

# Articulating *genba*:

## Particularities of exposure and its study in Asia

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Particles and waves as objects of duality have attracted the attention of scientists for generations. Resistance to definition has provided an enduring narrative for scientific investigations among those who attempt to reconcile various theoretical and practical explanations for the behaviors of fundamental phenomena (e.g., light). When a minimally innocuous concept (e.g., high-energy isotopes or pollution particulates) is investigated, the context of everyday life considerably highlights various forms of uncertainties that have environmental and societal concerns. Although discretely formulated problems can exhibit beauty, following the particulate in a historical or ethnographic manner may reveal that the particulate may not dwell within a “well-posed problem” and may elicit the antithesis of desire. The ability to navigate the tensions between sites of concern defines the method of following the particulate when and where it is manifested as the collective of “pollution.”<sup>1</sup> The issue of the particulate as a concept and material plays a crucial role in an industrialized and industrializing Asia. This role introduces this set of essays through the concept of *genba* (現場).

The objective of seeking a *lingua franca* to facilitate the advancement of discussions is no longer novel for scholars; however, the necessity to bridge disparate yet connected issues was

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<sup>1</sup> For example, a group of ethnographers have recently examined the value on sensorial engagement, asking how the sensory can help understand how people live in a hazardous environment of toxic chemicals and radiation. See <http://medanthroquarterly.org/2017/03/29/special-series-sensorial-engagements-with-a-toxic-world/>

felt acutely in the multidisciplinary *Exposure and Effect Workshop: Measuring safety, environment, and life in Asia* (i.e., *Exposure and Effect* thereafter) that convened in October 2014.<sup>2</sup> *Exposure and Effect* aimed to share scholarship and information from the field to comprehend the unwanted particulates in the environment and society among diverse historical and contemporary places. The discussions in *Exposure and Effect* involved the comparison of cases of various particulate sources in the environment. The “particulate” functions as the grains of irritation given that we sought to identify analytically salient commonalities among the spatio-temporal particularities of connection to the release of and exposure to radiation, chemical solvents, and insoluble copper in key points within East Asia. The term *genba* emerged and provided an energizing point, thereby possibly managing the discussion of research findings that would otherwise reside within the spheres of the respective language environments of these results.

*Genba* results from the conjunction of the Chinese characters for “now” and “place.” *Genba* in Japanese and *xianchang* in Chinese carry a tone of urgency that signals an unsettled space. The nuance that *genba* provides exceeds that of a mere physical place because it is a site of action where something significant has occurred or been produced. It is also a concept with which we analyze the sites by looking at a wider social context in which scientific knowledge can be produced. We can preliminarily define it as a lived site where knowledge of exposure and effects is produced through communication, knowledge exchange, translation of instrumental languages among cross-disciplinary professionals whose fieldworks traverse with one another, rendering emotions, value beliefs and reasoning that shape collective actions. In the current working definition, such sites of action as Yanaka, Minamata, Bikini Atoll, Chernobyl, RCA

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<sup>2</sup> See [www.teach311.org/exposure-and-effect/](http://www.teach311.org/exposure-and-effect/). The workshop was supported by the Centre for Liberal Arts and Social Sciences, Nanyang Technological University, Singapore.

factory in Taoyuan, and Fukushima Daiichi Nuclear Power Plant rarely represent sites where scholars could return to in time and space. *Genba* embodies a place that a person desires to know intimately; however, fieldwork involves the issue of proximity due to various physical or political limitations. That is, a person rarely finds the “X” that marks a spot. Immediately after World War II, the science of exposure to atomic radiation and its effects remained limited in terms of the scale of empirical data collection. The University of Tokyo conducted long-term surveys in Hiroshima and Nagasaki. In October 1957, the World Health Organization (WHO) organized study groups to collaborate with Dwight Eisenhower’s “Atoms for Peace” plan in 1953. The agenda of these study groups included radiological protection, as well as determine and analyze the effects of radiation on human heredity and mental health. However, experts who joined these groups were reluctant to establish significant correlation due to the scarcity of resources and scant evidence to support their diverse presumptions, which either support or deny causal relations. On May 28, 1959, WHO experts were effectively silenced by an agreement signed between the secretariats of WHO and the International Atomic Energy Agency (IAEA). This signed document, called WHA 12-40, subsequently prevented WHO from holding a public position on the atomic issue. Given that the United Nations (UN) Security Council outranks the Social and Economic Council and that IAEA reports to the former, WHO is prevented from taking any autonomous action toward achieving its originally stated objectives in the field of radiation protection. Such politics reflect the reluctance of bureaucratic practices and the distant processes of science regarding the inquisitiveness of scientists and the weight of proof that already exists among victims. Mental health experts in one of the short-lived WHO study groups quoted the English poet Joseph Addison in its conclusive report to mark its defenseless position on atomic energy: “ride[s] in the whirlwind, and direct[s] the storm.” (WHO, 1958)

However, studies on the lived sites of radiation or chemical exposure provide opportunities to reappraise the particularities of hazards. In the 1950s, the remoteness of such a place as Bikini Atoll exemplifies a type of policing that contributes to the sanctity that the United Nations Educational, Scientific and Cultural Organization (UNESCO; 2010) bestowed upon it as a World Heritage Site, which symbolizes the “dawn of the nuclear age.” (UNESCO, 2010) Discussions of the field and fieldwork in this type of actual locations accentuate the challenges of exploring the approximate in lieu of accessing the precise. These discussions also facilitate the understanding of how cross-disciplinary knowledge can be formed beyond the professional expertise that is limited in laboratories and meeting rooms. The earthquake, tsunami, and nuclear power plant disaster that hit northeastern Japan on March 11, 2011 necessitated a new cognitive space for the discussions of disasters within and beyond Asia.<sup>3</sup> Moreover, these events provided an opportunity for a socio-historical reflection related to the measurement and accounting of particulates. These disasters likewise presented an occasion to understand the history of pollution in East Asia. Thus, *genba* does not belong to “Fukushima” but is harnessed to other particulates, places, and problems that have required the complete and undivided attention of everyday people and experts.

### **Laboratory to field to *genba***

In science and technology research, the knowledge that can be drawn from understanding the congruences and differences of the phenomena shared between the laboratory and field has received constant attention. Environmental science scholars have explored the environmental and

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<sup>3</sup> List Fukushima Forum, Berkeley meeting, and other meetings preceding and following E&E 2014.

labor injustices in various types of global or local industries (Smith et al., 2006; Pellow, 2007). These studies minimally addressed the method of establishing the causal relations of environmental hazards and human health, apart from the resistance or campaign strategies of victims. By contrast, scientists have attempted to understand the effects of environmental hazards on human health by simulating such setting in laboratories. Petryna (2003) studied the victims of Chernobyl and determined the difficulty of translating *in vivo* exposure science to the identification of actual radiogenic cancers. Shostak (2013) extended the laboratories in the field and explored how environmental health scientists address the unknown vulnerabilities of human bodies by studying the effect of environmental hazards on genes. The laboratories in their stories focused on the sites where scientific questions were typically formulated and answered. This special issue uses *genba* as a starting point for discussing such topics defined by an awareness of inaccessibility or exposure to potential harm. Thus, we should consider how the concept differs from or complements either the “field,” where Bourdieu (1976, 1993) believed that the social life, practice, and the habits of scientists take place; or the “world,” coined by Becker (1982), which emphasizes on free will of human beings instead of forces that drive their activities. What *genba* includes and excludes raise a methodological concern among scholars in the Exposure and Effect Working Group. Such concern encapsulates the tensions of reconciling or approximating the phenomena of the field with the laboratory, which could be represented locally elsewhere, including a court of law. Genba refers to an actual space where actors from various fields or world concurrently intersect and exercise their logic and rationales.

Authors consider activities that are originally deemed peripheral to the manufacturing site of scientific discourses. They explore the methods in which the works of professionals, lay

individuals, and communities intersect. In addition, they ask how emotions are inflicted, values are shaped, and actions are further taken in these lived sites beyond what scientists can do.

To illustrate, the enormity of challenges in analyzing wildlife, as biologist Mousseau described Chernobyl, refers to the multigenerational, temporal aspect of studying biology (Møller and Mousseau, 2015). The pursuit of understanding the extent to which animal models constructed in the laboratory or other field settings can be developed, applied, and used to understand exposure in *genba*, which is a site of common concern and care, is paramount to understand non-humans and humans and their experiences of exposure. Issues that engage in gender and class are generally human-centered as much as they are heterogeneous. The decisions that have privileged the human-centered viewpoint have raised the necessity for an intervening scholarly discourse that also considers animals, wildlife, plants, and other non-humans. The endpoints of our assumptions should be revisited in such *genba*.

### **Limitations of evidence**

Nearly all studies illustrate the range of instrumentation that scientists have used to measure the intensity and scale of substance exposure, including toxicity and radiation, to calculate and assess risks to human and non-human health. Particularly challenging for scientists is to quantitatively and qualitatively justify their “good evidence.” The effort to produce evidence for the multi-causal models of diseases has often faced limitations. Moreover, scientists have struggled to attribute statistical correlations to causal relationships in different settings, such as a clinic or low court. Although scientists have continually debated the causation, function, and classification of disorders, epidemiology has become a crucial method for verifying the causes of diseases in the current science of chronic diseases. Science philosophers have questioned the

appropriateness of using statistical correlations to infer causality in relation to diseases; thus, correlations have been the most extensively used method for establishing a clinical view of non-infectious diseases since the mid-1950s (Broadbent, 2013). In addition, scientists are often required to stay impartial, as well as thrown into passivity, while encountering political agenda. Accordingly, environmentalists and developmentalists can easily deploy epidemiological evidence to support their own grounds and justify or refute the assumed determinants of chronic diseases. Given the ideology of instrumental rationality regardless of the various purposes of science, numerous questions have emerged as to how scientists may differentiate applied science from pure science, how they see quantity and quality of evidence as valid, and how historical and contemporary actors standardize animal models in the experiments that they conduct.

## **Undone**

Recent scholarships have noticed the relationship between industries and environmental justice. Much attention has been paid to the role of environmental activism in transforming the corporate responsibility of polluting industries (Smith et al., 2006). However, the role of science informing the extend and impact of pollution on human beings has been rarely explored. In another emerging scholarship, medical geology, methods such as environmental biology, toxicology and epidemiology have been employed to explore health effects of exposure to naturally occurring or artificial elements (Selinus, 2013; Ibraraki and Mori, 2017). In this discipline, however, the intention and purpose of conducting science is belittled.

The limitations of scientific evidence has resulted in the emergence of undone science as a key phrase that was aligned with questions on what research has yet to be conducted and why. How things come to be undone, or “not yet” (Frickel *et al.*, 2010), is a concern that seems to bear

significant historiographical ramifications in the history of science, environment, and technology of any given *genba*. The admission of knowledge into places of power depends upon a selection from available information and experience; this process is further mediated by translanguaging practices (Liu, 1995), thereby producing novel beneficial knowledge that can be used (or not), as well as possibly facing censure or self-censorship. Sciences outside the realm of topics that are permissible in public discourses and mainstream sciences should have been conducted but have yet to be done or attempted because of limitations in financial support, stringent national policies, or “out of bounds markers” (a term used in Singapore) among academics (Lyons and Gomez, 2005). The recognition of what should or should not be done includes conflicts of moral judgment among various stakeholders in different fields. Therefore, what is excluded in the dominant narrative of the history of *genba* is significant in the reconstruction of the scenography associated with the scholarly reconstruction of *genba*.

### **Scientific patronage**

The uneasy relationship between science and politics can be analyzed together with the patronage system. By studying scientific funding, incentive mechanisms, and relationships among scientists and their supporters, we can explore the methods that states, international organizations, and other scientific bodies control or influence in terms of the development of research from either the national or transnational perspectives. Scientific patronage is a complex social contract and is often unseen or even imperceptible in the aforementioned *genba* of scientific research. Nevertheless, scientific patronage determines many aspects that define the flow of capital through a *genba*, that is, the figure or institution of authority and location of expertise. On the one hand, the US government’s support for research and development in the



life sciences may be exemplified by the budget of the National Institutes of Health. On the other hand, the charges of politicization, combined with a disregard for scientific evidence, have intensified the tensions between the scientific and political communities. Intergovernmental organizations in post-World War II Asia distributed development funds for scientific internationalism for peacemaking, as exemplified by the UN-backed Peaceful Uses of Atomic Energy project, thereby leading to the proliferation of commercial nuclear power plants in developing countries. However, NGO funds have been drawn into Asia to support the sciences for environmental causes. The articulation and analysis of what may otherwise seem as ghostly forces of knowledge production facilitate the formation of particular types of scientific work for the recipients of foreign aid.

### **Agency of science and scientists**

In the histories recounted by the workshop participants, scientists in Asia served as social agents toward various purposes. The process of understanding their agency, whether they were used by developmentalists to exploit nature or employed for the empowerment of environmental campaigns, aids in defining the urgency that infuses *genba*. Scholars of post-colonial Asia noted that scientists have often received training in the West to become socialized as professionals and later employed by governments to build progressive and modern states (Anderson and Pols, 2012). Scientists often advocate universal laws and engage Western colleagues as equals without realizing that they are being used as chess pieces of post-war developmentalism. However, the authors of this issue have noted the existence of idealists, who are politically impartial but have been unconcerned about their social responsibilities as scientists, as well as easily agreeable to administrative forces. Survivors of scientifically mediated technological disaster and scientist

activists, who walked out of their laboratories and participated in public discussions, exist. A few of them even bore witness in courts and collaborated with laymen as members of civil society or residents' movement in response to different environmental crises. The agency of science and scientists is shaped together with the concerns on the emotional and cognitive aspects among social scientists and anthropologists in social and environmental movements (Flam and King 2010). This special issue focuses on how these emotions are translated into morals among scientists to take necessary actions beyond their professional practice. Exposure science in Asia sees the urgency for clarifications due to its integral role in research and development, policy-making, and technological controversies.

### **Making new sense**

The antecedent points that we provided emphasize why several individuals who represent different disciplines, aims, and languages have gathered to establish new grounds to study science-making and scientific practice that fit the particularities of problems to reside within and resonate from *genba*. The peculiarity of how ordinary conditions have permitted what seem like otherwise atypical situations in Asia (and elsewhere) has focused attention on the notion of *genba*. Moreover, analyzing *genba* has provided a means to build upon alternatives to standard histories of technology in Asia that scholars have raised over the years (e.g., Bray, 1998). The development of technologies, formation of scientific disciplines (e.g., nuclear and environmental engineering), and how institutions reflect societal needs and choices should be understood to provide a considerably detailed view. Thus, a critical outcome of the focus on *genba* is recognizing the necessity of understanding the agendas of the different sciences associated with technological developments.

Whether a scientific investigation was accomplished, ongoing, or undone, the contexts of Asia and inaccessibility of *genba* provide a unique opportunity to consider epistemological questions within the new bounds of scholarly responsibility. The studies of gene and environment interactions have been provided with new attention and are heavily accentuated in 21st century Asia, where personalized medicine is introduced. Research on stress and its social and cultural factors that initially propagated nearly 100 years ago have viewed different determinants in contemporary Japan, Taiwan, South Korea, and China. Moreover, lay response call for scientific investigations for the spontaneous learning of exposure science after environmental disasters in Asia. Fortun (2001) documented the advocacy works of women organizations in Bhopal after the deadly industrial pollution disaster. Scholars including Kimura (2016) and Polleri (2016) documented how citizens, especially parents, in Fukushima were mobilized to collect evidence of radiation exposure to support their causal-effective reasoning.<sup>4</sup> These examples are considerably gendered-division undertakings. Although gender aspects are considered in *genba*, the authors substantially focus on how novel scientific disciplinary research could emerge through communication, focus on care, and collaboration between professional and lay communities. The future implications of the historical consideration of scientific identities and the social role of science concentrated around *genba* offer moments of clarity and opacity that are linked to the tensions of committing theory to practice and vice versa, thereby reconciling field- and laboratory-based knowledge. Long-term and sustained questioning of how exclusive power relations operate and manage global capital, along with values about the environment among state, society, and international entities, is necessary.

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<sup>4</sup> Also see <http://medanthroquarterly.org/2017/03/29/radioactive-contamination-and-citizen-science-after-fukushima/>

This special issue opens with the article documenting the dialogue, “taidan”, between biologist Timothy Mousseau and documentary maker Ian Thomas Ash as part of the workshop we conducted in 2014. They discussed the course of their respective fieldworks in and around Fukushima. Mousseau traces signs of biological change in the wildlife, whereas Ash traces human stories. Robert Stolz prepared a case study on *minamata-gaku*, as well as questioned indeterminacy as the cause of environmental diseases and how a new scientific discipline emerged due to the joint effort of scientists and victims on the toxic sites in Japan through a democratic process. Lisa Onaga shifts the site of knowledge formation away from laboratories to the space between texts and readers. She analyzed the readership of *Iden*, a genetics magazine, and argued how a classic model for low-dose effects of radiation became a “here and now” science that entered Japan and how the society was cultivated during the two decades after World War II and. Lastly, Yi-Ping Lin explored an ongoing court case on toxic tort in Taiwan regarding how cross-disciplinary effort provides possible causal relations between industrial pollution and the health problems of plaintiffs. Apart from the unique law court she examines, Lin further analyzes the problem of translation regarding the assorted instrumental languages employed by different disciplinary groups. These articles provide a window for scholars into different *genbas* to probe the highlighted *problematik* of the particulate and contribute to the conceptualization of science in the making.

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