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## Obituary

### **Shozo Motoyama (1940-2021): A Life in the History of Science and Technology**

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Shozo Motoyama was the son of Japanese immigrants established in the interior of São Paulo State, Brazil, which was then undergoing a rapid economic expansion and had received a large number of settlers from all over the world. His father, a professor of mathematics, instilled in him a taste for the natural sciences, which led him to take a degree in physics at the University of São Paulo (USP), which he concluded in 1967. Initially, he thought of specializing in astrophysics, but at the time of his doctorate (concluded in 1971), he had completely changed his mind, and his dissertation was about the logic of research in Galileo. His Ph.D. counselor was the historian Eurípedes Simões de Paula, a long-time

director of USP's Faculty of Philosophy, Sciences and Letters. This earned him the invitation, along with his colleague physicist, Maria Amélia Dantes, to join the Department of History at the newly re-organized Faculty of Philosophy, Letters and Human Sciences.

From this time, he organized a course on the History of Science by inviting several scientists with interest in the history of their respective fields, which was transformed into one of the first publications in Brazil dealing with this subject (Motoyama 1974). One of his early concerns, already expressed in this publication, was with the public image of science, which emphasized either the almost miraculous capacity to cure mankind's evils, and thus earning and deserving eternal praise, or the opposite trend, blaming science for mechanization, pollution, war weapons, breaking the ecological equilibrium, thereby deserving despise and contempt. The misunderstanding results from scientific illiteracy, which prevented people from grasping the nature of science. In his words,

This illiteracy is present at all levels. Even the scientist is no exception to the rule... the laymen are not to blame for this state of things... History of science acquires within

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this panorama unquestionable importance... The historical analysis provides the elements for understanding science as culture, or else, as an active factor for the technical production. (Motoyama 1974, 13)

At this time, Motoyama was very much influenced by the generation of American historians of science which included prominent names such as John Randall Jr., Alistair Crombie, and Edward Grant. Another major guidance came from the Japanese physicist Mituo Taketani (1911-2000), whom he met both in Japan (where he conducted a post-doctorate in 1975), and in Brazil. Taketani was a prestigious physicist, a student and coworker of Nobel Prize Hideki Yukawa, (who proposed the meson theory), and he was a strong advocate for the Communist Party, which prompted him to publish a Hegelian-Marxist philosophy of science known as the three-stage theory. In his understanding, to put it very briefly, science starts from a phenomenal stage, which is dedicated to the description of natural phenomena known through experience. In the second, substantial stage, science asks what sort of substance may compose and structure such experimental findings. Then in the third stage, the question becomes what is the essence of the phenomenon and the substance. This synthesis at the essential stage goes on to a similar new cycle of three stages, continually repeated at higher levels of understanding. Motoyama did much to have Taketani's works translated into Portuguese, although one could say that at the same time he was also an admirer of Thomas Kuhn's and Karl Popper's models of science.

Early in his teaching career, Motoyama became a tenured professor in 1976 at the University of São Paulo, after which he began to pioneer postgraduate courses in the history of science. There had been isolated initiatives there and at a few other universities in this field, but institutionally it was the first time that a line of research entirely dedicated to the history of science and technology emerged in Brazil. Thus began the formation of a number of masters and doctors, including well-known names such as Ruy Gama, Olival Freire Jr., Carlos Maia, Francisco Assis de Queiroz, and many others. In 1990 he became the first Full Professor in the History of Science, an unprecedented title not only at the University of São Paulo, but also in Brazilian terms.

He had an unexpected opportunity, and succeeded in coordinating a new and temporary Center for the History of Science and Technology in Brazil, with support from UNESCO (1980-1983), in addition to receiving several grants from the São Paulo State Research Foundation (FAPESP). Due to his ease in establishing contacts with researchers from different lines of thought, Motoyama was an essential person for the foundation in São Paulo, at the end of 1983, of the SBHC (Brazilian Society for the History of Science), of which he was secretary for several years.

Afterwards in his academic career, he was happy to receive an invitation to create at the University of São Paulo a permanent Center for the History of Science (CHC) in 1988, which soon became an aggregating center for distinguished professors who were interested in the subject, such as the engineer Milton Vargas and the architect Júlio Katinsky, among several others, coming from various units in the campus.

Motoyama directed the CHC until his retirement in 2009. It is also worth mentioning the close ties he established with the Brazilian Institute of Philosophy (IBF), through jurist and philosopher Miguel Reale. Due to his Oriental ancestry, he was invited and served for several years as director of the Historical Museum of Japanese Immigration in Brazil, located in the Liberdade district in São Paulo, a neighborhood of Japanese descendants. He became a member of the São Paulo Academy of History in 2004, and also of the Historical and Geographical Institute of São Paulo in 2005.

Motoyama's bibliographic production was intensified after he shared the joint coordination with Mário Ferri of the three-volume work, *História das Ciências no Brasil* ("History of Sciences in Brazil", 1979-1981), which took as a model that of the earlier publication *As Ciências no Brasil* ("Sciences in Brazil", organized by Fernando de Azevedo). In

addition to this, several researches carried out at the CHC were the core of another book he organized, *Tecnologia e industrialização no Brasil: uma perspectiva histórica* (Technology and Industrialization in Brazil: a Historical Perspective, 1994).

In this work he laid one of the cornerstones of his commitment to the historical study of Brazilian science and technology. He had frequently observed that there were already several valuable books discussing the Brazilian industrialization, but little attention had been paid to the role of science and technology as variables for the general economic development in the country, and industrialization in particular. The dynamics of the interchange between technological phenomena and the structure of industrialization was waiting for scholars to be analyzed (Motoyama 1994, 20-21).

An earlier written statement of 1993 (published only in 2008) reflects how Motoyama's concern with a recognition of national scientific and technological advancement could be the central *Leitmotiv* for a Brazilian history of science:

Thus, for conducting research that is socially and culturally significant it is not enough to publish international papers, completing here and there dissertations already developed elsewhere... What is interesting is the research immersed in its social and economic reality... To efficiently move in this jungle of variables which pertain to the historical process, this strategic vision based on History is fundamental. (Motoyama 2008, 243-244)

After the book mentioned above there followed *O almirante e o novo Prometeu: Álvaro Alberto e a C&T* ("The Admiral and the new Prometheus: Álvaro Alberto and S&T", 1996, together with João Carlos Vitor Garcia) and a series of many institutional and commemorative histories organized by him, including *Escola Politécnica – 110 anos construindo o futuro* ("Polytechnic School – 110 years building the future", 1994), *Educação técnica e tecnológica em questão: 25 anos do Ceeteps - Uma história vivida* ("Technical and Technological Education in question: 25 years of Ceeteps – A living History", 1995), *Kokei Uehara - Reflexões sobre a Engenharia e a Educação - Para uma Tecnologia Voltada para o Bem-Estar Social* ("Kokei Uehara - Reflections on Engineering and Education - Towards a Technology Focused on Social Welfare", 1998), *Fapesp: Uma história de política científica e tecnológica* ("FAPESP: A history of scientific and technological policy", 1999) and *Para uma história da FAPESP – Marcos Documentais* ("Towards a history of FAPESP – Documentary Hallmarks", with Amélia Hamburger and Marilda Nagamini, 1999) *Cidadania e cultura brasileira – homenagem a Miguel Reale* ("Citizenship and Brazilian Culture – homage to Miguel Reale", 2001), *50 anos do CNPq – contados pelos seus presidentes* ("50 years of CNPq – told by its presidents", 2002), *Uma associação para a tecnologia brasileira* ("An association for Brazilian technology", 2005), *USP 70 Anos - imagens de uma história* ("USP 70 Years - images of a history", 2006), *Fuvest 30 Anos* ("Fuvest 30 Years", 2007, with Marilda Nagamini), *SEADE. Uma História Exemplar* ("SEADE. An exemplary History", 2007), *Memorial da América Latina 21 Anos* ("Latin American Memorial 21 Years", 2010), *Engenharia Mecânica na Escola Politécnica da USP e suas contribuições para a Sociedade* ("Mechanical Engineering at Polytechnic School at USP and its contributions to Society", 2014, with Marilda Nagamini), *FAPESP 50 anos - meio século de ciência* ("FAPESP 50 years - half a century of Science", 2015), *A presença japonesa na América Latina* ("The Japanese Presence in Latin America", 2016), *Do conflito à integração – uma história da imigração japonesa* ("From Conflict to Integration – A History of Japanese Immigration", 2017).

The younger generations of History students have had contact with Motoyama's thought through his last academic work, the comprehensive synthesis he organized, *Prelúdio para uma História. Ciência e Tecnologia no Brasil* ("Prelude to a History. Science and Technology in Brazil", 2004), covering a panorama extending for almost five centuries. Even

considering how much more mature the country had become in the 30 years after he first introduced the theme, he again observed that

It is not easy to understand the relationship of S&T and society. But one thing is certain: it is unnecessary to undertake exhaustive analyses to show ... the insufficiency of research in the country to have a place among the international leaders of this period. ... It is not enough to have a few enlightened and illuminating ones. It is fundamental to have a scientific and technological culture permeating the whole society ... We have already shown ... how two cultural variables – immediacy and rhetorical pragmatism – were deadly for the evolution of S&T in our land. (Motoyama 2004, 42-43)

Shozo Motoyama said goodbye to us 21 days after his 81<sup>st</sup> anniversary, in a characteristic way of his personality: calmly, while sleeping.

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