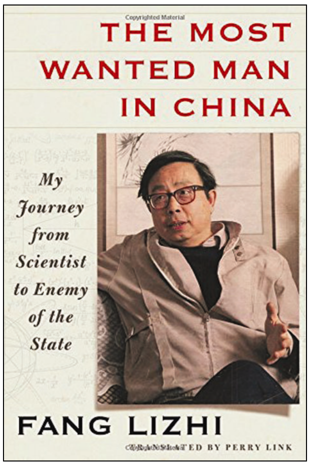

The Most Wanted Man in China: My Journey from Scientist to Enemy of the State. Fang Lizhi. Translated by Perry Link. Henry Holt and Company, LLC, 175 Fifth Avenue, New York 10010, USA. 2016. 352 pages. Price: US$ 32.00.

This book is the autobiography of a distinguished Chinese physicist, Fang Lizhi, who worked in several areas of theoretical physics, mostly in relativity, astrophysics and cosmology. The book is written in Chinese and is translated by his close friend Perry Link, who is a great scholar of Chinese language and civilization. The book describes Lizhi's experiences and the working conditions of scientists in China during the period 1940–1990.

The communist revolution took place in China while Lizhi was still a young student. During this period he became one of the many Chinese scholars who were swayed by the wave of communism and became a follower of Mao Zedong. He admits that his life progressed smoothly as a young college student on three fronts – physics, romance and communism. Despite the fact that he was an active member of the Communist party from an early age, in later years Lizhi faced many difficulties in pursuing science in China, which continued for many years till he was expelled from the party.

Lizhi's childhood, parentage and schooling are described briefly, as he claims them to be rather usual of the period. His father was a clerk in the post office, earned a meagre salary and had a large family, because of which they had to live in poverty. Lizhi was a brilliant student and after finishing his studies was appointed in the teaching staff of the Physics Department of Peking University. The most engaging descriptions in the book are of the times during the 'Great Leap Forward' and 'Cultural Revolution'. In this period Lizhi and many of his colleagues in the University, including his wife Li Shuxian, were forced to work in remote villages in the fields. He spent more than a year in a remote village during the 'Great Leap Forward' and after his release, joined the University of Science and Technology of China. Some years later, he was forced to work in the coal mines and also in factories. Each time after these interludes he came back to the University of Science and Technology of China to resume teaching and research. During one such interlude he realized that Marxism and physics are an anathema to him.

The book has plenty of subtle humour and fine descriptions of some key events and personalities. For example, Lizhi writes: 'You can't cheat physics', while describing the arguments of the celebrated Chinese physicist, Qian Xuesen, who is widely acknowledged to be the man behind Chinese nuclear and space programmes. The arguments pertain to an article written by Xuesen, where he describes potential increase in agricultural production several fold due to absorption of solar energy. This argument is widely believed to have had adverse consequences on agricultural practices and eventually to famine during the 'Great Leap Forward' in the late 1950s, resulting in the death of millions of Chinese. Lizhi criticizes Xuesen for his lack of understanding of nonequilibrium thermodynamics, but even more importantly, for his brazen attempt to move closer to the communist leadership. Unfortunately, criticism of Xuesen, including a scientific critique was not easy in the communist regime, which led Lizhi to remark: 'How can a country that imprisons Science expect anything but disaster?'

Lizhi was a great believer and advocate of human values and rights. He propagated his views fearlessly among students, because he believed that only with full freedom of speech and thought science in China could flourish to attain international heights. From time to time he was troubled by the communist regime suspecting that he was working against the policies of the communist party. However, because of his eminence in physics, Lizhi rose at an early age to become Vice President of the University. During this period, he published a large number of papers and mentored many students who continued his work.

During his Professorship in the University of Science and Technology of China, Lizhi received many invitations from abroad. After the death of Mao Zhedong, conditions in China became a little better, and Lizhi managed to visit Cambridge and many other places in Europe and even Pakistan, but he never came to India. He visited the ruins of the ancient Buddha temple in a village between the towns of Butkara and Malam Jabba in northwestern Pakistan. The famous Chinese pilgrim, Xuangang, who travelled to India in the 7th century AD had visited the temple and was in charge of it for some time.

Lizhi was well aware of the ancient Chinese wisdom, specially the Chinese work on astronomy. He also knew about the ancient work of science and civilization in India. He tried to compare the ancient work done in science in China with modern science and came to the conclusion that the older Chinese science was really not science in real sense, similar to what was developed in Europe by Copernicus, Kepler and Galileo. He tried to show that the science of physics is universal and there is no such thing as Chinese physics.

On 4 June 1989, a large gathering of students had assembled in the Tiananmen Square in Peking to protest against the anti-intellectual actions of the Government. When the crowd became uncontrollable, the government troops opened fire and hundreds of students were killed. This event caused a major uproar in China and the whole world. The authorities of the Chinese Government suspected that Lizhi had instigated the students. They immediately ordered for his arrest and he became 'the most wanted man in China'. Lizhi and his wife went into hiding and decided to leave China. They took refuge in the US Embassy in Peking, where they stayed for about a year in a special isolated room. After many negotiations between the US Ambassador and the Chinese Government, Lizhi was allowed to leave China along with his wife by a special American military plane on 25 June 1990. He arrived in Cambridge and stayed there for six months and later went to USA to work in Princeton University, from where after a year he shifted to Arizona to work as a professor of physics in the University of Arizona at Tuscan. It is interesting to note that the Head of the Department of Physics in the University was an Indian, Sumit Mazumdar who gave him all the support needed to work. Lizhi published 162 research papers while in Tuscan and helped many Chinese students to come to USA to work with him. He worked for about twenty years in Tuscan and died due to 'valley fever', a rare lung disease of the American desert.

Lizhi had two sons – Fang Ke and Fang Zhe. They could not go with their parents to the US when they escaped from China. The children were sent to the US after a great deal of effort made by several Lizhi's friends. Most unfortunately, one of his sons, Zhe, was killed in a car accident when he was only 16 years old.

The book contains a foreword and an epilogue, rather a long one, both written by Link. The main book ends with the flight of the Lizhis to America in 1990. Link describes in the epilogue the life and work of Lizhi in America from the time of his arrival till the time of his death in 2012.

Link writes, 'Some people call Fang Lizhi China's Sakharov, and that is fine. According to some others Fang and the Communist party of China are more like Galileo and the Roman church. An astrophysicist against powerful and arbitrary authority; the authority persecutes the physicist, but the physicist gets the truth right'.

The book describes vividly the troubles faced by scientists and intellectuals during the communist regime of China, especially in a period famously called the 'cultural revolution'. Mao Zedong treated intellectuals with great disdain, at times describing them as 'intellectuals are short on intellect because they can't plant crops or slaughter pigs'. After reading this book, it appears that the conditions for doing science were far better in India. When modern science arrived in India, the British treated the Indian scientists with dignity. The Indian scientists should appreciate that modern science in the real sense came to India with the British and that the rulers never came in the way of scientific pursuit, nor did they harass any scientist. Even the nationalists like Jagdish Chandra Bose and Prafulla Chandra Ray could carry out their work without any hindrance. Significantly, it was an Englishman of the Madras Port Trust, Sir Francis Spring, who encouraged S. Ramanujan and arranged to send him to G. H. Hardy in Cambridge. It is because of Hardy's initiative that Ramanujan could do his epoch-making work in mathematics and attain world fame. After the British left India, the subsequent Indian governments, especially under the leadership of Jawaharlal Nehru, helped and encouraged scientists to develop and promote science in India.

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Annual Review of Pathology: Mechanisms of Disease, 2015. Abul K. Abbas, Stephen J. Galli and Peter M. Howley (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 10. viii + 576 pp. Price: US$ 65. ISBN978-0-8243-4310-1

What can be said about the *Annual Review* that has not been stated before? All of us know that the series contains articles on, to use those two cliches, 'cutting edge' information on the 'state-of-the-art' of medical research. It has, quite deservedly, among the highest impact factors among the periodicals, in all of the subjects that the series covers. This volume too, joins the others in the pathology series as an outstanding one. The topics are as diverse as before – some on the basic processes in the pathological cell, and some on specific diseases. There are 576 pages in this volume, compared to 386 in the previous volume and much of this is because of one chapter of 68 pages. The interview with a pioneer in the field is, however, not present in this issue and that is a pity, because I have found these interviews absolutely fascinating. The choice of subjects includes endoplasmic reticulum stress, driver and passenger mutations in cancer, inflammasomes and autoinflammatory diseases, molecular pathogenesis of renal carcinoma, pathobiology of transfusion reactions, diseases of pulmonary surfactant homeostasis, DNA replication stress and cancer, and also topics most pathologists would not even be aware of.

The best example of this in the book is the chapter on 'Engineered *in vitro* disease models'. As is obvious, procuring appropriate disease models is not easy. Mice are not men and despite the best of research being done on mice and other animal models, sometimes the results are simply not applicable to human beings. Cell lines have distinct uses for understanding certain mechanisms of a disease, but fall far short of replicating the real case – a human being. While getting human models for all diseases is impossible for practical and ethical reasons, Ingber and colleagues write a scintillating and detailed essay (yes, this is the 68-page article) on tissue engineering using organ-on-a-chip and 3D cultures, which is a step ahead in our attempt to develop disease models.

The range of diseases and organs that can be studied and are being investigated is vast – there are engineered heart valve models, cardiac tissues, chronic obstructive respiratory disease, inherited liver diseases, drug-induced nephrotoxicity, deep-vein thrombosis, schizophrenia, etc. I note with some interest that among the diseases studied are microcephaly: ordinarily, a disease that may not have been top of my list to read about, because it is uncommon – but which I notice now with great interest, because of the recent news reports that the just-discovered Zika virus is known to cause microcephaly.

How special this tool is, is clear from these astounding facts which sound like science fiction: the microfluidic kidney-on-a-chip device is composed of human kidney proximal convoluted tubule cells which mimic the conditions in the living proximal convoluted tubule. When exposed to physiological fluid flow, these cells show primary cilium formation, alkaline phosphatase activity, albumin transport, glucose reabsorption and Pgp transport function compared to cells in static Transwell culture. Similarly, Caco-2 cells, derived from an intestinal tumour, when exposed to cyclic mechanical distortion analogous to peristalsis, reorganize into 3D intestinal villi, including differentiating into the different cell types of the intestine.

Given the fact that rogue respiratory viruses have been in much of the news this century, beginning with the SARS