This is a preprint draft of an article that appeared in *Isis* 98.3 (2007): 571-83.

On the Appropriate Use of Rose-Colored Glasses: Reflections on Science in Socialist China

Sigrid Schmalzer

In 1966, on the cusp of the Cultural Revolution, China Youth Press published a collection of reports on youth involvement in "scientific agriculture." One of the young people featured was Chen Enwang, who in 1955 had returned to his rural southern village from the city where he attended high school. This educated youth "had a fierce desire, a zeal that surprised people, to uncover weather patterns in order to serve the masses and production." He sought out old farmers and learned how they predicted the weather from the behavior of animals. Ants moving their houses, tortoises becoming active, frogs starting their chorus: these were all signs of rain. By carefully observing these phenomena and keeping a meticulous log, Chen Enwang turned this folk knowledge into a science and was able to set up a village weather post to supplement the forecasts from the regional weather station. "Forecasts climbed from 68% accurate... to about 90% accurate. In the majority of cases, disastrous weather conditions were forecast accurately and with sufficient advance notice... These numbers wonderfully portray the ocean of the masses' wisdom and the crystallization of Chen Enwang's labors."[1]

I wonder how *Isis* readers will react to this opening anecdote. Will you recognize an intriguing example of issues you have been pursuing in other historical contexts? Will you cringe at the sound of obvious political propaganda? Will you smile nostalgically at a charming but dated vision of science by and for the people?

My guess is that many *Isis* readers will experience all of these three responses to some degree. So much of science studies is about examining the social character of expertise and authority, exploring the relationship between theory and practice, and recognizing social and political aspects of knowledge production. The history of science in Mao-era China (1949-1976) is replete with specific cases that deal explicitly with the core questions of our field, questions we often struggle to make visible in Western, capitalist contexts.

At the same time, even unabashed leftists often know too much about what happened in Mao-era China to accept such stories at face value.[2] A red flag goes up (and not the good kind). What failures and travesties lie behind this politically perfect rhetoric? What about the criticism, punishment, and occasional killings of scientists during political movements; the requirement that geneticists study

Lysenkoism; the "backyard furnaces" that consumed the people's cooking pots in a feeble attempt to surpass Britain in steel production; the overly optimistic agricultural science that resulted in tens of millions dead from famine? Is it honest to entertain accounts of successful “mass science” when so many intellectuals have testified to the horrors and sheer futility of science driven by Maoist ideology?

And so we come to nostalgia – a sense that there was a time when we could believe in “science for the people,” but that we have grown beyond it. Indeed, Western accounts from the 1970s of socialist Chinese science were dominantly positive and often very enthusiastic.[3] Perhaps it was the politics of the Vietnam War era that created such enthusiasm for a socialist alternative and that encouraged such optimism that the alternative could be found in China. Whether or no, “learning from China” now seems a relic of the past.

While born into the wrong generation to experience this history as it unfolded, my own engagement with socialist Chinese science gravitates back to this earlier optimism. I first encountered socialist, feminist, and anti-racist critiques of science as an undergraduate at Wesleyan University in the early 1990s. In her recent discussion of Carolyn Merchant's engagement with the “utopian impulse,” Katharine Park reminded me that I read *The Death of Nature* (which tells us that our view of nature has a history and is thus not inevitable) in the same class as Marge Piercy's *Woman on the Edge of Time* (which creates for us a possible future based on our best hopes for different social and natural relationships).[4] Socialist China similarly appeared to offer evidence that there was more than one way to think about science in society. Training barefoot doctors to provide primary healthcare, combating syphilis by liberating women from prostitution, and overcoming the division between mental and manual labor appeared to me as provocative examples of themes emphasized in science studies.

Historical scholarship on the subject was scant at that time, but what there was did little to encourage my sense that science in socialist China deserved my enthusiastic interest. In a 1989 article, Laurence Schneider traced the “twisted path” of genetics in the People's Republic. He ended on an optimistic note with the Chinese press in 1986 asserting that “natural-science education and research can flourish and be productive only if free of government and Party interference.”[5] More recent contributions to the field have similarly taken a negative view of political and ideological “interference” with science in Mao-era China. Danian Hu's elegant study of Albert Einstein in China is the story of hopeful beginnings in the early twentieth century, followed in the Mao era by political attacks on Einstein and criticism of relativity on Marxist grounds, and finally the reemergence of Einstein as a “hero” in the post-Mao era.[6] In a poignant *Isis* article from 2000, Peter Neushul and Zuoyue Wang focused on the trials and triumphs of marine biologist C. K. Tseng. Tseng pioneered the

successful cultivation of kelp during the Great Leap Forward (1958-1960) despite the difficulties posed by the radical politics of that period, only to suffer terribly during the Cultural Revolution, when his research was brought to a halt.[7] All of these historians have contributed persuasive and well researched accounts of science gone wrong in the Mao era.

In the face of these sobering analyses, my continued interest in socialist Chinese approaches to science arises partly from political commitments: I still believe in the possibility and necessity of "science for the people," and I would like for my work to have some relevance for fellow activists working to realize this vision. But I would argue that knowledge of science in socialist China would be enormously beneficial even for scholars who oppose radical politics, who prefer to remain politically disengaged, or who keep their academic work at a discreet distance from their political activism. One important benefit is the opportunity to wrestle with a set of assumptions about "why science is useful and what it is useful for" (see Grace Shen's article in this section) that is radically different from the set to which we are accustomed. The history of science in socialist China is thus not just a political challenge to science as practiced in the capitalist West. It is also an intellectual challenge to historians of science: it helps highlight the specificity and contingency of ideas about science that otherwise might appear universal.

Such benefits will only come with more attention to the history of science in socialist China. As valuable as recent contributions have been, we are still laying the groundwork and await constructive debate on the deeper issues.[8] In preparing the way for these discussions, we first need to make sense of the wildly different pictures of science in socialist China that exist in the body of writings we have at hand. The positive accounts I encountered in my early forays are not isolated examples. In addition to the mountains of sources produced in socialist China, we also have many reports from foreigners who traveled to China during the Mao and early post-Mao eras. These glowing assessments have left few traces in the post-Mao literature, which takes a far darker view of radical attempts to transform science. How to use each of these different kinds of sources profitably is the puzzle I will attempt to untangle here.

"Learning from China"

In the 1970s and early 1980s, Western academics and activists flocked to a newly open China.[9] They were eager to learn about – or even to learn *from* – China's experiences applying socialist principles to scientific practice. Early visitors included left-wing activists, United Nations officials, and mainstream liberal academics. Representing a range of political commitments, they produced a largely

positive body of reports that explored with interest China's unique approaches to scientific education, research, and application.

One of the earliest American groups to observe socialist Chinese science policies in action was Science for the People, formed in 1969 by scientists and engineers radicalized by the anti-war movement.[10] Marxist scientists like Richard Levins, Richard Lewontin, and Stephen Jay Gould worked alongside graduate students, nurses, and community activists in anti-hierarchical collectives across the United States. Soon after its formation, chapters in Boston and Stony Brook, N.Y. began organizing China study groups. Members found inspiration in the 1969 book *Away with All Pests* by Joshua Horn, a British physician who had worked in China in the 1950s and 1960s. Horn painted a vivid and compelling portrait of mass mobilization campaigns to improve the health of the entire population – in other words, medicine by and for the people.

In 1973, Science for the People obtained an invitation to spend a month in China visiting communes, factories, scientific institutes, and schools. When the delegation returned to the United States, the members worked collectively to write a book detailing their findings. The result was *China: Science Walks on Two Legs*, a ringing endorsement of science as practiced in the Cultural Revolution. As they wrote in the introduction, "We saw China as the Chinese presented it and readily admit that we believed what we saw and heard."[11] Together with *Away with All Pests* and another volume on medicine by sympathetic Western observers (Sidel and Sidel's 1973 *Serve the People*), *Science Walks on Two Legs* inspired many who were disillusioned with science in the capitalist West and today remains central to the perspective on socialist science promoted by far-left organizations like the Maoist Internationalist Movement.[12] The book's well chosen title (borrowed from a Maoist slogan) captured the overarching difference Science for the People found in socialist Chinese science: unlike the capitalist American emphasis on highly specialized scientific research conducted in laboratories inaccessible and unaccountable to the larger public, in China science balanced professional research with concerted efforts to "make science a part of the mass culture."[13] Sending scientists into the fields and factories encouraged the integration of theory and practice and permitted them to learn from farmers and factory workers, who possessed the most intimate knowledge of applied science. Mobilizing neighborhoods for health education engaged the large numbers of people whose talents went untapped by the overly professionalized healthcare system that prevailed in the United States.

The delegation was even able to meet with prominent scientists who reinforced their impression of the widespread support such policies enjoyed. For example, the famous geneticist Tan Jiazhen (C. C. Tan) told them that his research "had never been as exciting as it is now." Being sent to the countryside

for manual labor gave him the opportunity to learn from the peasants, who were “ahead of the theoreticians” in their bold efforts to develop new plant varieties that addressed practical needs in agriculture.[14] The entomologist Pu Zhilong likewise spoke at length with the delegation about the productive relationships he and other scientists had forged with peasants in developing more effective means to prevent pest damage to crops.[15]

With its explicit leftist political goals, Science for the People was certainly a special case, but it was not alone in its enthusiasm for what the United States could learn from Chinese approaches to science. University of California entomologist Robert van den Bosch's influential 1978 book *The Pesticide Conspiracy* documented the excitement with which members of the Entomological Society of America delivered reports from their 1975 trip to China, where they found lower uses of chemical pesticides and more emphasis on careful monitoring of pest populations and judicious application of biological and cultural methods of control. Van den Bosch took pains to note of his fellow entomologists: “I know most of the panelists, some intimately, and would characterize them largely as politically moderate Middle Americans. In other words, they had no ax to grind on behalf of China and its Marxist political ideology but reported things as they witnessed and recorded them.”[16] These were mainstream American scientists whose research led them to be concerned about the environmental effects of excessive pesticide use and eager to find examples of better practices.

Other individuals and organizations sought to use “the Chinese model” not to transform U.S. science, but rather to offer strategies for developing countries around the world. In 1975, the Food and Agriculture Organization of the United Nations sent a study mission to China; the findings were written up two years later in *Learning from China: A Report on Agriculture and the Chinese People's Communes*. Reminiscent of the attitude taken by Science for the People, the mission leader, plant geneticist Dioscoro Umali, wrote a “preview” for the volume entitled “Leaving Our Mental Luggage Behind,” in which he explained that they “did not go to advise but to learn” and that they sought to “grasp the meaning of the egalitarian and anti-elitist society that the Chinese are trying to build.” Having witnessed the Chinese emphasis on “learning from the masses” and the success with which gender and class barriers had been overcome, he came away from China with a new sense of optimism that “[g]iven a vision, hard work, and self-reliance, mankind can still climb out of the cesspool of poverty.”[17] Political scientists and other academics internationally shared this interest in learning from “the Chinese model,” although they typically refrained from echoing so boldly the political rhetoric that went with it.[18]

Even mainstream academic and scientific journals frequently published very positive accounts

of science as practiced in socialist China. *China Quarterly* featured a special section in each issue specifically for reports of recent visits to China. A political scientist, Ward Morehouse visited a Chinese commune in 1973 and described the process of research and development there. Maintaining a matter-of-fact approach, his over-all evaluation was measured but nonetheless very favorable; he noted, for example, the commune's ability "to translate rapidly into actual production the findings of agricultural research."[19] In another *China Quarterly* article, a prominent Chinese-American physicist, Chih Kung Jen, was unreserved in his enthusiasm for the open-doors education movement, which sought to overturn intellectual elitism and promote better integration of research with agriculture and industry.[20] More critical, but still very respectful, was the report of Gordon Bennett, a China scholar who accompanied a delegation of geologists to investigate China's successful use of mass science to predict the Haicheng earthquake of 1975.[21]

The observations of these visitors were consistent with political scientist Richard Suttmeier's 1974 overview of socialist Chinese policy on science and technology, *Research and Revolution*. Without waxing enthusiastic, Suttmeier's account took seriously the specific, changing goals and priorities at work from 1949 through the early 1970s. He recognized that what he called the "socio-political approach" to science operative in the Cultural Revolution resulted in some waste of human and material resources, but noted also that the competing "economic approach" operative during less radical periods could stifle innovation. He concluded that the alternations between these approaches had resulted in "a unique, and somewhat attractive method of creating a national tradition of interest in science and an appreciation of the value of science and technical innovation for production."[22] Compared with the enthusiastic reports from Science for the People, Sutmmeier's evaluation appears quite moderate. But before long, even the modest "unique and somewhat attractive" would appear a quaint and insufficiently critical assessment of science policy in Mao-era China.

The Repudiation of Radicalism and "Springtime" for Science

In 1983, a reviewer of a new book by Sidel and Sidel on China's healthcare system noted pointedly, "By now, of course, those who know China tend to be a bit more skeptical of the 'official' versions."[23] Indeed, while positive accounts continued to accumulate, by the late 1970s there were already signs that the story was about to become more complicated. Even the politically committed members of Science for the People had trouble after a second trip in 1978 agreeing about the significance of what they had seen, and for this reason they never completed the second book they had planned to write. In part, this can be explained by their understandable confusion about the rapid

political changes in China after the death of Mao and the rise to power of the moderate Deng Xiaoping.[24] But it was also due to disagreements among the participants about how to interpret the conditions they had witnessed. One member of the 1978 delegation remembers both the appalling working environments in factories they visited and the highly suspect ways in which their guides blamed everything (even loud noises and particulates) on the “gang of four.” The experience of visiting China was becoming less novel at the same time that the official Chinese perspective on the Cultural Revolution was undergoing dramatic transformation. If visitors were somewhat less charged with optimism than they had been five years earlier, their Chinese guides were far less able to provide a clear and unambiguous picture of the good society.

The new official perspective on the Cultural Revolution provided the conditions necessary for the emergence of a genre known as “scar literature”; this narrative of victimization continued with a steady flow over the 1980s and 1990s of memoirs recounting the “ten years of chaos.”[25] Without casting any doubt on the very real trauma that the authors experienced, it is essential to note that such accounts also meshed with the new regime's repudiation of the radical approaches pursued during the Cultural Revolution. Scientists were perfect protagonists for such stories. Not only had they often experienced personal oppression during the Cultural Revolution, but political interference with their work was said to have caused a ten-year standstill in scientific progress. In contrast, Deng's new era was heralded in the press as “springtime for science.”

In a 1979 magazine article, "The Rocky Road to Science – A Husband and Wife Team," botanist Guan Yingqian discussed her experience since she and her husband returned to China in 1955 from the United States. They were initially given prestigious appointments and received relatively high wages, supplemented by a five-room apartment and a housekeeper to care for their child. "Thus we could give all our energy to scientific research.” But following the outbreak of the Cultural Revolution in 1966, "some people influenced by Lin Biao and the gang of four took control of our institute and accused us researchers who had studied abroad of having come back to China as spies.” For ten years, they suffered interrogation, beatings, public humiliation, imprisonment, and hard labor on a farm. In 1976 came "spring at last," and the couple went back to work. Better still, their old, roomy apartment was returned to them and "a new policy of finding work in the cities for children born abroad to overseas families" provided their son with a job in Shanghai. As Guan put it, “The policy of treating the overseas Chinese and their families with equality and consideration for their special needs is a Party policy that had been sabotaged by Lin Biao and the gang of four. It is now being implemented in earnest.”[26]

A similar story appeared in the magazine *Women of China* in 1980. Upon graduation from the

chemical engineering department of Jiaotong University in 1956, Wu Xijun became a technician in the central laboratory of the Nanjing Ammonia Factory. The director of the lab was impressed by her work and encouraged her to pursue research on the "basic theories" of chemistry because this knowledge would be necessary for the future growth of chemical engineering. But ten years later, her work was suddenly interrupted by the Cultural Revolution; research on “basic theories” had become equated with "bourgeois science." With the fall of the gang of four and the beginning of "springtime" for science, Wu was able once again to make significant contributions to her field.[27]

Both stories fit the standard post-1976 account of the Cultural Revolution as a ten-year gap for scientific research. Post-Mao American treatments of Mao-era science share this perspective, though they are sometimes less positive about the 1950s, which in the Chinese literature typically represent important progress for Chinese science. A 1988 conference volume published in the United States, *Science and Medicine in Twentieth-Century China*, presented eight chapters on the post-1949 period, all authored by specialists in the respective fields (agriculture, genetics, health, etc.) rather than by researchers in Chinese studies or science studies. For example, agricultural scientist Robert L. Metcalf wrote, “The Cultural Revolution severely disrupted the basic and applied research endeavor... Many scientists were forced to leave their laboratories and spend large blocks of time 'learning from the people.' The evil effects of this period, not only on scientific progress in general but on individual scientific careers, are well known and can readily be imagined.”[28] In the same volume, geneticist James F. Crow painted a portrait of Tan Jiazhen dramatically different from the one *Science Walks on Two Legs* supplied. In 1973, Tan told members of Science for the People that he had benefited from the time he spent in the countryside. In contrast, Crow noted that Tan published many articles before the revolution, but published none afterward with the exception of four during the early 1960s period of political moderation. Based on his personal communications with Tan, he further offered insight into Tan's own post-Mao reflections on Mao-era science, which suggested a standstill during the Cultural Revolution followed by the beginnings of new growth after 1976.[29] Crow's narrative agrees with a Chinese biography of Tan, which recounts that upon discovering that he would soon be freed from agricultural labor, Tan “knelt down next to the field," facing east toward his home in Shanghai, "with tears running down his face.”[30]

This is not just the current “dominant narrative” on science in Mao-era China; it comes close to being the only narrative. It certainly offers a needed corrective to earlier portrayals, which failed to show the suffering of scientists and the stifling effects of ideology on their work. Nevertheless, there are compelling reasons why we should not abandon entirely the earlier, positive accounts and follow

too closely the post-Mao narrative. The challenge is to find appropriate uses for each set of sources.

Walking on Two Legs

Positive accounts of science as practiced in the Cultural Revolution come from a wide variety of sources. To begin with, we have materials produced in China that present official perspectives on what was happening and why. Policy documents, newspaper and magazine articles, books published by state-run presses, and colorful posters (Figure 1) offer exciting pictures of science undergoing revolutionary transformation. These are all clearly propaganda in the sense that they are subject to the prohibitions and prescriptions of censorship and tell us only about the way state agents wanted to portray things and perhaps not how things really were.

The other significant body of positive accounts comes from the eye-witness reports of foreign visitors. What these visitors saw was less polished than the propaganda pictures, but the basic outlines were nonetheless largely the same. A great many visitors – from mainstream scientists to radical activists – took these pictures seriously and came home eager to share them with their colleagues, friends, and the public at large. Why were they apparently so uncritical?

We know that visitors were shown models, not representatives. Many of the visitors themselves were equally aware of this. While some may have come back with the impression that they had seen China as it really was, more common (and in the end more important to their stories) was a sense that they had seen what China was in the process of attempting to become. That is, what interested or even inspired them was the *goals* -- the strikingly different *approaches* to science, technology, and medicine -- rather than a belief that all these goals had actually been accomplished. It is thus not necessary for us as historians to believe in the literal truth of the state-produced propaganda or the visitor-produced reports in order to engage these sources in our work. Their significance as evidence is the insight they provide into how state agents wanted to transform science, how they wanted to portray this transformation to people in China and abroad, and why foreigners of different political and professional backgrounds found these goals impressive.

Pursuing goals and rhetoric as important subjects of inquiry is part of the larger project of examining the history of science on the terms recognized by historical actors themselves.[31] And according to the terms dominant in socialist China, politics was inseparable from science, not “interference with science.” Using Marxist philosophy to guide inquiry, insisting that research serve practical needs, and engaging the masses in science were all central goals of science policy crafted by the socialist state, and a great many scientists participated in implementing those policies. While it is

possible that most scientists privately rejected these goals and supported them only out of fear or desperation (and I think the reality was more complicated), we cannot dismiss their earlier positive statements while accepting without question their later reflections, which have emerged in an equally "political" historical context. When asked directly about their experiences in the Cultural Revolution, Chinese scientists will often provide a narrative that fits perfectly with the prototypical accounts found in "scar literature." But when the subject is not so baldly defined, other memories come to the surface. Once when I was chatting informally with a paleontologist, she began talking about how much more knowledgeable Chinese scientists of her generation are about food, weather, farming, and physical labor compared with their American counterparts. This knowledge and the experiences from which it grew are clearly important to her, but they do not become part of the story when she responds to questions about "being sent to the countryside" or any of the other key phrases that in retrospect have been coded almost universally as "bad."

Chinese people in the post-Mao era have far more latitude in what they can say, and foreign visitors have far more access to written and oral sources, than was the case in earlier years. Nonetheless, post-Mao depictions of science are just as much a product of their time as the poster in Figure 1 is a product of the Cultural Revolution. Take, for example, the image in Figure 2, from a 1980s science magazine for children. In the brief period of political moderation following the Great Leap Forward, the notion that "science has no class character" dominated science policy. The Cultural Revolution reversed this position, arguing that it served to conceal the very real bourgeois character of science as practiced in elite institutions. In our eagerness to distance ourselves from the violent and destructive aspects of Cultural Revolution science, we have tended to dismiss such analysis as propaganda serving to oppress intellectuals. At the same time, many historians of science (not to mention our colleagues in other disciplines) are very much concerned to recognize the ways class identities and dynamics have structured scientific practice. Without a recognition of the class character of science, would we have Steven Shapin's *A Social History of Truth*? For my part, the old language of socialist China reminds me to think critically about the post-Mao transformation of scientific culture: "bourgeois science" seems an appropriate label for a 1980s fantasy in which parents use a computer to buy their son a "solar-powered motorcar" for his birthday.[32]

Historical evaluations of Mao-era science tend to assume the priorities with which we ourselves are familiar. Conveniently, some of these priorities (especially progress in scientific research and economic development) are now officially embraced in China as well.[33] In the China Deng Xiaoping helped create, it does not matter whether the cat is white or black so long as it catches rats. But during

the Cultural Revolution, it very much mattered that science proceed along revolutionary lines. Chen Enwang's reported success in improving the accuracy of weather forecasts for one village was worthy of notice because of the means through which he accomplished it. He tapped the wisdom of the old peasants and invested his own youthful energy to make science serve the people. I do not mean to say that historians should never evaluate the success of Mao-era science according to the terms more generally accepted today. But the question of whether specific historical contexts supported progress in scientific research is only one aspect of the history of science. If we imagine ourselves as historians one hundred years from now looking back at the late twentieth and early twenty-first centuries, it becomes immediately clear that the terms on which science is judged in our historical context are embedded in a value system that privileges economic and professional development over revolutionary politics.

An awareness of these values is necessary for a critical understanding of why Cultural Revolution science appears to us as a "gap." In a post-Mao assessment of meteorology in China, an American professor of atmospheric sciences stated, "With the advent of the Cultural Revolution in 1966 and the subsequent discontinuance of research journals, meteorological activities in China disappeared from sight for eight years."[34] Out of sight? From the perspective of peasants, educated youth like Chen Enwang, and scientists working in the countryside, meteorological activities "of a mass nature" were very much in sight throughout the Cultural Revolution. This alternate perspective could be of great service to historians who want to convince people to see popular science in other times and places as a rewarding subject of inquiry. In socialist China, both the dissemination of scientific knowledge and the participation of laypeople in science were explicit state priorities.[35] What I described earlier as the intellectual challenge for historians posed by science based on different priorities now becomes a useful tool for historians of popular science seeking to challenge their readers to reconsider what constitutes a legitimate history of science.

For all these reasons, we must resist the temptation simply to replace the earlier, rosy account of science in socialist China with the later, negative one. But we should also resist the temptation to settle on a facile conclusion that "the truth lies somewhere in the middle." We are not faced with two ends of a spectrum that blend into one another in the center. Rather, we are confronting very different *kinds* of sources that speak to different *kinds* of truths. One kind speaks to political truths of the Mao era in China and the Vietnam War era in the U.S., when there was much optimism about socialism. The other kind speaks to political truths of the post-Mao era, when Chinese people and foreign China scholars alike became understandably disillusioned by the distortions of Mao's regime and the failures of socialism to live up to its many promises. Using these two sets of sources profitably is thus somewhat

like “walking on two legs.” By engaging both at once, we can think critically about the history in question while remembering to be equally critical of our own assumptions.

1 Zhongguo qingnian chuban she, ed., *Kexue zhongtian de nianqing ren* (Beijing: Zhongguo qingnian chubanshe, 1966), pp. 78-81.

2 There are exceptions. Some Maoist organizations continue to deny that the violence of the Mao era (or what they often term “excesses”) was anything but the result of counter-revolutionary forces.

3 There is no single, definitive end point for the “socialist era” in China, but by the mid-1980s the scales had tipped in the transition to a market economy and away from Maoist political priorities. China scholars have begun to refer to the period after this transition as “post-socialist China.”

4 Katharine Park, “Women, Gender, and Utopia: The Death of Nature and the Historiography of Early Modern Science,” *Isis*, 2006, *97*: 487-495.

5 Laurence Schneider, “Learning from Russia: Lysenkoism and the Fate of Genetics in China, 1950-1986,” in *Science and Technology in Post-Mao China*, ed. Denis Fred Simon and Merle Goldman (Cambridge, Mass.: The Council on East Asian Studies, Harvard University, 1989), pp. 45 and 65. In 2003 Schneider followed up with a most welcome book, *Biology and Revolution in Twentieth-Century China* (Lanham, Md: Rowman Littlefield, 2003).

6 Danian Hu, *China and Albert Einstein: The Reception of the Physicist and His Theory in China, 1917-1979* (Cambridge, Mass.: Harvard University Press, 2005).

7 Peter Neushul and Zuoyue Wang, “Between the Devil and the Deep Sea: C. K. Tseng, Mariculture, and the Politics of Science in Modern China,” *Isis*, 2000, *91*:59-88.

8 I have learned a tremendous amount already from Fa-ti Fan, Danian Hu, Grace Shen, and Zuoyue Wang, who began such debates with me after I circulated the first draft of this paper. A few of the most interesting questions raised were: What do we mean by “radical”? How genuine was mass participation? How should we approach the complicated issue of “class” in Mao-era China? How many scientists actively participated in promoting mass science?

9 I am grateful to Minna Barrett (Minna Goldfarb), Eric Entemann, Ward Morehouse, and Vinton Thompson for contributing oral histories of their 1970s observations of science in China.

10 The group's original name was Scientists and Engineers for Social and Political Action, but it quickly became known by the catchy title of its chief publication.

11 Science for the People, *China: Science Walks on Two Legs* (New York: Discus Books, 1974), p. 5.

12 See, for example, MIM's use of statistics on infant mortality rates in New York and Shanghai. Maoist Internationalist Movement, "A concrete argument over violence in China," http://www.etext.org/Politics/MIM/faq/violencept2.html (accessed 3 February 2007).

13 Science for the People, *China*, p. 11.

14 Science for the People, *China*, p. 10.

15 Science for the People, *China*, pp. 155-164.

16 Robert van den Bosch, *The Pesticide Conspiracy* (Berkeley, Calif.: University of California Press, 1989 [1978]), pp. 147-148.

17 Food and Agriculture Organization, *Learning from China: A Report on Agriculture and the Chinese People's Communes* (Rome: Food and Agriculture Organization, 1978), pp. vii-viii.

18 Bernhard Glaeser, ed., *Learning from China??* (London: Allen and Unwin, 1987). Susan B. Rifkin, “On 'Contradictions' among Academics (A Commentary on a Workshop),” *Science Studies*, 1972, *2.4*:395-399.

19 Ward Morehouse, “Notes on Hua-tung Commune,” *China Quarterly*, 1976, *67*:582-596.

20 C. K. Jen, “Science and the Open-Doors Education Movement,” *China Quarterly*, 1975, *64*:741-747.

21 Gordon Bennett, “Mass Campaigns and Earthquakes: Hai-Ch'eng, 1975,” *China Quarterly*, 1979, *77*:94-112.

22 Richard Sutttmeier, *Research and Revolution: Science Policy and Societal Change in China* (Lexington, Mass.: Lexington Books, 1974), p. 143.

23 Peter King-ming New, Review of *The Health of China: Current Conflicts in Medical and Human Services for One Billion People*, by Ruth Sidel and Victor W. Sidel, *Medical Anthropology Quarterly*, 1983, *14.4* :30.

24 Ted Goldfarb and Judy Weinstein, “Since the Cultural Revolution: Science Policy Changes in China,” *Science for the People*, 1981, *13.2*:11-15. The second delegation was in China during the summer of 1978. The previous March, Deng had given a landmark speech at the National Conference on Science and Technology that made clear the enormous changes he planned for science policy.

25 Western readers may be familiar with such famous English-language memoirs as *Son of the Revolution* and *Wild Swans*. Liang Heng an d Judith Shapiro, *Son of the Revolution* (New York: Knopf, 1983); Jung Chang, *Wild Swans* (New York: Simon and Schuster, 1991).

26 Yingqian Guan, "The Rocky Road to Science," *China Reconstructs*, 1979, *28*:72-4.

27 Zhong Lu, "A Woman Chemical Engineer," *Women of China*, 1980, *7*:17-21.

28 Robert L. Metcalf, “Agriculture and Plant Protection in China to 1980,” in *Science and Medicine in Twentieth-Century China*, ed. John Z. Bowers, J. William Hess, and Nathan Sivin (Ann Arbor, Mich.: University of Michigan Press, 1988), p. 198.

29 James F. Crow, “Genetics in Post-War China,” in *Science and Medicine in Twentieth-Century China*, pp. 155-169. A similar conference volume published in 1980 presented more mixed evaluations consistent with the greater uncertainty of foreign observers during the early transition from the Mao era to the post-Mao era. Leo Orleans, ed. *Science in Contemporary China* (Stanford, Calif.: Stanford University Press, 1980).

30 Zhao Gongmin, *Tan Jiazhen yu yichuanxue* [Tan Jiazhen and genetics] (Nanning: Guangxi kexue jishu chubanshe, 1996), 188. I thank Zuoyue Wang for supplying this reference.

31 Here I am recalling Benjamin Elman's *On Their Own Terms: Science in China, 1550-1900* (Cambridge, Mass.: Harvard University Press, 2005). By happy coincidence, I used a similar title for an article on science in the Cultural Revolution. Sigrid Schmalzer, “Labor Created Humanity: Cultural Revolution Science on Its Own Terms,” in *The Chinese Cultural Revolution as History*, ed. Joseph W. Esherick, Paul G. Pickowicz, and Andrew G. Walder (Stanford, Calif.: Stanford University Press, 2006), pp. 185-210.

32 Gao Zhizhong and Wu Shiliu, "Bu shi youxiang de youxiang gushi: weilai de jiating shenghuo," *Shaonian* kexue, 1981, *8*:61-65. On the post-Mao use of science fiction to "lobby" for special privileges for scientists, see Rudolf Wagner, "Lobby literature: the archeology and present functions of science fiction in China," in *After Mao: Chinese Literature and Society, 1978-81*, ed. Jeffrey Kinkley (Cambridge: Harvard, 1984), pp. 17-62.

33 I am not able here to address the very important priority of democracy; instead, I invite readers to consult Zuoyue Wang's contribution to this section.

34 Richard J. Reed, “Meteorology,” in *Science in Contemporary China*, p. 229.

35 The lack of historical scholarship on this subject is nowhere more strikingly apparent than in Clifford Conner's, *A People's History of Science: Miners, Midwives, and “Low Mechaniks”* (New York: Nation Books, 2005). Conner draws on numerous studies of working class contributions to science. Conner makes a valiant effort to include more than just Western examples, but his treatment of China is limited to Joseph Needham's very old arguments about imperial-era class biases against manual labor, which allegedly prevented the integration of theory and practice needed for the emergence of modern science in China. His analysis would have been greatly enriched and made considerably more provocative had he been able to discuss the explicit struggles in Mao-era China to achieve “mass science” through the dismantling of barriers between mental and manual labor. I have attempted to help bridge this gap in my book, forthcoming from University of Chicago Press, *The People's Peking Man: Popular Science and Human Identity in Twentieth-Century China*.