Fang Lizhi's Expanding Universe

James H. Williams

During an interview in September 1986, some three years prior to seeking political asylum with his wife at the U.S. Embassy in Beijing, Fang Lizhi was asked how he felt about the progress of political reform in China. Fang responded, "I must start with cosmology in answering this question."[1]

Fang's linkage of politics with cosmology – a branch of astrophysics concerned with the origins of the universe – must seem peculiar to those who know him only as a human rights advocate and critic of the Chinese Communist Party. Yet this was no idiosyncrasy on Fang's part. Fang's life and published work from the early 1970s to the present leave no doubt that his emergence as the symbolic leader of China's democracy movement is deeply rooted in his experiences and outlook as a scientist.

Fang's personal universe began to expand in 1972, when he and his colleagues at the University of Science and Technology of China (USTC) published a paper in *Physica* entitled "A Solution of the cosmological equations in scalar–tensor theory, with mass and blackbody radiation."[2] This innocuous-sounding article met with a furious response from leading theoretical circles of the Party. Fang *et al.* had broken a long-standing taboo by introducing the Big Bang theory to the Chinese physics world. Insofar as the Big Bang contradicted Engels's declaration that the universe must be infinite in space and time, Fang's paper was tantamount to heresy. From 1973 until Mao's death, the Shanghai Cultural Revolution Group under Yao Wenyuan pilloried Fang and his colleagues for promoting capitalist metaphysics and violating basic tenets of dialectical materialism.

Responding in 1975 to these attacks against his discipline, Fang made the first of his many defences of intellectual freedom. In the post-Mao era, Fang's growing prominence as a scientist and educator provided him a voice in public affairs, which he used to promote democratic reforms within his own professional domain and in society at large. Even after his expulsion from the Party and the USTC vice-presidency in the Anti-Bourgeois Liberalization campaign of 1987, Fang's probing of contradictions at the heart of the Dengist programme continued to force open the frontiers of permissible discourse, prick the conscience of reformists, and arouse the ire of hard-liners.

1. "Yiwei ziran kexuejia kan gaige: Fang Lizhi jiaoshou dawen lu" ("A natural scientist views the reforms: An interview with Professor Fang Lizhi"), *Shehui bao*, 28 October 1986, quoted in James H. Williams (ed. and trans.), "The expanding universe of Fang Lizhi: astrophysics and ideology in People's China," *Chinese Studies in Philosophy*, Vol. 19, No. 4 (1988), p. 75.

2. Fang Lizhi *et al.*, "Guanyu biaoliang–zhangliang lilun zhong han wuzhi ji heiti fushe de yuzhou jie" ("A solution of the cosmological equations in scalar–tensor theory, with mass and blackbody radiation"), *Wuli* (*Physica*), No. 1 (1972), p. 163.

Fang's path to the centre of China's political maelstrom is evident from his essays and lectures, of which about 50 have been published to date.[3] The common denominator in Fang's writing, which ranges in topic from education policy to observations on foreign culture, is science. Science is for Fang an independent basis from which to question the intellectual and political authority of the Party, and the source of a value system that compels him to "call attention to injustice and irrationality," and to advocate "science, reason, and democracy." Not incidentally, science is also the source of much of Fang's legitimacy and appeal; the importance attached to science in the Dengist reforms and in Chinese Marxism historically has provided a receptive audience for Fang's scientific idiom.

The present article sketches the evolution of Fang's ideas in the context of his writings and contemporary events. Besides his own remarkable emergence as an indigenous dissident, Fang's story provides a further glimpse into the lives of Chinese scientists, the growing independence of Chinese civil society, and the ongoing contradictions between the Party's desire to modernize and its pretensions to transcendant authority.

Fang's Early Life and Times

Fang Lizhi was born in 1936 in Beijing, where his father was a postal clerk. Though his family was of limited means, Fang's mother was able to call on well-placed friends to help arrange Fang's enrolment in good schools during the successive periods of Japanese, Nationalist, and Communist control. For his own part Fang was an exceptional student, entering the physics department of Beijing University at the age of 16, in 1952. Among his instructors at Beida were a number of eminent foreign-trained physicists, including Zhou Peiyuan, Zhu Hongyuan, and Huang Kun. Fang graduated with the highest distinction in 1956 and was assigned to the Institute for Modern Physics of the Chinese Academy of Sciences (CAS).[4]

Fang's career, like that of many other young intellectuals, met with drastic disruptions over the next two decades. During the Hundred Flowers campaign, Fang responded to Mao's invitation to criticize the Party by joining with other Beida students and alumni to draft a letter

3. The bulk of Fang's writing has been reprinted in two volumes from Singapore: *Zanmei wozhu zhi hou* (*After Praising the Lord*): *Selected Speeches and Writings by Fang Lizhi*, Vol. 1 (Singapore: World Scientific, 1988); *Weijigan xia de zeren* (*Responsibility Under Crisis*): *Selected Speeches and Writings by Fang Lizhi*, Vol. 2 (Singapore: World Scientific, 1989). Additional material appears in Fang Lizhi, *Zhexue shi wulixue de gongju* (*Philosophy Is a Tool of Physics*) (Hunan: Kexue jishu chubanshe, 1988).

4. Wu Guosheng, "Fang Lizhi–gongheguo xuyao zheyang de xuezhe" ("Fang Lizhi–Our republic needs this kind of scholar"), *Ziran bianzhengfa tongxun* (*Journal of Dialectics of Nature*), No. 6 (1986) p. 51 and in Williams, "Expanding universe," p. 88.

calling for academic freedom.[5] His involvement led to his expulsion from the Party (to which he had been admitted in 1955) during the Anti-Rightist campaign in 1957, and subsequently to being "sent down" to the Hebei countryside for manual labour.[6] On his return to Beijing, Fang was assigned to the newly created University of Science and Technology of China, which was then recruiting "rightist" scholars with outstanding academic credentials.[7] Fang was initially prohibited from teaching, as a potentially poisonous influence on students. Officially barred from research as well, his first scholarly paper had to be published under a pseudonym.[8]

Between 1961 and 1966, Fang worked in theoretical areas relevant to the up-and-coming technologies of the period, particularly solid-state and laser physics, and when allowed into the classroom became a popular instructor at USTC. He and his former classmate, the Beijing University physicist Li Shuxian, were married and had the first of their two children. This period of relative personal and professional normalcy came to an abrupt end, however, with the outbreak of the Cultural Revolution in the summer of 1966. Fang was labelled a class enemy by the Red Guards and consigned to several years of house arrest, including a year of solitary confinement in a "cow shed."[9]

In 1970, USTC was moved from Beijing to Hefei, capital of Anhui province. As a consequence, when Fang and other members of his unit were assigned to labour reform, their destination was the mines of Huainan County, Anhui. There, as the story goes, the only book Fang possessed was a secreted copy of Landau and Lifshitz's *Classical Field Theory*, which he read and re-read many times.[10] In the process Fang became interested in general relativity and cosmology.[11] Upon

5. The physics department was the epicentre of Hundred Flowers activity on the Beida campus. See Rene Goldman, "The rectification campaign at Peking University: May–June 1957," in Roderick MacFarquhar (ed.), *China Under Mao: Politics Takes Command* (Cambridge, MA: MIT, 1966), p. 255.

6. Fang was labelled a "quasi-rightist" and not formally "capped" at the time, Williams. "Expanding Universe," p. 90; Wu Guosheng, "Fang Lizhi," p. 52.

7. "The University of Science and Technology was created in 1958 out of the College of Science and Technology. In order to improve the teaching faculty, the two first Party secretaries, Yu Wen and Liu Ta-k'ai, decided to have 30 or more intellectuals who had been labelled Rightists... transferred to the university." See Ch'en Chang-chin, "Fang Li-chih: Theorist of the Mainland Chinese Democratic Movement," *Issues and Studies* Vol. 23, No. 11 (1987), p. 50.

8. Wang Yung-jan (pseudonym of Fang Lizhi), "A calculation of the nucleon charge radius using a modified propagator," *Wuli xuebao* (*Acta Physica Sinica*), Vol. 17 (1961), p. 51.

9. Fang's official designation was "slipped through the net rightist" (*lou wang you pai*), referring to the fact that he had not been "capped" in Anti-Rightist campaign, see Wu Guosheng, "Fang Lizhi," p. 53, and Williams, "Expanding Universe," p. 91.

10. "I had only one book with me, the Soviet physicist Landau's *Theory of Fields*.... For six months I did nothing but read this book over and over again. It was this curious happenstance alone that caused me to switch fields from solid state physics to cosmology." Orville Schell, *Discos and Democracy* (New York: Doubleday, 1988), p. 124.

11. A brief sketch might illuminate some of the background and terminology of the cosmology debate, as well as Fang's interest in the subject. Cosmological questions have

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re-joining USTC in 1971 (initially as a janitor), Fang abandoned his solid-state research, organized a working group in astrophysics, and began to explore his new field in earnest. Fang's subsequent work in this area has been distinguished, and his USTC Institute for Astrophysics is now recognized as a leading centre for theoretical physics in China.

Cosmology, a Bourgeois Science?

In 1972, however, when Fang and colleagues published their solution to Einstein's cosmological equations, they were breaking treacherous new ground by violating a decades-old prohibition on cosmological research in the People's Republic. In 1947, Stalin's cultural lieutenant A. Zhdanov had pronounced, in the name of dialectical materialism, a series of highly politicized judgements on developments in contemporary science. Cosmological research based on General Relativity was declared a product of bourgeois idealism and therefore off limits to Soviet scientists. The central issue, according to Zhdanov, was that expanding universe cosmologies

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figured centrally in the development of physics since Aristotle's time. Modern cosmology, however, emerged only in the 20th century, with the publication of Einstein's General Theory of Relativity in 1916. General Relativity is the major theoretical treatment of gravity, which is to our knowledge the dominant force of the universe at very large scales. In the 1920s, Friedmann and Lemaitre solved the highly complicated field equations of General Relativity – the "cosmological equations" of Fang Lizhi's 1972 paper. Their solutions indicated that the universe as a whole is expanding.

This prediction was corroborated by Hubble's discovery of the extragalactic redshift in 1929. Shifts toward the red end of the spectrum in light emitted by galaxies outside our own indicate that all galaxies are receding from each other. A quantitative relationship can be derived between redshift, speed of recession, and distance. Based on General Relativity and the rates of expansion indicated by redshift data, expanding universe theorists extrapolated backwards to conclude that the universe must have begun in a primordial fireball, or Big Bang. This theory met with indifferent success for several decades, largely because its initial prediction of the cosmic birthday was in conflict with geological dating, due to errors in astronomical measurements at the time. A major rival, the Steady-State Universe theory, held that matter was being constantly created *in situ* to replace the receding galaxies, and thus that no Big Bang was required. Both Steady-State and Big Bang theories had serious difficulties, and were considered rather speculative through the 1950s.

The deadlock between these competing theories was broken by the advent of radiotelescopes in the 1960s. A crucial development was the discovery of the microwave background radiation by Penzias and Wilson in 1965. This radiation comes to earth uniformly from all parts of the sky, and is consistent with the thermal radiation that would be found in the universe as a whole if it began in a cosmic fireball and expanded at the rates suggested by the redshift. A second landmark was the discovery of quasars in 1963. These highly energetic objects all exhibit very large redshifts, and therefore seem to exist only in very distant reaches of the universe, suggesting early artifacts of the Big Bang.

Radio astronomy revolutionized astrophysics and produced a profusion of new data begging for theoretical analysis. Intrinsic interest aside, no doubt Fang Lizhi was attracted to a wide-open field in which a theorist could still make important contributions with a pencil and paper, so that China's lack of advanced equipment need not be a major drawback.

based on General Relativity require the universe to have a definite beginning in time and also to be spatially finite, both of which provide arguments for a divine creator.[12] The cosmology prohibition, like those on genetic theory and other fields, accompanied Soviet technological assistance to China during the 1950s.[13] While Soviet science was gradually depoliticized after the death of Stalin, the ban on cosmology went unchallenged in China throughout the 1960s. Even as radio astronomy revolutionized astrophysics and models based on the Big Bang became the international standard, in China cosmology remained the province of dialectics.

Given this background, the treatment of Fang and his colleagues as "bourgeois academic authorities" during the Cultural Revolution is perhaps not so surprising. An example of the reception met by Fang *et al.* is the following excerpt from an essay entitled "The idealistic concept of a finite universe must be criticized" in *Acta Physica Sinica* in 1976:

> On the question of whether the universe should be infinite or finite, there has been throughout the history of physics a struggle between materialism and idealism, between dialectics and metaphysics. Materialism asserts that the universe is infinite, while idealism advocates finitude. At every stage in the history of physics, these two philosophical lines have engaged in fierce struggle. Although developments in physics always demonstrate the failure of the finite universe doctrine, with every new advance in science the idealists distort and take advantage of the latest results to "prove" with varying sleights of hand that the universe is finite, serving the reactionary rule of the moribund exploiting classes .... We must ferret out and combat every kind of reactionary philosophical viewpoint in the domain of scientific research, using Marxism to establish our position in the natural sciences.[14]

Criticism of the USTC cosmologists was spearheaded by the "Li Ke" scientific writing group at Shanghai's Fudan University, which was charged with responsibility by Yao Wenyuan for carrying out the Cultural Revolution in the scientific sphere. The *Magazine of Natural Dialectics*, a media arm of the Shanghai Cultural Revolution Group, devoted its inaugural issue in 1973 to scathing attacks by Li Ke and others on evolutionary cosmology, impugning its philosophical and scientific bases, and the bourgeois orientations of its Western founders and Chinese practitioners.[15] Similar denunciations of the "finite universe doctrine" as an antagonistic class viewpoint appeared regularly in the *Fudan University Studies Journal*, *Red Flag*, and *Acta Physica Sinica* from 1973 until the death of Mao.

12. Loren Graham, *Science, Philosophy and Human Behavior in the Soviet Union* (New York: Columbia University Press, 1987), p. 357.

13. See Laurence Schneider (ed.), *Lysenkoism in China* (Armonk: M.E. Sharpe, 1988).

14. Liu Bowen, "'Yuzhou youxian' de weixinlun guandian bixu pipan," *Wuli xuebao* (*Acta Physica Sinica*), Vol. 25, No. 4, (1976), p. 282, quoted in Williams, "Expanding universe," p. 80.

15. *Ziran bianzhengfa zazhi* (*Magazine of Natural Dialectics*), No. 1 (1973). The essence of the Li Ke arguments is tautological: if the universe is infinite, then

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The crusade against cosmology, along with the closely related anti-Einstein campaign described by Friedmann, was above all directed against Zhou Enlai and Deng Xiaoping, the presumed patrons of "bourgeois science."[16] Like the rest of the war of euphemism being waged in the years before Mao's death – such as the campaign to "criticize Confucius and Lin Biao" – the cosmology campaign was at once a part of the succession struggle at the highest levels and a battle within professions and units. With outright violence over such issues a fresh memory for Fang and his colleagues, to again be labelled counter-revolutionary was serious business. They did not, however, curtail their research and in fact continued to publish their findings.

In the autumn of 1975, following the release of Deng Xiaoping's "Outline report on the work of CAS" calling for the depoliticization of science, the USTC group was permitted to make a published response to criticism of its work. Appearing in the *Magazine of Natural Dialectics*, "The extragalactic redshift *can* be understood" makes the plea that whether the Big Bang is a correct theory or not, recent developments such as radiotelescopy had made cosmology an experimental science, to be approached through rigorous scientific methods rather than philosophical discourse. Fang and colleagues frequently cite the empirical side of the Marxist canon to assure the reader that their epistemology and methodology meet orthodox standards. While rebutting some of the scientific claims made by Li Ke, the USTC group cautiously criticize only western strawmen, who stand proxy for their Chinese adversaries. The conciliatory tone of the article is evident in its concluding sentence: "We believe that by following [Chairman Mao's] theory of practice and working diligently, we will produce a growing understanding of the redshift, revealing its essence and exposing its dialectical nature."[17]

Such "using Mao to debate Mao" tactics seemed only to further enrage the critics. The restrained essay by Fang's group was accompanied in the same journal issue by a virulent condemnation of the "finite universe doctrine." Li Ke's article, entitled "What does the extragalactic redshift *really* mean? – A renewed criticism of Big Bang cosmology," dismissed out of hand the cosmologists' contention that

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generalizations about the universe as a whole cannot be based on observations, which necessarily involve only a finite part. The question of whether the universe is infinite is therefore *scientifically* unanswerable. However, since belief in a finite universe promotes theological interpretations, materialists must advocate infinitude. Another consideration is that infinitude is seen as a corollary of the principle of infinite divisibility, and by extension of the law of unity of opposites. In this sense fundamental tenets of Marxism, and the Maoist justification for continuous class struggle on the basis of "one divides into two," were thought to be imperiled by belief in a finite universe.

16. Edward Friedmann, "Mao and Einstein: metaphors of revolution," *China Quarterly*, No. 93 (1983).

17. Fang Lizhi *et al.*, "Hewai tianti hongyi shi keyi renshi de" ("The extragalactic redshift *can* be understood"), *Magazine of Natural Dialectics*, No. 4 (1975), p. 53.

key aspects of their field were now the province of experiment.[18] With Deng Xiaoping deposed again in the summer of 1976, a similar "dialogue" between the USTC group and critics was constructed in *Acta Physica Sinica*, with arguments on both sides essentially unchanged.[19]

The 1978 Watershed

1978 was a watershed year for Fang and the Chinese scientific community, as Deng Xiaoping commandeered supreme leadership of the CCP and directed the drastic change of course from class struggle to modernization. Deng's keynote speech to the National Conference on Science in March 1978 announced a radical departure from Cultural Revolution science policy and made clear the central role science and technology would play as "the key to the Four Modernizations." Henceforward, science was to be considered a force of production, and scientists and intellectuals to be patriotic members of the working class, three decades of stigma and suspicion removed.[20]

Fang prospered professionally under the improved conditions, as did many other Chinese scientists. In September 1978, rehabilitated and restored to Party membership, Fang was promoted from instructor to become, at 42, China's youngest full professor.[21] His research into a wide range of topics in astrophysics was prolific, with 150 scholarly articles and 12 books to his credit by 1989.[22] Fang received international notice for his work, including receipt of the (U.K.) Gravity Research Foundation's First Prize in 1985.[23] His colleagues and peers, many of their own careers having been disrupted and nearly destroyed by two decades of mass campaigns, clearly recognized the extraordinary nature of Fang's scholarship and productivity. He was elected chair of the USTC Department of Fundamental Physics in 1980, director of the Chinese Society for Gravitation and Relativistic Astrophysics in 1981, and in the same year, to membership in the Academic Committee of the Department of Mathematics and Physics of CAS.

18. Li Ke, "Hongyi xianxiang shuomingle shemme?", *ibid.* p. 34.

19. USTC, Institute for Astrophysics, "A tentative history of the origins and development of modern cosmology," *Wuli xuebao* (*Acta Physica Sinica*), No. 6 (1976), pp. 273–281.

20. Deng Xiaoping, "Speech at the opening ceremony of the National Conference on Science," 18 March 1978, *Deng Xiaoping: the Leader of Post-Mao China, Speeches and Writings* (Oxford: Pergamon, 1984), p. 41.

21. Wu Guosheng, "Fang Lizhi," p. 56. Translated in Williams, "Expanding universe," p. 95.

22. *Physics Abstracts* contains about 80 titles for Fang in the period 1976–87. Prior to 1976 there are no listings for China. Fang was first noted outside China for his statistical analysis of the distribution of quasar redshifts, in T. Kiang, *Nature* No. 270, 17 November 1977, p. 205.

23. Fang Lizhi and Sato Humitaka, "Is periodicity in the distribution of quasar redshift evidence of a multiply connected universe?", *General Relativity and Gravitation* (U.K.), Vol. 17, No. 11 (1985), p. 1117.

Fang was among the first wave of Chinese scientists sent abroad to re-establish connections to the international scientific community. In 1978 he made the first of a dozen trips to conduct research and attend scientific conferences overseas. During the next decade Fang spent a total of about 18 months in Europe, Japan, Australia and the United States. He also hosted foreign scientific delegations to China, including those of the eminent theoretical physicists John Archibald Wheeler and Stephen Hawking.[24]

The political sea-change also gave Fang an opportunity to turn the tables on his Cultural Revolution tormentors. As Dengist forces went about reviving CAS and CASS research and removing allies of the leftist faction from the scientific establishment, scientists from a number of fields began to publish accounts of the outrages perpetrated on their research by the Gang of Four. Fang and co-author Yin Dengxiang of the CASS Institute of Philosophy, contributed to this scientific "wound literature" by recounting their version of the cosmology battle of 1973–76. "The controversy between science and pseudoscience over modern cosmology," appearing in the newly resurrected *Philosophical Research*, bitterly recited a litany of accusations made by the Shanghai Group: "the clamor of idealism and metaphysics... not so much science as theology... the fig leaf of science... nothing more than political opium... attempting to show that the capitalist system will never be superseded and will continue to expand indefinitely all by itself... Can statements like these possibly emanate from those that have truth on their side?"[25]

Defending the need to judge scientific arguments by scientific criteria, Fang angrily denounced a "doctrine of substitution" (*daiti lun*), in which scientific arguments were assigned philosophical pedigrees and then judged on the basis of the resulting political labels. Fang told the National Conference on the Dialectics of Nature in the summer of 1979 that the point his antagonists had failed to grasp was that the methods of science must take precedence over any particular conclusions. No theory, be it the Big Bang or the Marxist doctrine of infinity, is above theoretical challenge or observational test.

> But when the Doctrine of Substitution was flourishing under the Gang of Four, scientific methods were abolished. The so-called "Big Criticism of Science" became the highest arbiter of scientific right and wrong. No reliance was placed on experiment, and all scientific controversies were treated

24. Hawking wrote in 1985 that Fang's Institute for Astrophysics was at "the state of the art in astrophysics and cosmology." Wu Guosheng, "Fang Lizhi," p. 56. Translated in Williams, "Expanding universe," p. 95. Fang edited a volume of collected talks from Wheeler's trip to China, *Wulixue he zhipuxing* (*Physics and Austerity*) (Anhui: Kexue jishu chubanshe, 1981). Fang's introduction contains an interesting observation on the role of Taoist metaphysics in the development of quantum mechanics.

25. Fang Lizhi and Yin Dengxiang, "Weiraozhe xiandai yuzhouxue de yichang kexue yu jia kexiue de lunzheng," *Zhexue yanjiu (Philosophical Research)*, No. 1 (1978), p. 86. Also Williams, "Expanding universe," p. 14.

according to certain *a priori* principles. Big-Bang cosmology, and alas the whole of modern cosmology, received the theoretical equivalent of a death sentence at its hands.[26]

Fang's defence of cosmological research in "The controversy" marks the blossoming of his extra-curricular career as author and commentator on public affairs. By 1989 Fang had published some 30 articles or essays, and half as many speeches, in media ranging from specialized academic journals to national newspapers. His principal topics are science, education, and political reforms, but other subjects include accounts of his travels and science popularizations for lay readers. Invariably, Fang's writing revolves around his perspective as a scientist, initially focused on the affairs of his discipline but steadily expanding to cover a broad vista of philosophical, political, and cultural issues affecting China as a whole.

"The controversy" also marks the high point of Fang's united front with Party leadership against a common political foe. With the Gang of Four dispatched, Fang's views on reform became a source of increasing friction with Party conservatives. Nonetheless, his opinions enjoyed a growing audience, owing at least in part to the salience of his writing. Fang is a capable essayist, writing with clarity, humour, and a sometimes lethal sarcasm. While Fang disclaims having made "any systematic study of philosophy and social science," he is clearly no culturally illiterate scientist; in adapting to the demands of different topics and audiences, Fang shows a comfortable familiarity with the history of ideas in both China and the West. His writing carries pronounced May 4th overtones: iconoclastic, idealistic, and above all advocating "science and democracy." Four themes figure centrally in his writing: independence in scientific research, the role of democracy in modernization, the role of intellectuals in reform, and Chinese political culture. The next two sections discuss these themes in Fang's writings from 1978 to 1984.

The Guiding Role

Deng Xiaoping's call to overturn Maoist dogmatism and construct a flexible Marxism hospitable to his reforms met with a quick and favourable response in the scientific arena. Natural dialectics – the branch of dialectical materialist philosophy directly concerned with the natural sciences – was broadly acknowledged to have lagged far behind the developments of 20th century science. Those most concerned with dialectics – primarily philosophers and historians of science in CAS and CASS – set out in 1978 to critically re-evaluate and revise Marxist philosophy of science in the light of contemporary

26. Fang Lizhi, "Xiandai yuzhouxue ji qi zhexue wenti" ("Philosophical problems of modern cosmology") (hereafter "Modern cosmology"), in *Xiandai ziran kexue di zhexue wenti* (*The Philosophical Problems of Modern Natural Science*) (Jilin: Renmin chubanshe, 1985), p. 50. See Williams, "Expanding universe," p. 62.

knowledge. A vigorous debate was inaugurated, especially in journals under the aegis of CASS Vice-president Yu Guangyuan.[27] Scientists were invited to discuss the latest developments in their fields and the implications for dialectics. Debate was further intensified by ideas that came flooding through the open door, as the works of Popper, Merton, Kuhn, Lakatos, Feyerabend and other contemporary Western authorities on science became widely available for the first time.[28]

Beyond the commonly accepted need to revise the scientific content of Marxist philosophy, however, lay more prickly questions about the limits of its authority. While Dengist policy called for curtailing ideological intrusions in the day-to-day functioning of the laboratory, it also left unchallenged the pre-eminence of dialectics in areas such as the interpretation of scientific results and the evaluation of research projects. Disagreement over how, or even if, Marxist philosophy should play its customary "guiding role" was manifest in an increasingly polarized debate, in which Fang Lizhi played a prominent role as an outspoken advocate of intellectual freedom for scientists.[29]

In the foment of 1978, the "guiding role" was not being directly challenged. Instead, the focus was on how the negative lessons of the Cultural Revolution, with regard to both specific academic questions and the conduct of science generally, could be used to define a constructive role for Marxist philosophy. At the National Conference on Dialectics of Nature, Fang Lizhi offered his views on both. The justification for the Shanghai Group's attack on cosmology had been based largely on Engels's beliefs about space, time, and "infinity." Seen in the light of contemporary understandings of the gravitationally twisted topography of spacetime, these "dialectical principles" appear so vague and archaic that one might as well, said Fang, "hearken back two thousand years to the Kai-T'ien theory, which claimed that the earth is flat."[30] At the root of the problem, Fang continued, is a disastrous conception of the relationship between science and philosophy:

> Scientific research, especially basic theoretical research, is inseparable from philosophy. Choice of direction, determination of topic, and methods of

27. Trained in physics at Qinghua, Yu Guangyuan has been an important and seemingly ubiquitous patron of free expression in Chinese academia. In 1977 Yu told a conference on dialectics that "Marxism is a science, and science allows people to study; it is not a law that commands people's obedience, and it is not a religion that calls upon people to worship it." See Yu's biography in *Zhongguo dangdai jingjixuejia zhuanlue (Biographical Sketches of Chinese Economists)* (Liaoning: Renmin chubanshe, 1986), pp. 462–517.

28. Lyman Miller, *Ideology, Science, and Authority in Dengist China*, unpublished manuscript, 1989. Miller's study includes a thoughtful and detailed analysis of the revamping of natural dialectics and the "guiding role" debate.

29. David Kelly, "Chinese controversies over the guiding role of philosophy over science," *Australian Journal of Chinese Affairs*, No. 14 (1985), pp. 21–34.

30. Fang Lizhi, "Modern cosmology," p. 56. In Williams, "Expanding universe," p. 58.

approach, are part and parcel with philosophy . . . [but] the Gang of Four and the "leftist" line distorted the function of philosophical guidance, abolishing any concrete scientific work. According to their "logic", whenever a scientific dispute is encountered, judgement can always be made by a quick consultation with the Book of Quotations, followed by a rapid deduction according to some philosophical "principle". Too bad nothing is so simple in this world.[31]

In eschewing "deduction according to some philosophical principle" in favour of "concrete scientific work," Fang pits scientific practice against the usual methods of dialectical materialism, which (as an essentially Hegelian natural philosophy) operates precisely by positing premises of ostensibly universal deductive power. Fang's suggestion that there might be, in fact, a role for "philosophical guidance" would seem to indicate his hope that post-Mao Marxist philosophy would be transformed along pluralistic lines compatible with the norms and values of 20th century science.[32]

If he had such hopes, however, by the early 1980s Fang had forsaken them and was declaring the independence of science from dialectical "guidance." The continued assertion of the correctness and universal applicability of Marxist principles, along with new attacks on "the finite universe doctrine" by Natural Dialectics Research Office head Zha Ruqiang and others, convinced Fang that newly retooled categories and contemporary scientific language concealed a fundamentally unreformed outlook.[33] Fang's arguments in response ranged from the general to the detailed. His science popularizations served the dual purpose of educating the public on scientific topics and making pointed jabs at dialectical principles; his debunking of the essential Maoist principle "one divides into two" met with an angry response from Yang Xianzhen.[34] At the same time, historical essays such as "From 'Water is the origin of all things' to 'Spacetime is the form of material existence'" in the June 1982 *Philosophical Research*, and "On primordial motion, past and present" in the April 1984 *Journal of Dialectics of Nature*, depicted dialectical philosophy as a museum piece that would best serve both science and itself by "retreating" from scientific disputes.

Within closed-door conferences and media, Fang was even more blunt. In an essay with the shocking title "Philosophy is a tool of physics," which appeared as the foreword to a *neibu* (restricted internal circulation) book on scientific methodology in 1983, Fang calls the guidance of "supreme principles" antithetical to the practice of science: "One of the maxims of scientific methodology is never to blindly trust in some omnipotent 'supreme'. The statement that

31. *Ibid.* p. 61. Williams, "Expanding universe," p. 62.

32. This has occurred to some extent in the Soviet Union, according to Loren Graham in *Science, Philosophy and Human Behavior in the Soviet Union* (New York: Columbia University Press, 1987), p. 6.

33. Zha Ruqiang, *Zhongguo shehui kexue* (*Chinese Social Sciences*), No. 4 (1982).

34. Fang Lizhi, "Cong bu cunzai zhong renzhi cunzai" ("Perceiving what exists on the basis of what does not"), in *Philosophy is a Tool of Physics*, pp. 107–112.

Marxist philosophy is 'the supreme principle and method guiding scientific research' it itself inconsistent with Marxist principles. It is a form of blind faith and ignorance."[35]

Caustically reminding readers that "all of us have had direct experience of the 'Supreme,' so we treat it with great care," Fang argues that what science thrives on is philosophical diversity. Citing Einstein's observation that physicists are philosophical opportunists, Fang notes the wide range of ideas, from Pythagoreanism to positivism, that have contributed to the growth of physics. Like different forms of mathematics, these philosophies played a "guiding role" in physics as long as they were "useful tools of scientific research." If Marxism is to continue calling itself a science, Fang concludes, it must start acting like one: "Marxism is the product of an age... and cannot epitomize all the science of today. The essence of science is development, creation, constant self-transcendence, and Marxism is no exception."[36]

By 1984, Fang had made his position on the "guiding role" clear and moved on to other business, notably the vice-presidency of USTC, to which he was elevated that year. The "guiding role" debate itself continued to grow, with such prominent figures as Zha Ruqiang and particle physicist He Zuoxiu supporting an active "guiding role," and Xu Liangying, director of the CAS Institute for the History of Natural Science and translator of Einstein into Chinese, opposing it. By 1986 the debate had spilled out of academic confines into the pages of *Guangming Daily* and *Red Flag*.[37] As will be discussed later, the "guiding role" issue then became intertwined with other issues for Fang, contributing to his expulsion from the Party in 1987.

Science, Modernization, and Reform

Discussing his impressions of the differences between Chinese and Western science following a trip to Italy in 1979, Fang Lizhi observed that while China lagged substantially behind the West in terms of equipment and trained personnel, the more severe problem was one of "cultural traditions, scientific attitudes, and philosophical approaches." The scholasticism of the dialectical establishment was abundant evidence of this for Fang, who concluded, "looking back 300 years to the beginnings of modern science, we see that the questions regarding the criteria for deciding scientific truth were already resolved. Yet here and now in China these issues remain unsettled, the topic of wearying debate. Doesn't this show that as far

35. "Philosophy is a Tool of Physics" was published as the preface to Zhou Lin, Yin Dengxiang, Zhang Yongqian (eds.), *Kexuejia lun fangfa* (*Scientists on Method*) (Nei Menggu: Renmin chubanshe, 1983). Reprinted in *Philosophy is a Tool of Physics*, pp. 143–45.

36. *Ibid.* p. 145. Williams, "Expanding universe," p. 44.

37. Miller, *Ideology, Science and Authority*, p. 179ff.

as science is concerned, the cultural gap is far wider than the material gap?"[38]

Fang's identification of deep-rooted cultural orientations as impediments to scientific modernizations had far-reaching implications. From the late 1970s on, the Dengist leadership steadily expressed its concern that China not be left behind in an accelerating global technology race. Their desire to stimulate a "scientific and technological revolution" in China sanctioned a remarkably open discussion of the social context of scientific success, allowing the expression of ideas otherwise beyond the limits of political acceptability. For Fang Lizhi in particular, the opportunity to raise fundamental questions about the meaning of modernization and the goals of reform became a "Trojan horse of science" from which to breach the sanctuary of official ideology.

Fang's reflections on modernization start with the legacy of the scientific heroes and martyrs of the Renaissance, such as Galileo and Giordano Bruno, for contemporary European science. The habit of independent thinking that originates in this heritage is more essential to science than any technical knowledge, Fang writes in the preface to a physics textbook in 1979. Thus "if we only concern ourselves with the technical aspects of our disciplines and fail to grasp the scientific spirit, the soul of what makes science what it is, then we will never be able to make science take root in China."[39] Fang derives his scientific ethos from the values he finds pervasive in science: truth-seeking, openness to outcome, individual autonomy, pluralism in the realm of ideas.[40] Such a value system must be sustained on the one hand by the "spirit, ideas, passion, and individual integrity" of the scientist, and on the other by a hospitable cultural environment.[41] It is this premise that leads Fang into the "forbidden zone" of exploring the contributions of Western culture – including bourgeois political values – to the evolution of Western science.

In "Written at midnight after praising the Lord," a darkly humorous essay contrasting Mao-worship during the Cultural Revolution with an Advent service that Fang had attended while at Cambridge in 1979, he asks "while China has never been under formal religious rule for any length of time, hasn't it been dominated by informal religion for far too long?"[42] Considering the Inquisition-

38. Fang Lizhi, "Yiding maozi, yikuai jindi, yige wenti" ("A hat, a forbidden zone, a question"), *Beijing keji bao* (*Beijing Science and Technology News*), 19 October 1979, in Williams, "Expanding universe," p. 30 and Fang Lizhi, *Philosophy is a Tool of Physics*, p. 60.

39. Fang Lizhi, Foreword, in Fang Lizhi and Chu Yaoquan, *Cong Niudun dinglu dao Aiensitan xiangduilun* (*From Newton's Laws to Einstein's Theory of Relativity*) (Beijing: Kexue chubanshe, 1981), in Williams, "Expanding universe," p. 27.

40. For this and other insightful observations on Fang I am indebted to David Kelly. See David Kelly, "Fang Lizhi: Democrat on the Road to Class Power," Contemporary China Centre, Australian National University, unpublished, 1988.

41. Fang Lizhi, "Hat, forbidden zone," in Williams, "Expanding universe," p. 30 and Fang Lizhi *Philosophy is a Tool of Physics*, p. 61.

42. Fang Lizhi, *After Praising the Lord*, p. 5.

like character of the Cultural Revolution, Fang observes, Chinese intellectuals should pay careful attention to the ways Renaissance and Reformation reduced the sway of religion over intellectual life: the former by humanizing divine authority, the latter by proclaiming the moral autonomy of the individual. In the rise of Western modernity, Fang argues, science grew hand-in-hand with humanism and democracy. Without democracy, there is no stable guarantee of human rights; without rights, there is no protection of intellectual freedom; without freedom of the mind, there is no real science. This logic makes it incumbent on intellectuals to fight for democracy, both to protect their own freedom of thought and to benefit society as a whole. This is the reason, wrote Fang from the Lincean Academy in Rome in 1979, that great scientists such as Einstein have fought under the Enlightenment banner of "science, reason, and democracy."[43]

Whatever expectations had been aroused by Deng Xiaoping's calls for "emancipation of the mind," the suppression of the Democracy Wall in 1979 and the Bai Hua campaign of 1981 provided an unpleasant dose of realism for many Chinese intellectuals. No doubt it reinforced Fang's conviction that real reform in China required fundamental shifts in cultural paradigms; underlying episodic purges was a serious potential for new Inquisitions. Fang's emphasis on systemic changes distinguished him early on from good-government advocates such as Liu Binyan, who focused on the corruption or injustice of individual officials; and also from other strains of the loose reform coalition of the early 1980s, including technocrats and Marxist humanists.

An example is the short but remarkably iconoclastic speech given by Fang to a conference on the "science of science" in 1980. To technocrats in high-level think tanks, Fang remarks that science and technology *per se* are no panacea for China's problems; any society's basic issues are "ultimately human." Therefore, even policies attempting "to cultivate human resources and scientific progress should not focus narrowly on science. Without corresponding human and social development, such efforts will be illusory and futile."[44] Fang's dismissal of Marxism as too obsolete to guide reform is even more blunt. Many of the standard predictions of Marxism have been proven wrong, said Fang, not only in dialectical philosophy but also in political economy and scientific socialism. The result has been "a global crisis of faith in Marxism. This is because Marxism has become fossilized. It is composed of obsolete conclusions that have led to failure... the emancipation of our thought means a search for new

43. Fang Lizhi, "From Newton," in Williams, p. 27.

44. Fang Lizhi, "Tuodiao jiu sixiang cai neng jinru weilai" ("To enter the future, we must cast off old ways of thinking"), an address to the Second National Conference on the Science of Science, Hefei, Anhui, December 1980. In *Responsibility under Crisis*, p. 5, and Williams, "Expanding universe," p. 32.

theories, not the so-called restoration of Marxism's original face, nor any such thing."[45]

These statements led to Fang's first direct run-in with Dengist officials over ideology. Shortly after his talk, Fang was visited by Fang Yi, the vice-premier in charge of science and technology, who warned him against calling Marxism obsolete in public.[46] While Fang's ideas may have raised the hackles of some conservatives within the leadership, however, among the many reformists who privately agreed with Fang his star was rising in the early 1980s.

Administrator and Advocate

In 1984, Fang was finally confirmed as vice-president of USTC by the central Party Secretariat. His nomination had reportedly been blocked since 1981 due to an unfavourable political evaluation by He Zuoxiu, a prominent opponent in the "guiding role" debate.[47] Once appointed, Fang and new president Guan Weiyan, a fellow physicist, implemented radical changes in the university administration, opening decision-making processes to the university community and actively promoting overseas study by students and faculty. The centrepiece of the new programme was academic freedom. At his inaugural ceremony, Fang remarked that while his capacity to improve salary and conditions at USTC was limited, "I am going to make freedom of thought one of the administrative policies of the university."[48]

Fang's experimental policies were sanctioned by reformists in the CCP leadership, concerned with winning the support of alienated intellectuals and restive university students in the aftermath of the Spiritual Pollution campaign. In his capacities at CAS and USTC, Fang called for support for basic research, reductions in political education requirements, more democratic selection of cadres, and an increased role for intellectuals in policy-making. Fang's position became something of a "bully pulpit," as he accepted invitations to speak on these issues at universities and professional organizations in Shanghai, Beijing, and elsewhere, starting in the spring of 1985.

Fang's approach to the problems of intellectuals had two main thrusts. On the one hand, he supported improving their conditions, and joined other voices of concern over abnormally high death rates among middle-aged intellectuals and a salary structure in which intellectuals ranked substantially lower than manual labourers in comparable age groups. With urban price reforms and inflation

45. *Ibid.* p. 6. Williams, "Expanding universe," p. 33.

46. Schell, *Discos and Democracy*, p. 128; "Zhongguo yao jiesan? Zhuanfang Fang Lizhi" ("Will China disintegrate? An interview with Fang Lizhi"), *Jiushi niandai* (*The Nineties*), October 1988, p. 71.

47. *Ibid.* See also "Fang Lizhi's Biography," *China Spring Digest*, Vol. 1, No. 2 (1987), p. 2, Ch'en, "Fang Li-chih," p. 58.

48. Wu Guosheng, "Fang Lizhi," p. 60. Williams, "Expanding universe," p. 103.

leading to deteriorating conditions for middle-aged intellectuals especially, "the milch cow must be fed, otherwise what is squeezed out will not be milk, but blood."[49]

On the other hand, Fang believed that to obtain a new social contract for intellectuals would require radically new commitments on their own parts. Fang told Beijing University students in the autumn of 1985, that intellectuals must be more than mental workers:

> Intellectuals must be those who earnestly seek truth in their chosen fields, who will not give up their scientific independence for the sake of personal gain or loss. They must have a deep concern for the common interest and a strong sense of responsibility toward the affairs of their nation and the future of humanity. They must be discerning enough to recognize injustice, and courageous enough to attack it when they do .... They must stand up and be counted in their struggle for truth, justice, and democracy.[50]

Fang's own determination to "stand up and be counted" appears to have had a major impact on the subsequent course of events. In November 1985, Fang publicly criticized Beijing vice-mayor Zhang Baifa for turning a scientific delegation to the United States into a personal junket. The trip, organized by Chinese-American Nobel prize winner Li Zhengdao, was to study the construction of particle accelerators in the U.S. prior to beginning construction of China's own accelerator. By inserting himself into the delegation despite his lack of qualifications, said Fang, Zhang had taken a place that could have gone to a scientist.[51] In response, a furious Beijing Party committee accused Fang of slandering Zhang and demanded a public apology. Guan Weiyan and the USTC Party committee protected Fang and no apology was forthcoming, but indirect consequences were harder to avoid. Fang's exit visa to take a research sabbatical at Princeton in December 1985 was delayed for several months, and it was said that some major leaders already wanted Fang out of the Party.[52]

Fang's criticism of Zhang Baifa may have helped to heat up the "guiding role" debate. Hu Qiaomu – whose wife Gu Yu was reportedly involved in approving Zhang's travel plans – criticized Fang's latest research interest, quantum cosmology, as bourgeois idealism. This marked the first time a Dengist Politburo member had become directly involved in the dialectical debates. After Fang had finally been allowed to go abroad, the *Beijing Daily* – house organ of the Beijing Party committee – published an article entitled "No science can ever replace Marxist philosophy." Affirming the leading role of Marxism as "the ultimate methodology guiding all our endeavours and all scientific research," the May 1986 article concluded with an

49. *Ibid.* p. 61. Williams, "Expanding universe," p. 103.
50. *Ibid.* p. 59. Williams, "Expanding universe," p. 101.
51. "Zhishifenzi de shehui zeren" ("The social responsibility of intellectuals"). Speech at Beijing University, 4 November 1985. In *Responsibility Under Crisis*, p. 73ff.
52. "Will China disintegrate?", in *Jiushi niandai*, p. 71.

ominous reference to the idealistic and metaphysical doctrine of a finite universe.[53] Fang was not without his own supporters, however. The *Journal of Dialectics of Nature* published a glowing biographical sketch of Fang by Beijing University philosopher Wu Guosheng in June, entitled "Fang Lizhi: The Republic needs this kind of scholar." *Guangming Daily* carried an interview of Fang by Dai Qing on 22 September, and this was followed in October and November by a series of articles in the *People's Daily* hailing USTC's academic freedom policy as a great success and a model of educational reform.[54]

Fang returned from the U.S. and Europe in the summer of 1986, during a reformist surge. Liberal leaders seeking to renew the momentum of stagnating urban reforms had sanctioned the study of Western economic theories, and calls for a renewal of the spirit of Hundred Flowers on its 30th anniversary led to unprecedented openness in the cultural arena. The State Council's September "White Paper on science and technology" pointedly omitted references to a Marxist "guiding role" in science, as the debate over dialectics erupted with new energy. Fang, still incensed over the events of the previous winter, escalated his public criticism to include Zhang Baifa *and* Hu Qiaomu, whom he charged with meddling in science.[55] Why is it, asked Fang, who had just attended a conference on Halley's Comet at the Vatican, that cosmological research should receive a respectful welcome from its historical nemesis, the Pope, while at the same time encountering dark threats from the ideological authorities of scientific socialism?

Fang's response to his own question focused on the role of traditional Chinese culture. While historians and social scientists debated the factors that had kept both democracy and capitalism from developing in traditional China, Fang looked at parallel tendencies inhibiting the rise of modern science.[56] In a speech to cultural researchers in August entitled "Reflecting on traditional Chinese culture from the vantage point of natural science," Fang observed that excessive pragmatism and fear of making mistakes had led Chinese proto-science to be empirically strong and theoretically weak. The contemporary political relevance – that many Chinese still fear to "develop intellectual models" which might contradict orthodox teachings – was apparent.[57] In an interview a few days later, Fang remarked:

53. Jin Lin, "Renhe kexue dou buneng qudai Makesi zhuyi zhexue," *Beijing ribao (Beijing Daily)*, 5 May 1986. See Williams, "Expanding universe," p. 87.

54. Lu Fang, "Minzhu ban xue zai Zhongguo keji daxue" ("Running education democratically at USTC"), *Renmin ribao (People's Daily)*, 22, 26, 31 October 1986; 4, 14 November 1986.

55. Fang Lizhi, interview, in *Shehui bao*; in *Responsibility Under Crisis*, p. 105 and Williams, "Expanding universe," p. 75.

56. David Kelly discusses the "culture fever" that began in the mid 1980s in "Chinese Intellectuals in the 1989 Democracy Movement", in George Hicks (ed.), *The Broken Mirror: China After Tiananmen* (forthcoming 1990).

57. Fang Lizhi, "Cong xiandai kexue jiaodu fanxing Zhongguo chuantong wenhua." Speech to Qingdao Conference on Chinese and Western Culture, 4 August 1986. In *After Praising the Lord*, p. 131 and Williams, "Expanding universe," p. 65.

The pluralist mentality has been very difficult to establish in China. The monistic view that there can be only one right idea has prevailed among the Chinese since the days of Confucius; if the two of us are discussing a problem, and I'm right, then you must be wrong, and maybe you'll even have to be completely eliminated.... The psychological leanings of Chinese culture are deeply embedded, and in the end the idea of a single correct belief always seems to prevail. This is a fundamental problem.[58]

The Speeches of Autumn 1986

"Progress in cosmology requires making conceptual breakthroughs," Fang remarked in the same interview, "and the reform of political systems does also; otherwise, we are simply fiddling around with technicalities."[59] Fang's own efforts to stimulate "conceptual breakthroughs" in the fall of 1986 came in the form of speeches to students at Shanghai's Tongji and Jiaotong Universities, Ningbo University, and USTC, in which he offered his views on the prospects of reform and the role young intellectuals might hope to play in them. While Fang's speeches support a gradualist approach and are not the provocation to revolutionary unrest later alleged by conservatives, they clearly show his intention to personally demonstrate the mental independence that he urged on fellow intellectuals. His frank assesments of the failures of socialism and irreverent criticisms of high officials marked an unprecedented break with political protocol, a fact evidenced in the astonished laughter and applause of his student audiences.

Fang refers frequently in his speeches to his experiences and observations abroad. "The change in many people's outlook, including my own, came from seeing the outside world," Fang told the Tongji students in November. "We discovered our backwardness and were enlightened."[60] His anecdotes often involve comparisons of Chinese conditions with those in other countries, and his attitude is one of a scientist reporting his findings. "I am just a physicist who went abroad to lecture and saw a few things," said Fang, "but even though I'm no social scientist... when I see a huge difference between societies it makes an impression."

The real situation, Fang began at Tongji, is that "the last 30 years in China have been a failure in essentially every aspect of economic and political life."[61] This is a product of the failures of state socialism in China and around the world, a fact "privately admitted by many in the leadership." As a case in point, Fang recalled his experience of Berlin, where East German border guards at the Berlin Wall had

58. Fang Lizhi, Interview, in *Responsibility Under Crisis*, p. 110 and Williams, p. 79.
59. *Ibid.* p. 109. Williams, "Expanding universe," p. 78.
60. Fang Lizhi, "Minzhu, gaige, xiandaihua" ("Democracy, reform, and modernization") Speech at Tongji University, 18 November 1986. In *Responsibility Under Crisis*, p. 231.
61. *Ibid.* p. 197.

searched under his bus, looking for would-be escapees. "If a society is good, why should it fear people trying to run away?" Fang asked. "My intention is not to condemn the East Germans," he continued, "but as scientists, the first thing we have to acknowledge is where we have failed. If we want improvement, we must start by having the courage to acknowledge our own failures. And our socialist system over the last three decades has been a failure . . . The fact is, orthodox socialism from Marx, Lenin, and Stalin to Mao Zedong has been a failure."[62]

In contrast, Fang saw in Northern Europe a model of non-totalitarian socialism to which China might aspire. Despite the reactionary label placed on social democrats by Lenin, said Fang, it appeared to him that Sweden had achieved more real socialism through parliamentary means than had China or the Soviet Union through decades of class struggle. In making such comparisons, Fang's goal seemed not so much to depict foreign utopias, as to challenge preconceptions and self-serving Marxist stereotypes. What one sees in looking around the globe, argued Fang, is that maintaining dictatorship under the pretext of ending exploitation has led predominantly to backwardness and stagnation; while the pursuit of the humanistic goals of socialism under democracy – imperfect and difficult though the process may be – carries at least the promise of progress.[63]

Real reform must start with the recognition, argued Fang, that China is backward not only technologically and economically but also culturally and politically. What is called for is a complete opening (*quan fangwei kaifang*) to the outside world, requiring all Chinese institutions to confront, learn from, and compete with those outside. Attempts to maintain cultural and political orthodoxy by permitting technology imports and joint ventures but periodically purging "spiritual pollution" are tantamount to a continuing *tiyong* policy, which has undermined real modernization for the last century. Rather than appealing to xenophobic and parochial tendencies in order to preserve its power structures, China should attempt to "show a little humility" in trying to learn from others.[64]

What the "complete westernization" of Tan Sitong meant to him, said Fang, "is not that big noses are more beautiful," but that without this contact with the rest of the world, it will be very difficult for Chinese to develop a "democratic and scientific mentality." In the Tongji speech and elsewhere, the nature of this "democratic and scientific mentality" is at the heart of Fang's message. In elaborating

62. *Ibid.* p. 199.

63. *Ibid.* p. 203. Fang speaks approvingly of the fundamental goals of socialism, and of social democracy in Europe. His primary concern in the economic arena, however, is that political monopoly in China has led to a monopoly over economic resources as well. Whether a system is called "socialist" or "capitalist" – and Fang holds that modern economies are increasingly a mixture of both (see e.g., "Democracy," p. 218ff.) – mismanagement and corruption can only be prevented when power-holders are held accountable to the public. (On the question of Fang's relationship to Marxism, see David Kelly, "The ironic Marxism of Jin Guantao," unpub., 1988.)

64. *Ibid.* p. 201.

on it, he ties together the four themes that appear repeatedly in his essays of the previous decade: democracy and human rights; Chinese political culture; the role of intellectuals; and scientific independence.

"I think that the key to understanding democracy is to recognize that each individual has rights," Fang said at Tongji, "or to use what in this country is a very sensitive expression indeed, everyone has 'human rights'.... In China we talk about human rights as if they were something fearful, a terrible scourge. In reality they are very basic, and they should be recognized everywhere."[65] Lasting reform requires a foundation of individual rights, on which contending interests can be mediated through the institutions of pluralist democracy. But while democratic institutions rooted in law are essential, they can only be maintained in practice through attitudes that are alien to both traditional and Marxist culture in China. "Over the last 30 years it seemed like every one of these good words – liberty, equality, fraternity, democracy, human rights – was called bourgeois. What on earth did that leave for us?", asked Fang. "If you want to ask what our 'spiritual civilization' is really lacking, the answer is this: a democratic spirit."[66]

Only by going abroad was he able to see the depth of feudal attitudes in his own socialization, said Fang, and fully realize that such phenomena as secret informants are not accepted as routine in democratic countries.[67] Feudal attitudes arise from a deep expectation that superiors will dictate and inferiors will do what they are told, and are incompatible with democracy. "Democracy is first and foremost the rights of individuals, and it is individuals who must struggle for them," Fang told the students at Tongji. "Expressions like 'extending democracy' and 'loosening up' would have you think that democracy can be bestowed upon us by those in charge. Nothing could be further from the truth."[68] (Reformist vice-premier Wan Li forced Fang into a public debate on the question of "democratization from above" at USTC in December 1986.) The attitude in democratic countries is that government exists to serve the citizen, continued Fang, not the other way around; only when people feel this way will they demand – and obtain – control over their own affairs.

It was time for Chinese intellectuals, Fang told the *World Economic Herald* in November, to "straighten their bent backs" and assume their social responsibilities.[69] Besides working to bring themselves and China up to world standards in their various fields, their greatest responsibility was to manifest a democratic spirit, starting with demanding their own rights. Despite the fact that specialized

65. *Ibid.* p. 206.
66. *Ibid.* p. 210ff.
67. *Ibid.* p. 211.
68. *Ibid.* p. 206.
69. "Zhishifenzi wei bei chengren wei shehui jinbu zhudao liliang" ("Intellectuals have not been recognized as a leading force for progress"), *Shijie jingji daobao* (*World Economic Herald*), 24 November 1986.

knowledge makes intellectuals a "leading force of production" in technological societies, Chinese intellectuals were continuing to allow themselves to be paid and treated like a "stinking ninth category." But the most serious problem, Fang told students at Jiaotong and Tongji, is that intellectuals have been content to be "docile instruments used by others," rather than critical thinkers. "Chinese intellectuals need to insist on thinking for themselves and using their own judgement, but I'm afraid that even now we have not grasped this lesson."[70] The power that intellectuals should rely on is not the power of the state or official orthodoxies, but the liberating power of knowledge and reason. "Only when you believe that you know something independently are you really free from relying on authorities outside the intellectual domain, such as the government.... Within the sphere of science and the intellect, we must make our own judgements based on our own criteria."[71]

To emphasize his point, Fang returned to science. A journal for which Fang was an editor had received a letter from "China's ideological generalissimo, Hu Qiaomu" complaining that a certain article on cosmology was idealistic and should be retracted. After deliberation the editorial board had decided to ignore the demand. While they would be happy to argue science with anyone on an equal footing, Fang told the students, they would not grovel before the whip of Marxist philosophy: "If you know some physics, then we can have a debate; we're more than willing to do that. But if you don't know physics, then get out of the damned way! This is the kind of spirit you have to have to safeguard democracy."[72]

The Campaign Against Bourgeois Liberalization

Despite his sharp criticisms, Fang's speeches were upbeat about the prospects for long-term change. Within a few months, however, Fang was forced to admit that his remark to Jiaotong students that "now nobody is afraid of anybody" in China was excessively optimistic. In late December, USTC students demonstrated in Hefei against rigged elections for local People's Congress. The strike quickly spread to other campuses in Nanjing and Shanghai, and then to Beijing. In early January 1987 the Central Committee put an abrupt stop to the demonstrations and inaugurated the Anti-Bourgeois Liberalization (ABL) campaign. Fang was stripped of his Party membership and relieved of all his duties at USTC.

Documents issued by the Anhui Party committee on 17 January cited five reasons for Fang's expulsion from the CCP: (1) "denying the guiding role of Marxism"; (2) "denying socialism, calling for complete westernization, and advocating the capitalist road"; (3) "publicly

70. Fang Lizhi, "Democracy," in *Responsibility Under Crisis*, p. 212.
71. *Ibid*, p. 212.
72. *Ibid*. p. 215.

calling for changes in the Party and denying its leadership"; (4) "encouraging students and intellectuals to seek complete independence from the Party"; and, (5) "inciting students to make trouble and damage political unity and stability."[73] For his own part, Fang later contended that neither the student protests nor ideological errors *per se* were at the root of his expulsion. He had opposed street demonstrations from the outset, Fang claimed, and in fact it was he that convinced USTC students to abandon their sit-in at the Hefei Party headquarters. As far as political heresies were concerned, Fang asserted that he was only saying publicly what others in the Party were saying privately: that no one really believed in Marxism any more.

The more likely cause of his troubles, Fang felt, was that he had criticized people by name, including Zhang Baifa and Hu Qiaomu, making some powerful enemies. An additional factor was bureaucratic jealousy, because USTC, which is under the jurisdiction of CAS, had outperformed universities under the jurisdiction of the State Education Commission in national rankings.[74] Whether or not Fang is entirely correct about these motivations, it is clear that his expulsion involved a complex mixture of personal, political, bureaucratic and philosophical issues, of the sort that Carol Hamrin has described as "policy packages" at the heart of Dengist politics.

The "New Enlightenment": May 4th Revisited

The removal of Fang and Guan Weiyan from their USTC posts marked the first openly political actions taken against prominent scientists in the Deng era. Zhao Ziyang and the reformist leadership, worried about the impacts on science and technology, repeatedly announced that the campaign would not be allowed to spill over into the professional sphere. An attempt was made to separate Fang's science from his politics; even while he was still being publicly criticized in January and February, his research activities in his new post at the Beijing Observatory were widely reported.[75]

Yet unintended consequences beset the campaign against Fang at every turn, starting with the galvanizing influence it had on the scientific community. Many scientists refused to provide the expected *pro forma* criticism of Fang, and many of those who did were ostracized by their colleagues. Far from repudiating Fang, students in Beijing's Haidian district elected Li Shuxian as their People's Congress representative by a landslide. In an undeniable blunder by the Party, the distribution of Fang's speeches to local Party branches for criticism won Fang admirers nationwide among people who were previously unaware of his ideas.

73. "Zhonggong Anhui sheng jilu jiancha weiyuanhui guanyu kaichu Fang Lizhi dangjie de jueding" ("Decision to expel Fang Lizhi from the Communist Party, by the Anhui Communist Party Discipline Inspection Committee") 17 January 1987.
74. Fang Lizhi, Interview, in *Jiushi niandai*, p. 72.
75. See *Beijing Review*, 9, 23 March 1987.

For his own part, Fang refused to acknowledge any wrongdoing or write a self-criticism. With foreign media already emphasizing the obvious parallel with Sakharov, Fang's extraordinary behaviour made him a cause célèbre. Fang continued to "report his findings"; his frank responses to questions led to commotion on both occasions he was permitted to travel abroad. In the summer of 1987, Fang went to Italy, where he gave interviews to *Der Spiegel* and the Hong Kong monthly *Zhengming*. Declaring that Marxism was for all intents and purposes dead and had been so for some time, Fang applied Planck's maxim about the acceptance of new paradigms in physics – that sometimes an older generation has to die off before new ideas can be accepted – to China and the current CCP leadership.[76]

Fang's remarks resulted in the revocation of his travel permit until August 1988, when he was allowed to attend a conference in Australia. There, and in Hong Kong en route, Fang remarked on the pervasiveness of corruption and nepotism in the Party, from local bosses to the Politburo. Fang tied these problems to a lack of democracy and human rights, which he argued provide the only firm basis for official accountability. Though his remarks were ostensibly unintended for public consumption, they soon made their way into the headlines, arousing the ire of Deng Xiaoping, who reportedly spoke of suing Fang for slander. While no legal action ensued, Fang's planned research trip to the U.S. was cancelled.

In December 1988, Andrei Sakharov wrote a letter on Fang's behalf to the Chinese government, requesting that Fang be allowed to travel.[77] As if passing the favour on to another dissident, on 6 January Fang wrote his now-famous open letter to Deng Xiaoping, requesting the release of Wei Jingsheng and "other political prisoners." Fang's letter provoked other intellectuals to follow suit. One letter on 26 February was signed by 42 prominent scientists and academicians, with Xu Liangying and physicist Qian Linzhao, emeritus president of USTC, at the head.[78] These unexpected expressions of dissent, and the international attention drawn to the police action that prevented Fang and his wife from attending President Bush's dinner, helped focus unprecedented scrutiny on human rights issues in China.

In his writing and in the discussion "salons" springing up in cultural and student circles in Beijing, Fang responded to the issue of Chinese nationalism that had come to a head in the summer of 1988 with the screening, and banning, of the TV series *River Elegy*. To Fang, with belief in Marxism fading, the Party leadership had increasingly resorted to appeals to nationalism – in the name of "Socialism with Chinese Characteristics" – to prop up their authority; at the same time they opposed democracy by labelling it "complete westernization." In response, Fang facetiously remarked that there is

76. *Zhengming*, July 1987, p. 20.

77. Daniel Southerland, "Sakharov appeals to Beijing: China asked to lift ban on dissident," *Washington Post*, 15 December 1988.

78. *Jiushi niandai* (*The Nineties*), April 1989, pp. 20–28.

no "physics with Chinese characteristics, only good physics or bad physics"; and that democracy and human rights are a human universal, not the sole possession of bourgeois or western society. "Is it possible that our leadership is telling us that Chinese people are too good for human rights?" Fang asked at one point.

On 24 February, Fang spoke to the History of Science Society at Beijing University on "Patriotism and World Citizenship." As authorities had decided to stress patriotism rather than "science and democracy" in official May 4th observances, Fang began, he wanted to discuss some of the drawbacks of patriotism. While love of home and hearth can be commendable, patriotism is "an emotion constantly subject to political exploitation;" it should not be a guiding principle. "Whether something is or isn't Chinese is not the issue," said Fang. "You can't go tip-toeing around for fear of challenging anything that is labelled 'Chinese'.... The validity of human rights does not depend on the particular culture involved." As in natural science, "truth doesn't distinguish between localities."[79]

In fact, Fang continued, in the highly interdependent world of the present, nationalism is a dangerously outmoded concept. Global problems of environment, development and security can no longer even in principle be solved by one nation alone, including China. Noting that "to those of us who work in astronomy, it is clear how small the earth really is," Fang argued that "national boundaries need to be weakened, not strengthened"; the challenge of the present is to create a "truly global civilization." In conclusion, Fang praised Einstein's concept of world citizenship. Einstein's idea of a unified field theory was poorly received during his lifetime, said Fang, "and even criticized by Marxist–Leninists as idealistic.... But time has shown the true profundity of Einstein's scientific thought. His idea of world citizenship was also severely criticized at the time; it was called 'cosmopolitanism' (*shijie zhuyi*). But in the years ahead, the human race will have to come to grips with this idea as well."

If Fang's political outlook had by this point expanded into a kind of whole-earth federalism, within a few months his personal universe had collapsed back into a black hole inside the U.S. embassy. On 6 June, two days after the Tiananmen massacre, Fang and Li Shuxian sought and received political asylum. Arrest orders against Fang and Li charged them with being prime conspirators behind the "counterrevolutionary unrest," though there is no evidence that they had any direct involvement in the demonstrations. In a moment of abiding irony, the Chinese government declared that in order to prevent the couple's escape it was closing the nation's borders, making Fang and Li the symbolic pretext for an at least temporary end to *kaifang*.

While the pair were roundly condemned in nationwide media

79. Fang Lizhi, "Patriotism and world citizenship," in George Hicks (ed.), *The Broken Mirror: China After Tiananmen* (1990, forthcoming).

throughout June, particularly vitriolic attacks on Fang emanated from his old nemesis, the *Beijing Daily*. A collection of these commentaries, along with documents from the 1987 ABL (this time, Fang's speeches were not included), was issued by the central Party Discipline Inspection Committee in the form of a criticism pamphlet. "The Real Face of Fang Lizhi" concentrates for the most part on labelling Fang a traitor to China and servant of foreign powers. Criticism appeared less frequently as the crisis over Fang and Li's presence in the embassy waned. But in August the *Beijing Daily* again criticized Fang – for his "cosmopolitanism."

Conclusion

"I am just a physicist," Fang Lizhi has said, disclaiming orginality or sophistication for his political ideas, "who has expressed his views on injustice and irrationality in his society."[80] Yet Fang's identity as "just a physicist" has figured centrally in his ability to express those views and in the impact they have had. From the outset of the Dengist programme, science has been seen both as a vital engine of technological and economic growth, and as a theoretical pillar of the regime's authority. An interpretation of Marxism as the embodiment of scientific empiricism and exploration – symbolized by such slogans as "practice is the sole criterion of testing the truth" and "emancipating the mind" – has been the basis of Dengist justifications of policy changes and critiques of Maoist utopianism.

Yet these invocations of science and openness have been regularly contradicted by the Party's own pretensions to transcendant authority. Public life generally has been buffeted by policy reversals and episodic purges of spiritual pollution, as a divided leadership lurches between the competing claims of charisma and modernity.[81] Such conflicts are evident within the sphere of science and technology itself, from cosmic claims of a Marxist "guiding role" over scientific theory to more mundane control over science and technology enterprises by Party bureaucrats (dramatized in a 1986 movie about the frustrations of a hapless engineer, *The Black Cannon Incident*). Fang's life illustrates that forces for change in the scientific sector are not so different from those among the cultural intelligentsia as is often supposed.

Starting from his own experiences as scientist and citizen, Fang Lizhi came to argue that scientific and social progress share a common requirement for pluralism and individual rights, which he finds fundamentally at odds with the Party's monopoly on intellectual and political authority. As Fang told students at Tongji, "if science, democracy, creativity, and independence are in conflict with the 'Four

80. Fang Lizhi, "xuyan" ("Foreword"), *After Praising the Lord.*

81. Kenneth Jowitt, *The Leninist Response to National Dependency* (Berkeley: Institute of International Studies, 1978).

Upholds'... it's because the 'Four Upholds' advocate superstition instead of science; dictatorship instead of democracy; conservatism instead of creativity; and dependency instead of independence."[82] In response Fang called on individuals to seize democracy within their own spheres, which for intellectuals begins with "straightening their bent backs" and asserting their independence of mind. The sudden galvanizing of intellectual disaffection in the spring 1989 demonstrations seems to dramatically confirm Fang's contention that he has "only said what many others feel." How deeply his ideas resonate throughout Chinese society at large is a question to be answered only through the continued unfolding of events in the wake of Tiananmen.

How did Fang Lizhi come to play the role he has played? Clearly, he is a bona fide product of the Chinese revolution, from his indoctrination in a scientific ethos and revolutionary idealism at Beida in the mid 1950s, to the brutalization and disillusionment of two relentless decades of mass campaigns, to being thrust through an abruptly opened door to the outside world and told to "seek truth from facts." Yet the crystallization of Fang's nascent humanism into an outspoken campaign against dictatorship is more than a function of conditions in China. Fang's own qualities have played an important part: his "five red categories" class background; his communication skills; his professional success; his decision to study cosmology. What is most important is perhaps least easily explained: Fang's refusal to accept the comfortable life of travel and research offered to an elite scientist in Dengist China, preferring instead to criticize Engels and call for democracy. Invoking the inspiration of science, Fang Lizhi chose to live outside the "Velvet Prison."[83]

The divergent trajectories of events in China and the rest of the socialist world during the last year have raised again the cultural question in Leninism. Throughout Eastern Europe, now throwing off an externally imposed system, there is for better or worse the prospect of the return of national culture. In China, the resurrection of May 4th themes in last year's demonstrations promised only a return to the unanswered questions of decades past. It is an irony of the present situation that China has produced in Fang Lizhi the sort of modern citizen cast as the May 4th ideal – independent, scientific, and committed to his civic responsibilities – and been unable to accept him. But of the many ironies surrounding Fang, none is more trenchant than this: that Chinese Communism was born under Chen Duxiu's banner of "science and democracy" 70 years ago, and that it may yet be under this banner that Chinese Communism will be laid to rest.

82. Fang Lizhi, "Democracy," in *Responsibility Under Crisis*, p. 226.

83. Geremie Barme, "The Chinese velvet prison: Culture in the new age, 1976–89," *Issues and Studies*, Vol. 25, No. 8 (1989).