

A Revolution Across Art and Science

Participatory Knowledge Production in
China's Great Leap Forward

Edited by

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Introduction

Christine I. Ho and Sigrid Schmalzer

In 1958, the Chinese journal *Insect World* heralded the emergence of peasants capable of contributing to agricultural science: “Hearing the call for technological revolution, peasants and insect workers in every locality have bravely broken open the mysteries of the insect world, accurately grasped the life patterns of insects, adopted integrated pest control methods, and engaged in the timely extermination of insect pests.” The article further highlighted a region in Guangxi where peasants combined local plants into a potent insecticide. It declared triumphantly, “There are similar examples all over the country, which shows that China’s entomological research has already cast off the foreign formulas (*yang bagu* 洋八股) and traveled the correct socialist road.”¹ Similarly, when the Zhejiang Art Academy published its 1960 guidelines for artistic and literary criticism, *Introduction to Aesthetics*, their handbook specified that participation in aesthetic judgment was not the exclusive domain of professional critics. Instead, many other participants could also join in deciding whether a poem or painting was beautiful: “Party leaders, literary and artistic administrative cadres, village cadres, workers, and peasants all have the qualifications to do literary and art criticism.”² Even as the editors echoed, unintentionally or intentionally, Marx’s famous illustration of unspecialized labor in communist society—“To hunt in the morning, fish in the afternoon, rear cattle in the evening, criticize after dinner, just as I have a mind, without ever becoming hunter, fisherman, herdsman or critic”—they also underscored the active intervention of laypersons in the production of socialist art and science.

A poster from 1958 presents the vision driving these and myriad other projects of the Great Leap Forward (1958–1962): socialist construction borne aloft by twin revolutions in culture and technology (fig. 0.1). And so, laborers were encouraged to become

1. Benkan weiyuanhui 本刊委員會, ed., “Kunchongxue zai nongye fengchan de juda chengjiu” 昆蟲學在農業豐產的巨大成就 [Major accomplishments of entomology in producing agricultural high yields], *Kunchong zhishi* 昆蟲知識, no. 5 (1958): 199–200.
2. Zhejiang meishu xueyuan lilun jiaoyanshi 浙江美術學院理論教研室, ed., *Yishu gailun (chugao)* 藝術概論 (初稿) [Introduction to art (draft)] (Zhejiang meishu xueyuan lilun jiaoyanshi, 1960), 235.



Figure 0.1: "Construct Socialism: Revolutionize Culture, Revolutionize Technology," 1958. Polychrome print, 25.5 × 19 cm. Landsberger Collection.

weathercasters, curators, historians, fisheries experts, energy producers, writers, tool designers, artists, and industrial technicians. Educational reforms emphasized student discussion and learning from community members over memorization of textbooks. Mass meteorology campaigns tapped folk knowledge to improve reliability of weather forecasts. Experimental studies of folk songs challenged existing representations of human relationships with nature. New research into the science of fatigue recognized the experiential knowledge of factory workers.

Accounts of participatory knowledge production abound throughout the archives and lived memories of Mao-era China. A small sampling might include magazines that were solely devoted to publishing the creative endeavors of amateur photographers and artists; comics (*lianhuanhua* 連環畫) celebrating technical innovations devised by unsung artisans; journal articles detailing agricultural experiments conducted in conjunction with farmers; exhibitions for which workers composed narrative scripts; reports from conferences on worker innovators; and reenactments by cinema audiences who performed the emotions elicited by films.³ Central to these accounts is the role of the masses in introducing native on-the-ground experience into imported systems of knowledge, thereby counterposing foreign, abstract, and specialized expertise (*yang* 洋) with vernacular, embodied, and practical know-how (*tu* 土), as summarized in the slogan “combining *tu* and *yang*” (*tuyang jiehe* 土洋結合).

While mass participation was not unique to the Great Leap Forward (referred to throughout this volume as the Leap), it dramatically accelerated during this period. Along with the rhetoric of voluntarism surrounding mass mobilization and labor retraining for expedited industrialization, the Leap’s grandiose ambitions resulted in sprawling documentation of participatory campaigns that involved the masses across all domains of socialist life. These not only included well-known experiments in steel and fertilizer production but also encompassed lesser-known experiments in arenas as diverse as poetry composition and weather forecasting, tool design and mural painting, calisthenics and museum exhibitions, fisheries and pharmaceuticals, biogas production and history teaching. The Leap left behind a vast corpus of radical experimentation, detailing the successes and travails of work units that involved mass participants in previously specialized work. By taking on this largely ignored archive of mass participation, this volume argues that the Leap’s extension into all facets of scientific and artistic production in socialist China requires understanding it not only as an extractive economic campaign but also as a revolution in the culture of producing knowledge, one that was shared throughout the practices of the scientific, manufacturing, education, construction, literary, and artistic worlds.

3. Vivian Y. Li, “‘How-To’ Make Art in Communist China: Professionalizing Amateur Artists,” in *The Oxford Handbook of Communist Visual Cultures*, ed. Aga Skrodzka, Xiaoning Lu, and Katarzyna Marciniak (Oxford University Press, 2020), 223–47; Denise Y. Ho, *Curating Revolution: Politics on Display in Mao’s China*, Cambridge Studies in the History of the People’s Republic of China (Cambridge University Press, 2017); Rui Kunze and Marc Matten, *Knowledge Production in Mao-Era China: Learning from the Masses* (Lexington Books, 2021); Chenshu Zhou, *Cinema Off Screen: Moviegoing in Socialist China* (University of California Press, 2021); Jie Li, *Cinematic Guerrillas: Propaganda, Projectionists, and Audiences in Socialist China* (Columbia University Press, 2023).

A book on the arts and sciences during China's Great Leap Forward is inherently provocative. Academic treatments of the Leap have multiplied in recent years, but the focus has remained on the economic sphere: specifically, Mao's attempt to fast-forward the transition to a fully communist system and the ensuing famine that claimed tens of millions of lives.⁴ Given the magnitude of human suffering, this emphasis is very much as it should be. And yet, we argue that a full understanding of this calamitous period must do more than count and mourn the dead; it must go beyond simply bemoaning attempts to create steel in backyard furnaces and other infamously "irrational" policies that contributed to the catastrophe. To fully appreciate the painful ironies of this era, we must also examine the state's ambitious efforts to promote the kinds of participatory science and art that continue to excite people around the globe but that have rarely, if ever, been pursued so vigorously or on such a large scale. Even as officials designed and implemented the policies responsible for economic and humanitarian disasters, they were also reimagining the production of knowledge.

Yet the immense tragedy and consequences of the Leap pose serious methodological and ethical challenges. This volume does not ignore the many catastrophes and misjudgments that led to the Leap's estimated thirty million deaths from starvation and related causes. Nor do the authors deny the suffering and lived realities of the Leap, which have been meticulously analyzed by important firsthand narratives and scholarly monographs. At the same time, this volume asks readers to consider experiments with mass participation on their own terms, to deal with the Leap's piles of documentation as not simply fabrications of what would turn out to be a mirage but rather as real events in which real people participated. The authors in this volume take on the methodological problem of reading the Leap's manifold experiments with both skepticism and sympathy, and the assembled essays are linked by an effort to take seriously the radical experimentation and challenges of implementation involved in mass participation.

There was a time when scholarship on the arts and sciences of Mao-era China treated the subject as a tragedy, or worse yet, a farce. The heavy hand of the state seemed to preclude the freedoms deemed necessary for creativity and inquiry to flourish. More recently, scholars have increasingly considered Mao-era arts and sciences "on their own terms," including or even especially during what was once called the "ten-year gap" of the Cultural Revolution (1966–1976).⁵ And yet, until now, the distinctive

4. Roderick MacFarquhar, *The Great Leap Forward, 1958–1960*, Studies of the East Asian Institute (Columbia University Press, 1983); Kimberley Ens Manning and Felix Wemheuer, eds., *Eating Bitterness: New Perspectives on China's Great Leap Forward and Famine* (UBC Press, 2011); Frank Dikötter, *Mao's Great Famine: The History of China's Most Devastating Catastrophe, 1958–1962* (Walker & Co., 2010); Yang Jisheng, *Tombstone: The Great Chinese Famine, 1958–1962*, trans. Edward Friedman, Jian Guo, and Stacy Mosher (Farrar, Straus and Giroux, 2012).

5. The most recent comprehensive such study is Rui Kunze and Marc Matten, *Knowledge Production*. For a useful historiographical overview of science in the Cultural Revolution, along with six case studies, see Danian Hu, ed., "Science, Technology, and Medicine in China's Cultural Revolution," a special issue of *Endeavor* 41, no. 3 (2017): 78–145; Barbara Mittler, *A Continuous Revolution: Making Sense of Cultural Revolution Culture* (Harvard University Asia Center, 2012); Shuyu Kong, Julia F. Andrews, and Shengtian Zheng, eds., *Art and Modernism in Socialist China: Unexplored International Encounters 1949–1979* (Routledge, 2024).

history of the Great Leap Forward has not received its due. While both periods are rightly considered high points of Maoist radicalism, the Cultural Revolution was premised on the notion that the economic sphere had already been transformed and the time was then ripe for a transformation of the superstructure, i.e., the cultural sphere.⁶ The Leap differed profoundly in its far more explicit emphasis on economic development and in the urgency with which the state sought to mobilize the masses to accomplish immediate goals in material transformation. The emphases on labor and production thus infused all endeavors of the Leap, making it a powerful lens through which to view the core elements of Maoist epistemology, including mass mobilization, the primacy of practice, frugality, self-reliance, and decentralization.

In focusing on *knowledge* production, we consciously bridge the histories of the humanities and the sciences, what C. P. Snow in 1959 famously called the “two cultures.”⁷ Since then, Western academics have recognized that gulf as both artificial and stultifying, and they have actively sought to overcome it. This book invites the reader to consider a time and place when the arts and sciences were not considered so estranged. Poetry, murals, exhibitions, and other artistic works were expected to inspire technological innovations, while new technologies made possible new relations between workers and their world, and thus in turn new forms of artistic expression. Juxtaposing cases from the arts and sciences during the Leap also allows us to identify shared epistemological principles, derived especially from Mao’s influential writings on the role of labor in knowledge production and on the relationships among intellectuals, laborers, and the party. We find that the medium very much mattered: participation worked differently in each case. And yet, the examples by no means fracture along the lines of arts versus sciences. What inspired folk songs might fall flat when it came to murals; what worked for meteorology might fail in calisthenics. By assembling ten scholars to contribute their cutting-edge research, we capture both the diversity of experience during the Leap and the multiple ways this contested history may be analyzed.

We also consciously engage with the significance of *production* as a link between the economic and cultural spheres. Here as well, our own disciplinary divides too often get in the way of a holistic analysis. A study may begin with the question of how technological innovations managed (or failed) to result in development—and so never grapple with how the people involved understood the meaning of technology or development in the first place. Or we might start by asking how a certain genre of painting came to flourish in a given period—and wind up with an analysis that does not contend with the transformation of the material conditions in which people painted. In Mao-era China, *production* was an explicit, overriding concern in the material construction of the new socialist political economy; it was simultaneously a potent signifier that saturated the emergent cultural and ideological fabric of state and society. Building on the fundamental insight of cultural studies that knowledge (whether scientific or artistic)

6. Lin Biao, “Why a Cultural Revolution?” in *China’s Cultural Revolution, 1966–1969: Not a Dinner Party*, ed. Michael Schoenhals (M. E. Sharpe, 1996), 13.

7. C. P. Snow and Stefan Collini, *The Two Cultures* (Cambridge University Press, 1993 [1959]).

Possibilities and Limitations of Mass Science

Hydrobiologist Nie Dashu and the Making of Knowledge on Fish Diseases Before the Great Leap Forward

Jongsik Christian Yi

In July 1958, an editorial in the bulletin of Beijing's Ministry of Fisheries declared that socialist collectivization had developed freshwater fisheries across the nation. In a tone typical of Great Leap Forward propaganda, it stressed that the collectivist concentration of manpower and the advancement of communal irrigation would further increase production and soon make "every corner of the whole country a land of fish and rice" (*yu mi zhi xiang* 魚米之鄉). It is not surprising that collectivism, productivism, and optimism—perhaps the fundamental features of the Leap—infused not only agriculture but also inland fish farming.¹ To the extent that such optimism was justified, it owed much to the foundations of "mass science" laid in previous years. And to the extent that such optimism was foolhardy, its roots can also be found in those earlier efforts.

In the early 1950s, the Chinese Communist Party (CCP) and the central government of the People's Republic of China (PRC) encountered war-torn fish farmers and ruined aquafarms across the Chinese mainland. As in many other fields, "science" was summoned by the leaders as a remedy to revitalize fishing communities and the fishery industry. Responding to the new socialist state's request, the hydro-parasitologist Nie Dashu (倪達書, 1907–1992) and his fellow scientists at the Chinese Academy of Sciences Institute of Hydrobiology wedged themselves into the world of the working masses.² In collaboration with local fisher-peasants, they solved everyday issues on site while accumulating and codifying knowledge on fish diseases and health. This work was the warm-up for the fanfare with which the Leap in fisheries would be proclaimed in 1958. A historical examination of the interactions between biologists and villagers in the early and mid-1950s will enable us to better understand the nature of the knowledge that provided a firm basis for the Great Leap Forward. This chapter

1. "Fazhan danshui yuye de liangtiao luxian" 發展淡水漁業的兩條路線 [Two approaches to developing freshwater fisheries], *Zhongguo shuichan* 中國水產, no. 3 (1958): 12–13.

2. The scientist's last name is more commonly Romanized as Ni. However, he used "Nie" when publishing his research in English. Here, I follow his chosen spelling.

engages with ongoing scholarly discussion regarding “mass science” in Mao-era China. Historians of science, technology, and medicine have challenged the idea that socialist China was simply anti-scientific. They highlight that an anti-technocratic, popular democratic, and decolonial vision of science can be found in the revolutionary ideal of mass science. Indeed, providing the majority of the nonelite population with opportunities to participate in the process of making “scientific” knowledge and becoming “experts” in given fields was not only epistemologically liberating but also politically beneficial for the party-state that had to govern a vast and diverse nation.³ Mass scientific endeavors were legitimized by revolutionary politics that valued local peasant (*tu* 土) knowledge as much as transnational, ivory-tower (*yang* 洋) knowledge.⁴ The vision of mass science was also supported by fundamental Maoist philosophical principles, which promoted the idea that as long as determined peasants and workers continued to engage in production and experiment with what was available on the ground, they were bound to succeed in creating “correct” knowledge.⁵

Scholarship on mass science—as a revolutionary and experimental understanding of what “science” is, what it should become, and how it should be practiced—has focused on the controversial period of the Cultural Revolution.⁶ The case studies in this volume set an earlier starting point for examining its development. While subsequent chapters all focus on the Great Leap Forward, I pull back even further, showing the foundations that had already been laid for mass science in the early and mid-1950s, before the radical peak of the Leap. Focusing on a relatively successful case from fisheries science and analyzing scientific journals, research notes, and other documents produced by Nie,⁷ I argue that the possibilities and limitations of mass science were already taking shape before the Leap.

Building Fisheries Science in New China

In the early 1950s, CCP leaders quickly recognized the socioeconomic significance of freshwater aquaculture in the southeast. Zhejiang and Jiangsu Provinces were

3. See Xiaoping Fang, *Barefoot Doctors and Western Medicine in China* (University of Rochester Press, 2012); Fa-ti Fan, “Collective Monitoring, Collective Defense: Science, Earthquakes, and Politics in Communist China,” *Science in Context* 25, no. 1 (2012): 127–54; Sigrid Schmalzer, *Red Revolution, Green Revolution* (University of Chicago Press, 2016); Miriam Gross, *Farewell to the God of Plague: Chairman Mao’s Campaign to Deworm China* (University of California Press, 2016).
4. Schmalzer, *Red Revolution, Green Revolution*.
5. Rui Kunze and Marc Andre Matten, *Knowledge Production in Mao-Era China: Learning from the Masses* (Lexington Books, 2021).
6. Chunjuan Nancy Wei and Darryl E. Brock, eds., *Mr. Science and Chairman Mao’s Cultural Revolution: Science and Technology in Modern China* (Lexington Books, 2013); Danian Hu, “Despite or Due to the Cultural Revolution: The Development of Chinese Science, Technology, and Medicine in the 1960s and 1970s,” *Endeavour* 41, no. 3 (2017): 78–84.
7. This chapter focuses on freshwater fisheries. On the science of oceanography and marine farming in twentieth-century China, see Peter Neushul and Zuoyue Wang, “Between the Devil and the Deep Sea: C. K. Tseng, Mariculture, and the Politics of Science in Modern China,” *Isis* 91, no. 1 (2000): 59–88. On a socioeconomic history of oceanic fishery reform in Northeast China, see Xiaofei Gao, “Making a Coastal Revolution: Farmers, Fishers, and Socialism, 1946–1959,” *Twentieth-Century China* 48, no. 1 (2023): 3–22.

especially well known for breeding the “Big Four” fish—black carp (*qingyu* 青魚, *Mylopharyngodon piceus*), grass carp (*caoyu* 草魚, *Ctenopharyngodon idella*), bighead carp (*yongyu* 鰱魚, *Aristichthys nobilis*), and silver carp (*lianyu* 鱔魚, *Hypophthalmichthys molitrix*). Being caught in high quantities and easily bred in the lower Yangtze region, the Big Four were mainstays of fish markets in and beyond Shanghai and Nanjing, and they were even exported to Thailand and British Malaya in the first half of the century. In 1951, *Science Bulletin* summarized the new government’s goal in the realm of freshwater fishery: “synthesizing the working people’s experience in aquaculture and further developing [the industry] by building upon the existing foundation and utilizing the scientific method.”⁸

As one of the main organizations that would realize the goal, the Institute of Hydrobiology of the Chinese Academy of Sciences was established in February 1950. Although its headquarters were located in the metropolis of Shanghai, and it had two Marine Biological Laboratories in Qingdao and Xiamen,⁹ the majority of the Institute’s researchers worked in the city of Wuxi, Jiangsu Province, where the Freshwater Biological Laboratory had been constructed on the shores of Lake Tai. The Institute of Hydrobiology set the following immediate goals: improving the genetic quality of the Big Four; identifying the optimal practices for mixed farming of different fish; codifying knowledge on fish feeding and everyday management; and developing diverse fishpond fertilizers through experimentation.¹⁰

The most urgent challenge for the Institute and the Laboratory, however, turned out to be coping with fish diseases. On June 15, 1950, only four months after its founding, the Institute received a report from a peasants’ association in Linghu District, Wuxing County, Zhejiang, on a possible outbreak of “fish plague” (*yuwen* 魚瘟). A week later, the Institute dispatched five biologists to Linghu. The scientists decided to investigate all fourteen aquafarms in the district, conducting water-quality tests and autopsies on thirty dead carp. After a series of follow-up examinations, in September the Institute concluded that the “plague” affecting multiple fishponds in Linghu was in fact the phenomenon now called “eutrophication”: excessive growth of microorganisms in the water reduces oxygen levels, which can culminate in mass death of fish. The growth is usually caused by adding too much feed or not properly managing fish feces. Having determined the cause, Institute researchers then taught local cadres and fish farmers how to control water quality to prevent the phenomenon.¹¹

8. Shuisheng shengwu yanjiusuo 水生生物研究所, “Zhongguo danshuiyu yangzhi shiyan” 中國淡水魚養殖試驗 [Experimental trials of freshwater fish farming in China], *Kexue tongbao* 科學通報, no. 8 (1951): 875.
9. The headquarters of the Institute of Hydrobiology were moved from Shanghai to Wuhan, Hubei, in late 1954. For more information on the Qingdao Marine Biological Laboratory and the prominent phycologist C. K. Tseng 曾呈奎 (Zeng Chengkui, 1909–2005), see Neushul and Wang, “Between the Devil and the Deep Sea.”
10. Shuisheng shengwu yanjiusuo, “Zhongguo danshuiyu yangzhi jingyan”; Wang Jiaji 王家楫, “Zhongguo kexueyuan shuisheng shengwu yanjiusuo de jieshao” 中國科學院水生生物研究所的介紹 [Introduction to the Institute of Hydrobiology, Chinese Academy of Sciences], *Shengwuxue tongbao* 生物學通報, no. 8 (1953): 290–91.
11. Shuisheng shengwu yanjiusuo 水生生物研究所, “Fangzhi Linghu yuwen de jingguo” 防治菱湖魚瘟的經

Although the Institute of Hydrobiology successfully responded to the “fish plague” in Linghu, it was deluged with similar or more severe crises from Jiangsu and Zhejiang over the following several years. In addition to eutrophication, diseases were also rampant in the region’s ponds and fish farms. Outbreaks of parasitic, bacterial, and viral diseases in the southeast, not to mention other areas of the country, simply went beyond the manpower of the Institute. The scarcity of fish health specialists trained in the republican era exacerbated the situation. In 1951, the average mortality rate of black and grass carp in Wuxi rose to 60 percent. The number in Wuxing in 1952 was still about 47 percent. The Institute needed a breakthrough.¹²

In the fall of 1952, the leaders of the Institute committed to building a new research institution specializing in preventing and treating fish diseases. They reorganized the Institute’s Parasitology Group and created the Fish Disease Group. In March 1953, the Fish Disease Group came to establish China’s first modern fish disease research agency, the Fish Disease Work Station, in Linghu. A protistologist named Nie Dashu was in charge of the Station. On-the-ground research at the Station and other branches of the Institute of Hydrobiology, initiated in the early 1950s and carried through the Great Leap Forward into the first half of the 1960s, spearheaded the emergence of fish pathology as a distinct scientific field in socialist China.¹³

Born to a peasant family in Wuxi, Nie Dashu entered the Department of Biology at the National Central University in Nanjing in 1928. Immediately after graduating from the university in 1932, he started working as a research scientist at the Institute of Zoology at Academia Sinica. By 1946, Nie had become one of China’s leading specialists in marine protists, which enabled him to receive the Advanced Research Fund from the republican government as well as a grant from the American Philosophical Society. These awards allowed him to spend two years in the Department of Zoology at the University of Pennsylvania.¹⁴ In 1949, rather than moving with the Guomindang to Taiwan, he chose to stay on the mainland with his Academia Sinica mentor—another renowned, Penn-trained zoologist named Wang Jiaji (王家楫, 1898–1976). Nie then dedicated himself to research on fish diseases and health at the Institute of Hydrobiology until his death in 1992.¹⁵ In the sections to follow, I delve into how Nie Dashu and his

過 [The process of preventing and controlling the fish plague in Linghu], *Kexue tongbao* 科學通報, no. 7 (1950): 489–90.

12. Dashu Nie 倪達書, “Zhongguo kexueyuan shuisheng shengwu yanjiusuo sinian lai de yubing fangzhi gongzuo” 中國科學院水生生物研究所四年來的魚病防治工作 [Four years of fish disease prevention and control work at the Institute of Hydrobiology, Chinese Academy of Sciences], *Kexue tongbao* 科學通報, no. 11 (1954): 43.
13. Han Yufen 韓玉芬, “Linghu yubing gongzuozhan: Xiandai kexue gaizao Zhongguo chuantong yangyue de xuqu” 菱湖魚病工作站: 現代科學改造中國傳統養魚業的序曲 [Linghu Fish Disease Work Station: The prelude to the modern scientific transformation of traditional fish farming in China], *Shuisheng shengwu xuebao* 水生生物學報, no. 5 (2020): 1028–39.
14. Dashu Nie, “The Structure and Division of *Chilomastix intestinalis* Kuczynski, with Notes on Similar Forms in Man and Other Vertebrates,” *Journal of Morphology* 82, no. 3 (1948): 288–89.
15. Liu Jie 劉潔, “Nie Dashu de yue keji chengjiu ji qi sixiang yanjiu” 倪達書的漁業科技成就及其思想研究 [A study of Nie Dashu’s scientific achievements in fisheries and his thought] (Master’s thesis, Shanxi University, 2007), 3–20.

fellow hydrobiologists produced knowledge of freshwater fish pathology, with special attention to the possibilities and limitations created by the mass science paradigm.

Mass Participation

As with many other scientists in Mao-era China, Nie Dashu explicitly foregrounded his devotion to the well-being of the ordinary people.¹⁶ In a 1954 article in *Science Bulletin*, he posited that “satisfying the desperate needs of the masses” was what his science was for. He further emphasized that he and his colleagues at the Institute of Hydrobiology had selected Linghu as the location of the Fish Disease Work Station because of its convenience for “closely contacting and interviewing the masses of fishers.” In these ways, he closely resembled exemplary scientists of the Mao era, such as the marine biologist C. K. Tseng and the entomologist Pu Zhelong.¹⁷ In the sense that they saw their research as practical scientific knowledge to help peasants address their everyday issues at work, they were advocates of Maoist mass science.¹⁸

Nie Dashu typically emphasized working people’s participation as the starting point of his research. One of the earliest projects that he led at the Fish Disease Work Station, for example, was to develop a remedy for a parasitic disorder called grass carp gill lamellae disease. The specific parasites causing this disease were already known before Nie started his work in Linghu in 1953. What the local fish farmers demanded was an effective treatment, and so they allowed Nie and other scientists to carry out a series of field experiments on their village ponds. Nie’s team confirmed that the blend of 0.7 ppm copper sulfate solution and 0.7 ppm ferrous sulfate solution at a ratio of 5:2 could kill all the parasites in a pond. However, Linghu fish farmers and cadres complained. Without precise measurements, the remedy could kill the fish as well. The fish farmers insisted the scientists find an easier method. Responding to their concerns, Nie and his colleagues replaced the liquid-based treatment with bags of powdered chemicals in the correct quantities, and the villagers simply placed the bags on the edge of fishponds.¹⁹

Sometimes, Nie credited local fish farmers with making more direct contributions to the design and performance of his scientific research. For example, in 1953 he reported that he had relied on Linghu peasants in his experiments to identify the best way to disinfect fishponds. The villagers reportedly agreed to allow Nie to use their aquafarms as his experimental sites, although they understood that some ponds might be damaged. On more than twenty fish farms, Nie experimented with lime powder, tea fruit residue (*chapo* 茶粕), and a native plant called *badou* (巴豆, *Croton*

16. The enthusiasm of scientists for devoting themselves to the ordinary people was not unique to the socialist period. Rather, it was also characteristic of the first generation of modern Chinese scientists who were influenced by the May Fourth movement. See Zuoyue Wang, “Practicing Mr. Science: Chinese Scientists and the May Fourth Movement from Zhu Kezhen to Fang Lizhi,” *East Asian Science, Technology and Society: An International Journal* 16, no. 3 (2022): 327–48.

17. Wang and Neushul, “Between the Devil”; Schmalzer, *Red Revolution, Green Revolution*.

18. Nie, “Zhongguo kexueyuan shuisheng,” 44.

19. Nie, “Zhongguo kexueyuan shuisheng,” 44–45.

tiglium) to determine which would be the best disinfectant. All of these materials were recommended by Linghu fish farmers based on their positive experience using them in the past. Nie, in turn, provided the fish farmers with more accurate and credible knowledge: lime powder was the best (the death rate of one-year-old fish was 9 to 14.7 percent); tea fruit residue was next (22 to 30.5 percent); and *badou* was the least effective (23 to 63.9 percent).²⁰

If Nie framed the research as beginning with requests from the people, he emphasized the approval of the people as the necessary conclusion. Nie Dashu's research reports and journals, with few exceptions, articulate whether or not his outcome gratified grassroots fish farmers. When agricultural collectivization was in full swing between 1956 and 1958, for instance, Nie focused on developing a therapy for a parasitic skin disease called white dot disease (*baidianbing* 白點病, *ichthyophthiriasis*), which was threatening collective fishponds. In collaboration with the Institute of Materia Medica of the Chinese Academy of Sciences, Nie's team discovered how mercurous acetate could be used to cure the disease. The specific steps of the experiments were reported in great detail in his 1960 peer-reviewed journal article. But it did not stop there. The article emphasized that local fish farmers and cadres in Hunan and Hubei wrote complimentary letters to the Institute of Hydrobiology to inform the scientists that the new remedy was working very well.²¹

While the masses were a potent political category that Nie and his publishers were careful to highlight, nonhuman animals were not. And yet, the collaboration between Nie Dashu and fisher-peasants in making knowledge on fish diseases and health often needed to go through a final verification process ruled by carp themselves. In one experiment, Nie as usual tried to authenticate the experience of Linghu fish farmers—in this case, that salt could be helpful in preventing fish diseases. He carefully designed the experiment with feed made from ten *jīn* (斤) of bean cakes and six *liang* (量) of refined salt on two 0.6-hectare-sized fishponds stocked with bighead and grass carp. This effort bore no fruit. Nie and the fish farmers could find no correlation between the application of the salt mixture and the incidence of disease. Though not acknowledged as agents in the production of knowledge, the corporeality of the fish could, at times, deliver a verdict on the success or failure of human efforts to transform mass experience into scientific knowledge.²²

20. Nie, "Zhongguo kexueyuan shuisheng," 45; Nie Dashu 倪達書, "1953 nian yubing fangzhi gongzuo baogao" 1953年魚病防治工作報告 [Report on fish disease prevention work in 1953], *Shuisheng shengwuxue jikan* 水生生物學集刊, no. 1 (1955): 8–11.

21. Nie Dashu 倪達書, Li Lianxiang 李連祥, "Duozi xiaoguachong de xingtai, shenghuoshi ji qi fangzhi fangfa he yi xinzhong de miaoshu" 多子小瓜蟲的形態, 生活史及其防治方法和一新種的描述 [The morphology, life cycle, and control methods of *Ichthyophthirius multifiliis*, and the description of its new species], *Shuisheng shengwuxue jikan* 水生生物學集刊, no. 2 (1960): 206–7.

22. Nie, "1953 nian yubing fangzhi gongzuo baogao," 12. On a "symmetrical" account of how scallops, fishermen, and scientists framed the understanding of the causes for the decline in the population of the invertebrates in St. Brieuc Bay, France, see Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay," *The Sociological Review* 32, no. 1 (1984): 196–233.

A similar situation occurred in a research project on the diet of silver carp. Nie Dashu and his fisher-peasant collaborators initially assumed that any kind of plankton commonly found in the freshwater in China's southeast might be edible for the fish. If viewed with the naked eye, silver carp appeared to eat them all indiscriminately. But one day, Nie noticed peculiar mismatches between the results of water examinations and fish fecal tests. This led Nie to examine the anuses of living fish under a microscope and dissect them to double-check what remained in their digestive organs. Nie and the fish farmers eventually identified some plankton that were indigestible for silver carp and thus corrected their understanding. From the vantage point of science and technology studies, carp can be seen as nonhuman actants influencing the course of mass scientific projects.²³ This angle, however, was not recognized in the Maoist paradigm. Mass science referred only to the human masses, not to the far greater masses of nonhuman participants.²⁴

Intellectual Hierarchy and Authority

As we have seen, Nie Dashu and his fellow scientists at the Institute of Hydrobiology attempted to open the door of the pantheon of science to ordinary working people and, in doing so, enable a form of participatory knowledge production for fish diseases and health. Their openness reflected the broader Mao-era mass-oriented vision of science that privileged bottom-up over top-down approaches and recognized the *tu* expertise of peasants and workers on the ground over the *yang* technocracy of elites. Though mass science was liberating in a sense, its egalitarian expectation was hardly unconditional. Neither Nie nor even Mao himself considered the raw knowledge of the masses as “scientific.” Rather, they clearly distinguished “experience” (*jingyan* 經驗) from “science” (*kexue* 科學). Only when experience underwent “experiment” (*shiyan* 試驗) and “validation” (*jianding* 鑑定) could it become science. Nie, while willing to accept the vigorous participation of the masses in creating and practicing science, retained a hierarchical view on the different stages of knowledge, and in fact, this distinction between experience and scientific knowledge was inherent in the Maoist philosophy of science.

In his influential essay “On Practice,” Mao Zedong himself introduced this hierarchy of knowledge. “Man’s knowledge, whether of nature or of society, also develops step by step from a lower to a higher level.”²⁵ The following lines then posit that what is lower is “experience,” and what is higher, “science.”

23. Nie Dashu 倪達書, Jiang Xiezhong 蔣燮治, “Hualian he bailian de shiliao wenti” 花鰱與白鰱的食料問題 [Problems in feeding bighead carp and silver carp], *Dongwu xuebao* 動物學報, no. 1 (1954): 59–71. On the agency of nonhumans, see Whitney Barlow Robles, “On Nonhuman Agency,” *The Journal of Interdisciplinary History* 54, no. 3 (2024): 305–21.

24. I have shown elsewhere a similar example of neglecting nonhuman participation, namely of rabbits, in the mass-scientific creation of a swine fever vaccine in the Mao era. See Jongsik Christian Yi, “Rabbit Spleen and Medicinal Herbs: Animal Infectious Diseases, Grassroots Communes, and the State in Maoist China,” *Bulletin of the History of Medicine* 98, no. 2 (2024): 315–18.

25. Mao Tse-tung, “On Practice: On the Relation between Knowledge and Practice, between Knowing and Doing,” in *On Practice and Contradiction* (Verso, 2007), 53.

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