not let her lie down, constantly forcing her to stand. However, about one p.m. Shanthi, evidently sensing that the calf was dying, left Kumari, something she had never done since Kumari's birth, and just before 2 p.m. Kumari crashed in the outdoor yard. CPR was administered for about 20 minutes, but it was evident that she was dead even before this procedure began.

The Zoo's veterinary pathologists, under Dr. Montali, performed a prompt necropsy (veterinary term for autopsy) and found, in the cells lining the blood vessels, evidence of viral infection that had caused numerous small hemorrhages. The viral invasion was later confirmed from electron microscopy photos of tissue samples. We do not know yet what kind of virus felled Kumari, but it seems to be related to the herpes complex. Efforts are still underway to culture the virus in hopes of tracking down what might have been the source of the infection. It will be weeks if not months before this study is completed.

Meanwhile the Elephant House keepers are slowly adjusting to the trauma of Kumari's death and plans are underway now to breed Shanthi artificially. Artificial insemination has never led to a successful elephant pregnancy, but it has only been tried on females that have never had a calf. Shanthi has, of course, had one calf. The Zoo has stored a cache of frozen male cells, and the world's expert on using sonograms to determine the precise timing for artificial insemination will be visiting soon from Germany. We are thus very optimistic that we may have a successful pregnancy.

The comparison of the death of a young elephant and the demise of the super conducting super collider in Texas may seem forced, but both cases illustrate in their own way the perpetual search by humans to understand the world around them. Just as the chemical characteristics of separate strains of viruses are extraordinarily difficult to isolate, so too are the atomic particles necessary to form matter. In both cases scientists

need large, expensive machines and laboratories to explore phenomenon about which we humans were totally ignorant only a few decades ago. The search for new knowledge will continue as long as humans exist. It is part of our nature, and part of what makes us human. We are physically grounded on our planet, but our minds can soar to the edges of the universe, or conversely, to the heart of matter. Whether we can ever arrive at either one of these limits is questionable and perhaps unlikely, but our search continues.

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