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T R I B U T E

How M. S. Swaminathan Improved International Science at the U. S. National Academy of Sciences

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Monkombu Sambasivan Swaminathan was a leader with immense vision and abilities. I first met him in 1997, when he and I were recruited by the World Bank to serve as the co-chairs of the Science and Strategy half of a major review of the famous Consultative Group on International Agriculture Research (GCIAR), composed of 16 public sector laboratories spread around the world. During the next year, I spent the equivalent of about six weeks of full-time effort working with Dr. Swaminathan on our part of the report, including the nine 14-hour days that we spent together in London in September 1998 for an intensive joint writing session with our two secretaries to complete it, as a critical October deadline loomed (Alberts 2005).

As a great agricultural scientist and a former director of the International Rice Research Institute (IRRI), the CGIAR rice research laboratory in the Philippines, M.S. had an encyclopedic knowledge of both the history and the operations of the very complicated research system that we were reviewing. In stark contrast, I had spent 30 years as a research scientist at U. S. universities as a biochemist, struggling to unravel how protein machines copy the genetic information stored in the DNA double helix. When we began, I knew almost nothing about agriculture and had only superficially heard of the CGIAR.

The time spent on this report, skillfully led by Maurice Strong, included committee meetings held at different CGIAR labs around the globe. That alone provided a great education. But most critical for me was the opportunity to absorb M.S.'s deep understanding and feelings for the billions of impoverished people throughout the developing world on whom the CGIAR – with its central aim of poverty alleviation through agricultural improvement – focuses. His many personal experiences, in

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India and elsewhere, had led him to develop a unique and powerful vision for how the benefits of science can best be delivered to the world's poor.

Our final report, "The International Research Partnership for Food Security and Sustainable Agriculture: Third System Review of the Consultative Group on International Agricultural Research (CGIAR)" was published in pre-print form on October 8, 1998, just in time for the scheduled huge meeting of all of the labs and donors at the World Bank. As the first such review in 17 years, ours was a bold effort that, in more than hundred pages, proposed major changes in the CGIAR system in its 29 detailed recommendations (CGIAR 1998). The recommendations included changing the CGIAR mission statement to emphasise natural resource management in addition to food security, as well as propose new mechanisms designed to maximise the quality of both the science and the outreach that are provided by this critical international system. Although the report was taken very seriously, it would take many years for its effects to take hold; in 2002, the CGIAR system would publish a special report to describe how each of its recommendations were being implemented (CGIAR 2002).

In retrospect, this was a truly worthwhile effort for me personally. Despite the enormous amount of time that I had to spend away from my real job, at the time being the president of the U. S. National Academy of Sciences, I developed a strong friendship with M. S. Swaminathan, who would continue to inspire me for many years to come.

In particular, M. S. soon invited me to "inaugurate" some of his "information villages" in southern India. My first visit to the M. S. Swaminathan Research Foundation (MSSRF) in January 1999 proved to be enormously stimulating. Under M. S.'s guidance, my wife Betty and I were taken on a whirlwind tour to inaugurate several of the experimental information villages that MSSRF had established in rural Pondicherry (now Puducherry), a two-hour drive south along the coast from MSSRF in Chennai. There we visited the small groups of women volunteers in each village who had been recruited by their fellow village residents to run local internet kiosks.

Unlike the projects of far too many NGOs and government aid agencies, this was clearly an effort that had been carefully designed with deep respect for the intelligence and values of its clients. The scientists who ran this project were humble and realistic enough to admit that they had to learn by doing, with the village residents themselves shaping the project. Thus, before providing a computer and internet connection for a village, its inhabitants were tested to ensure that the project would meet important needs. In the end, women from the village would manage the computers to provide daily weather and market prices, as well as agricultural and health information, to all village inhabitants, regardless of status or caste.

M. S. also showed us other knowledge-intensive innovations that had been introduced into these villages, such as the production of mushrooms or biopesticides (parasitic wasp eggs) by small cooperative groups (mostly women) for nearby markets. In subsequent years, my wife and I would return to the same villages, so as to follow the progress being made as time passed. In January 2004, we were startled to discover what was for us a completely new phenomenon: the involvement of the commercial banking sector in India in financing small science and technology-based enterprises through cooperative loans to “self-help” groups of ten to twenty persons. In these villages of a few thousand people, in which half of the population lives below India’s official poverty line, the bankers were making money through collateral-free loans that were insured only through the pride and social cohesion of the borrowers.

The experiences that M. S. exposed me to in India were so impressive that they formed the basis for several annual talks I presented to the members of the National Academy of Sciences. A few months after my initial visit, my annual talk included photographs from my visit to India. After describing what I had seen, I emphasised that “most of the system operators and volunteers in the project in India are women. For this reason, this Information Village programme also increases the status and influence of women by making them the primary local knowledge providers. The program has been set up as a scientific experiment with computer system location, association with a preformed community group, and so on, being used as input variables. I am enormously impressed with the quality of thought that has gone into this project, as well as by the energy, dedication, and skill of the young Indian scientists who are carrying it out.” (Alberts 1999)

My next-to-final annual report in 2004, entitled “*A World that Banks on Science*”, was based nearly completely on what I had learned from Swaminathan (Alberts 2004). As the title implies, I had become intrigued by the enormous possibilities for knowledge-based, private “science-based franchises” that spread by local free-market forces. Here, technological improvements spread rapidly because they are catalysed by synergistic profit motives: that is, by the combined desire of people in poverty for more income and of local bankers for more profit-making loans to cooperative groups of enterprising poor people. And I concluded that: “Most of the world resembles India, but India has the advantage of having a strong scientific and technical capacity despite its extensive poverty. It is also a very large and diverse nation that provides a fertile test bed for new ideas. If our Academy wants to make a strong contribution to sustainable development through science and technology, it is in nations like India that we should search for models, not in nations like ours.”

A later visit to Chennai amazed me with the dramatic ways in which the “information village” movement had expanded. Dr. Uma Lele, who had just completed a major independent evaluation of the MSSRF, told me there that, in all her years of carrying out assessments for the World Bank, she had never seen an institution as effective

as the MSSRF – doing so much with so few resources. The M. S. Swaminathan Research Foundation was directly overseeing nearly 200 information villages in different parts of India, and it was tightly networked with thousands more. Much of this work was admirably summarised in the well-illustrated 2009 book “Reaching the Unreached,” which is freely available on-line (Nanda 2009). Its most crucial chapter is called “Setting up Village Knowledge Centres for ICT-enabled Development,” and it starts as follows: “From the point of view of development, it is not technology which will be the critical factor. It is available and affordable. What will be crucial is empowering the rural poor and the marginalised with knowledge, skills, and livelihood opportunities – or, in other words, bringing about a transformation in their economic and social status.”

A closely related innovation by M. S., the National Virtual Academy for Rural Prosperity (MSSRF 2023), had an initial enormously ambitious aim of honouring two rural village leaders (a woman and a man) from each of India’s 600,000 villages. Its mission statement, produced by M. S., is to “To promote sustainable rural livelihoods through digital empowerment based on a pro-poor and pro-women orientation to technology choice and dissemination, and human resource development.” The impressive ceremony that I attended in December 2009 inaugurated 280 new members. At the event, M. S. clearly enjoyed meeting the farmers directly, and the farmers appreciated the fact that their views were being sought and respected by leading academics.

I have focused here on M. S.’s achievements in using science for poverty alleviation, rather than on his incredible earlier work in India and elsewhere in agriculture (the Foundation was founded in 1989 with money from several prizes that recognized these achievements, including the World Food Prize). As the *New York Times* noted in Swaminathan’s obituary, “Dr. Borlaug earned the 1970 Nobel Peace Prize for developing the seeds that staved off mass starvation and fed the world. On receiving the prize, he commended his Indian collaborator: “To you, Dr. Swaminathan, a great deal of the credit must go for first recognising the potential value of the Mexican dwarfs. Had this not occurred, it is quite possible that there would not have been a green revolution in Asia.” (Schneider 2023)

In 1990, M. S. introduced the term “evergreen revolution” as a synonym for sustainable agriculture. As he later explained, “there has to be a paradigm shift in research strategies from a commodity-centred approach to an integrated natural resources management procedure covering the entire cropping system,” ending his detailed 2006 overview entitled *An Evergreen Revolution* by stating that “There is an urgent need for an international research network that can facilitate knowledge and technology sharing in the area of improving farming systems productivity on an environmentally sustainable basis. Such a network, which may comprise partners in the major farming systems and agroecological regions of the world, could undertake studies on the following topics: (i) integrated gene management; (ii) higher factor

productivity, with particular reference to water and nutrients; (iii) precision farming and development of the biological software essential for sustainable agriculture; (iv) bio-organic agriculture combining relevant features of organic farming and biotechnology; (v) biomass utilisation for adding economic value to every part of the biomass; and (vi) knowledge connectivity through internet-aided rural knowledge centres.” (Swaminathan 2006)

M. S. Swaminathan always pushed the envelope of what is possible with relentless energy, and the Foundation first set and then achieved goals that seemed unachievable to most others. As his legacy, the Foundation – being deeply embedded in harnessing science to improve the lives of the rural poor – must continue to enable generations of others to follow in his footsteps with imaginative leadership for sustainable development.

In summary, it has been a wonderful privilege for me to have had this opportunity to recognise a few of the tremendous contributions M. S. Swaminathan has made to both his nation and the world. Through his wisdom and example, M. S. made people around the world aware of the enormous good that can be provided to the world’s poor through both science and the work of scientists. He thereby helped us realise that the potential span of science is much greater than we had imagined, giving scientists the opportunity to be an even greater force for progress in the world.

Acknowledgments: I have previously written about my interactions with Dr. Swaminathan (Alberts 2005), and parts of this article incorporate some of that earlier text.

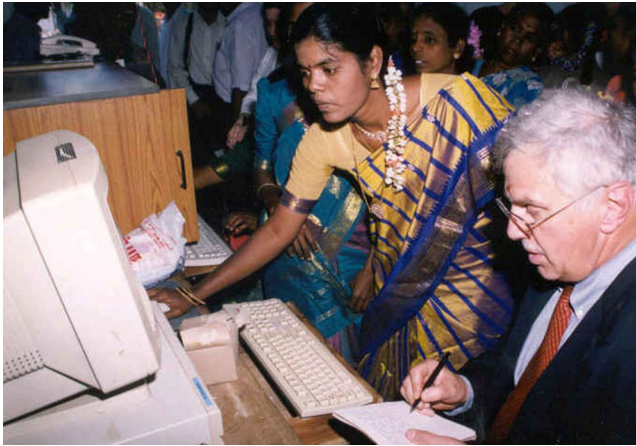
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Bruce Alberts visiting an information village in rural Puducherry.