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Ong, Aihwa

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Landscapes of (un)knowability

Reviewed by: Aihwa Ong, UK [\[AQ1\]](#)

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Fungible Life hopes to cast light on the Biopolis milieu where scientists develop genomic science oriented towards problems of disease, health and security in Southeast Asia. As cutting edge science is ‘translated’ to non-Euro-US sites, ‘scientific entrepreneurialism’, I argue, is much more varied and complex than an alignment of global science and late capitalism. My work tracks approaches to the life sciences that are still outside the preview of many researchers based in the West where science is increasingly corporate-driven (Rose, 2007; Shapin, 2008). But sovereign interests do intervene in new frontiers of medical science (Jasanoff, 2007; Ong and Chen, 2010; Rabinow, 2002).

Rational modes of reasoning, knowledge and technology, Max Weber (1919) [\[AQ2\]](#) has argued, originated in the North Atlantic world but having since migrated worldwide, come to constitute our shared condition of global modernity. The universalization of such ‘global forms’, however, shapes not a uniformly striated landscape but the splintering terrain of ‘a thousand plateaus’ (Deleuze and Guattari, 1992). [\[AQ3\]](#) ‘Global assemblage’ (Collier and Ong, 2005) provides the lens for my investigation into how the Biopolis initiative emerged out of a specific conjuncture of cosmopolitan science, Singaporean politics and collectivist ethos. A bifocal goal is to customize medicine for peoples in Asia and to study tropical diseases that menace the world.

My work, teeming with spaces, speaks to geography from fresh angles. First, all knowledge is situated and our perspective always partial (Haraway,

1988). Second, as Michel Foucault (1993) [\[AQ4\]](#) has observed, medical perception spatializes bodies, populations and geographies in hierarchical systems of surveillance. Researchers are cartographers who shift, shuffle and design an analytical topology of experimentation. Micro geo-practices configure a space of inquiry, trace the flow, interaction and interrelationship of elements and (hopefully) project spaces of ethical intervention. Third, in a ‘fast and furious’ genomic science, researchers in the non-West, starting at the same baseline, get to name new findings and spaces of their investigation. As the scientific lingua franca, English facilitates the strategic iterations of names and spaces that trouble notions of stable geographies.

At Biopolis, ‘Asian’ and ‘Asia’ are variously invoked to identify objects and spaces specific to particular inquiries. Genomic experiments are poised between the standard and the variable, the databased and the undatabased. Beyond the lab, scientists are critically involved in planning health institutions, public–private partnerships, infrastructures and networks for scientific and market opportunities. Scientists thus name, observe and discover scientific artefacts that are intertwined in temporal, conceptual, material and symbolic spaces.

Kris Peterson captures my focus on the unpredictability of experiments. I need first to mention a small but critical misreading. Singapore’s taxpayers, not ‘the federal government’ (United States?), support and sustain Biopolis. The platform upholds ‘best practices’ in research, ethics, legal rights and business performance in order to draw leading experts and investments in the life sciences. As Peterson notes, ‘In contrast to North American biotechnological hope and hype that are linked to stock market vagaries, hope and precariousness in

Asian cosmopolitan science are distinctly regional, epidemiological, and political'. (p. 4) But because all experiments are conducted in an 'ecology of ignorance' (Luhmann, 1998), my argument is structured by 'risks', 'uncertainties' and 'known unknowns', that is, the many challenges that reveal the limits of calculation in the scientific enterprise.

Asli Ceylan Oner explores 'place identity and spatial quality' in the branding a site of scientific innovation (p. 1). I welcome her acute observations and add a few more. A major institute is called Helios, the Greek sun god who drives his chariot through the equatorial flow and returns to the East every night. Biopolis is situated on the campus One North (one degree above the equator). Science towers linked by skybridges evoke pathways through a jungle canopy; below, street light fixtures pose like giant flowers. This research 'ecosystem' embedded in a tropical 'nursery' signals dedication to human flourishing in the Asian tropics that form the distinctive context and identity of the biomedical centre.

Beyond Biopolis, a so-called Helix Bridge leads to the Marina Bay casino, thus joining a 'global school house' and an international playground in Singapore's global brand. By contrast, BGI **AQ5** Genomics, China, is located in a manufacturing zone. Hiding in plain sight, this 'global sequencing factory' is accumulating the genomes of many life forms.

I like Paul Jackson's focus on 'experiments', but challenge his view that science is mainly about 'details over biomatter' and less about values (p. 2). The Prologue clearly states that the new genomics is interdisciplinary, depending on collaborations between wet and dry labs (i.e. bench-top experiments and computer-generated analysis). The first chapters describe the mobilization of genetic variants for transforming the material process into data points. The folding of ethnic, genetic and disease risks into databases renders life as the fungible, mobile and combinational artefacts of genomic research and precision medicine. These novel findings, objects and data sets underpin Singapore's role as a research platform and testing site for therapies customized for Asian bodies. Genomic knowledge is becoming a living tissue of digital bits.

The work of science is hierarchical and multifaceted but not 'cheap' (Jackson, p. 3). The Singapore government invests multibillion US dollars in Biopolis which has been called a 'science Nirvana' for its generous salaries, funding largess and beautiful labs. Expatriate scientists, including those from Duke Medical School, flock in for opportunities to research 'Asian' life forms and disease models. Chapter 5 describes the ethical challenges of foreign and locally born Principle Investigators. They lead clinics staffed by PhDs from China and elsewhere in Asia. Lab work can be tiring and tedious (thus the moniker 'research factory'), but these PhDs are better paid than most of their counterparts in the United States, Europe and Australia. Only in BGI Genomics, China, can one talk about the 'cheap labour' of programmers. Not paid like scientists, computer operators are rather privileged compared to workers who make Apple gadgets at a nearby factory.

I may have already cleared up some of Peter van Meeteren's 'cognitive dissonance' (p. 1) over multiple geographies. Positionality underpins spatial politics and intelligence. Rather like the workings of invisible White male power that require the marking of female and minority identities/spaces, cosmopolitan science configures unmarked and marked fields. But in order to advance, DNA research must incorporate 'the difference that makes a difference' (Bateson, 2000) – that is, genetic, epigenetic, ethnic, racial, gender and ecological – encountered outside the non-Atlantic world. East–West distinctions are always implicated in complex negotiations of the dominating Western gaze and efforts to gain mastery over self-knowledge. But as part III clarifies, for Asia-based researchers, other significant divisions include intra-Asia stem cell rivalry, a 'pan-Asian' science commons, and China's national gene pool.

'Cascading scales' are the effects of multiple strategies (including the biomedical) involved in governing biosecurity (Foucault, 2007). 'Jumping scales', by contrast, describes the capacity of pathogens to leap over ecological and national borders, thus spillover into human habitations. Chapter 8 identifies how, in times of emergency, technologies devised in labs, clinics, public health agencies, airline authorities, corporations and the US-armed

services in the region anticipate coming together to coordinate efforts against SARS [AQ6]-like pandemics.

My book exposes a big lacuna in Science & Technology Studies that ignores the complex statistical and cultural coding of scientific data and work of science at multiple scales, from studying disease to shaping public opinion and ordering value regimes. In Asian nations, most locally born scientists are public servants who are variously tasked and implicated in realizing ‘collective’ values that legitimize the support of taxpayers. Rationality and affect, science and meaning, profit and ethos and the national and international are intertwined in any science experiment.

Ethnographically, my focus is on the multiple stakes of the Biopolis initiative for Southeast Asia. BGI Genomics of China is brought in as an alternate model of biomedicine. The comparison also highlights how scientific endeavours are besieged by contrary effects of vulnerability and hope as well as by degrees of political wariness. Fieldwork was no walk in the park; I encountered relative openness in Singapore but murky obfuscation in China. Nevertheless, my research documents that Biopolis aims to be a conduit to American life sciences while BGI Genomics seeks to ‘shake-up’ the world of science.

A ‘fast and furious race’ in genomic science everywhere increases the dangers of eugenics. Jackson (p. 3) seems to have missed the Prologue that weighs fears of racial stigmatization (e.g. by Troy Duster) against the American National Institutes of Health’s decision to use ethnic/ancestry biomarkers in a socially inclusive science. The stakes of ethnic-specific medicine in Asia are different. The Epilogue concludes that whereas Biopolis works to insert Asia’s populations into cosmopolitan science, BGI Genomics is dominated by finding solutions to China’s staggering health and demographic problems. More worrying, the wild-west Chinese science landscape is a slippery slope to eugenics. In Chapter 9, a BGI study of an ‘athlete gene’ discovered in minority Tibetans is intended to benefit the lung capacities of majority Han. Another project receives a state loan to scan genetic variants that co-relate with high IQs. Meanwhile, in the United States, gene-editing tools (Crispr), developed at

Harvard and Berkeley, enhance possibilities for improving on human hereditary. As scientists speed beyond ethical restraints everywhere, strange new worlds emerge, pushing the human to the edges of unknowability.

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