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BOOK REVIEW

Biotechnology Unglued: Science, Society, and Social Cohesion

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Since Thomas Kuhn's *Structure of Scientific Revolutions*,[1] philosophers and sociologists of science have become bolder in questioning the purity or objectivity of scientific claims. Science and technology continue to be scrutinized in regard to their socio-cultural content and their doubtful claims to neutrality. Critics and proponents of science are divided between the extremes of "scientific faithfuls" and "scientific skeptics" or Luddites. For most scientific faithfuls, science is an unbridled pursuit of knowledge, with little regard to the consequences of scientific and technological innovations on society and social cohesion. Many sociologists and philosophers of science, however, agree that science cannot be insulated from moral, political, and socio-cultural values that constitute permanent features of all human activities. Kitcher and Beck, for example, argue that science has no monopoly on truth, and the interrelationship between science and society requires making science accountable to democratic and social values if we must realize "the ideal of well-ordered science".[2]

If the above references to Kitcher and Beck seem distant, do not worry. In *Biotechnology Unglued*, Mehta and his thirteen-member interdisciplinary team, comprising mainly of social scientists using a number of "case studies", explore in nine essays "how advances in agricultural, medical, and forensic biotechnology may threaten the social cohesiveness of different kinds of communities and at different scales".[3] In a way, the project is a successful attempt to underscore the theme of (and imperative for) social accountability of science and bio/technological innovations. This 208-page collection of nine essays in a corresponding number of chapters is a remarkable effort. It is a departure from the traditional concerns regarding biotechnology innovations which, hitherto, emphasized ethics, environmental sustainability, safety, human rights, equity, and global geo-political tensions. These concerns are, however, not completely glossed over. They are implicated in the essayists' analyses, but not at the expense of the book's central theme.

Mehta sets the tone in chapter one by situating the essays that follow within the social cohesion theoretical framework. He notes that social cohesion gauges "how tightly coupled, robust, and unified a community is across a set of indicators".[4] A socially cohesive community is resilient and most likely to adjust successfully and to take advantage of developments or changes in society, including biotechnology innovations. Because such a community focuses on the interests of its members, it does not necessarily address concerns about equity in relation to less cohesive others. For Mehta, social cohesion can serve dual outcomes: "[I]t can work to ensure that injustices are minimized".[5] Conversely, "[it] can support the conditions that allow injustices to remain entrenched or even to develop more markedly".[6] Focusing on the promises and potential pitfalls of the various forms of biotechnology in select communities, the authors explore the technologies' ramifications for social cohesion of those communities. In mostly embedded ways, they attempt to contrast socially cohesive communities that benefit from biotechnology, and how biotechnology disrupts or "unglues" fragile or less cohesive communities and thereby yields general inequity.

In chapter two, Mehta focuses on the impact of biotechnology, especially the introduction of proprietary genetically modified (GM) canola, on small-scale agricultural farming communities in Canada's prime agricultural province of Saskatchewan. Because of the social cohesiveness of large-scale farmers, they have been able to take advantage of the introduction of herbicide-tol-

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erant crops and genetic modification in agriculture. A combination of factors, including ready and integrated industrial markets, strong capital outlay, sophisticated manpower, and risk-benefit considerations, aided large-scale farmers to make the transition to GM cropping. However, this technology has the effect of eroding and weakening small farming communities who are targets of the new culture of surveillance imposed by proprietary right holders of patented transgenic materials. Also, as part of its impact, agrobiotech practices de-skill small farming communities by compromising their ability to manage ecological or non-market stresses, engage in seed-saving, and foster crop diversity. Mehta draws from statistics evincing the recent rise in the percentage of large-scale farmers in contrast to the decline of their smaller counterparts, as well as increased incidence of rural-urban drift among members of small farming communities since the advent of agrobiotech. From that information, he concludes that such weakly cohesive communities "are less able to muster and nurture 'social capital' needed to sustain themselves"[7] in the era of biotechnology. Consequently, biotechnology is implicated in the decline in the quality of life for traditional but weakly cohesive agricultural communities in rural western Canada. It is important to indicate that the conclusions of Mehta's "case study" of Canada's agricultural belt holds true for the role of biotechnology on the global geopolitical scale in terms of the North-South dynamic.

Chapter three vindicates the last observation with its focus on agrobiotech in developing countries and global concerns about poverty alleviation, food security, and sustainable development. It explores worldwide trends in the biotechnology revolution and its promises in regard to health, food, and the environment. The authors of this chapter juxtapose the promises of modern biotechnologies with their inherent disadvantages for less cohesive and resource-poor farming communities in the developing world. Adopting an "opportunities and threats" paradigm, this chapter argues that the opportunities of agrobiotech "[have] so far been very much the preserve of richer countries and to a lesser extent some emerging economies"[8] at the expense of small-scale and traditional farmers. This widening gap presents a threat to social cohesiveness in developing countries. According to the authors, this is so because agrobiotech research hardly focuses on the needs of poor producers and consumers. In their view, what is needed is a double-shift in the research paradigm to focus it on agro-ecological systems, and crops and other genetic resources critical to people in developing countries. Such research needs should "be contextualized within the broader socioeconomic and cultural situations of the poor and within a deeper understanding of sustainable issues".[9] In order to achieve this double-shift, the writers recommend the adoption of interactive and participatory approaches. Under this arrangement, which echoes Kitcher's notion of a well-ordered inquiry, developing countries must be active partners in shaping a biotechnology development research agenda that is specifically targeted at the poor. What the writers fail to realize, however, is that because biotechnology research is conducted, for the most part, outside the public funding framework, it is essentially driven by commercial motives — a point that the concluding chapter affirms. Contrary to the authors' suggestion, corporate stakeholders, rather than scholars, are in a position to ensure the desired double-shift in the biotechnology research paradigm. Indeed, altruism is a stranger in corporate boardrooms.

The next two chapters explore in two different contexts how the "legitimacy question" is a factor in the introduction or non-introduction of genetically modified foods (GMFs) in two national consumer/citizen communities of the US and Norway. In the US, loss of confidence in regulatory authorities predated the introduction of GMFs. This trend was exacerbated in the context of GM by the fundamental way in which it "alters the cultural frame in which food and society issues are embedded".[10] In the US, government could not be relied upon to convince consumers as to the safety of GMFs. This is so because the closeness between science, industry, and government in the regulation of GMFs shows that government agencies are compromised and incompetent. The agencies are, in the words of this chapter, "captured by the groups that they were supposed to be administering".[11] Consequently, consumers' general attitude to GMFs is one of skepticism. They are now turned into "'new Luddites' who want to break the movement of scientific progress in order to return to a prescientific past characterized by minimalist technology".[12] Thus, citizens and consumers demonstrate resistance to GMFs and seek to regain control by shifting to organic and other alternative food.[13]

As if in contrast to the trend in the US, and indeed North America, chapter five[14] explores the procedural pattern of the debate that led to a total rejection of GMFs in Norway by consumers and citizens. Norway, to some extent, is representative of the trend in Europe. In Norway, two carefully selected lay panel conferences backed by expert insights were organized as a modified consensus development conference within a four-year interval (1996 and 2000). They deliberated on the consequences and risks of introducing GMFs in Norway, and their recommendation paved the way for the ban on GMFs there. As in the US, the cultural frame in which food is constructed is not one that GM addresses fully. But the Norwegians were able to ensure that consumer perception of food was not manipulated by a distrustful regulatory authority that lacked legitimacy. By so doing, Norwegian consumers averted the "exit" or resistance measure that the US consumers adopted in regard to GMFs. Indeed, unlike the US experience, Norway's consensus on GMFs is informed by exceptional consumer trust in government authorities. Such trust, Mehta insists earlier, "is an essential component of socially cohesive

society".[15] It also accounts for greater transparency and translates, in Norway's case, into the panel's disposition toward mandatory labeling for food containing GM-sourced ingredients, a feat the US system could not accomplish.

Chapter six shifts the previous chapters' focus on agriculture and food to health ramifications of biotechnology. It broaches Icelandic historical, political, geographical, and homogenous genealogical peculiarities. These factors provided the unique set of circumstances upon which Iceland's biological, cultural, and social cohesion is based. Consequently, Icelanders became the source of a unique genetic database which, despite privacy and human rights concerns, the government was able to commercialize in an arrangement with the US-based Decode Genetics. Access to Iceland's genetic data base is commercially attractive because its homogenous nature facilities quicker identification of genetic traits than would a nonhomogenous one. The author argues that the Icelandic initiative reveals how a geographically and culturally isolated and potentially endangered local community could, through the wonders of biotechnology and the information society, facilitate therapeutic strides with global ramifications. Even though the chapter argues that this initiative is justified on medical and economic grounds, perhaps its strongest implication is captured in the author's observation that it illustrates the divorcing of culture and information "from a specific place, experience and time" as a "global resource to be mined through 'bioprospecting'".[16] It creates a dynamic in which biotechnology is implicated as an aspect of the information society that "draws on the diversity and cohesion of societies globally for very specific information to create competitive asymmetries".[17]

Flipping over to the impact of biotechnology on the Canadian justice system, chapter seven explores the theme of biotechnology and social control. It discusses broadly the place of DNA technology in the criminal justice system and examines, specifically, why the introduction of a DNA data bank into the Canadian justice system did not elicit much public scrutiny or resistance. Clearly omitting the urgent desire for restoration of confidence in the criminal justice system, the author argues that a combination of factors, including the fear of crime, the emergence of a surveillance society, a redefinition of criminality in favour of nature over nurture, and the rationalization of the criminal justice system along a corporate model, account for the willingness of Canadian society to accept, with little or no questioning, the risks to human rights, privacy, and personal liberty posed by this technology. According to the author, through biotechnology, the logic of "a genetically based justice system"[18] or a justice system based on "biological determinism"[19] has ousted the traditional theory of crime based on nurture. The risk-management potential of a DNA data bank, in the eyes of the Canadian public, appears to be a reasonable compromise for enhanced genetic surveillance.[20]

Perhaps chapter eight stands out from the rest of the contributions in regard both to its unique subject matter and its analytical approach. It analogizes biotechnology to "modern museums of civilization". With that imagery, the authors argue that biotechnology is not radically different from the 300 years of colonialism and the politics of interpretation and mis/representation of the colonized by members of the dominant society for whom the present collection, classification, and commercialization of vital biological information is, in many ways, akin to collection, arrangement, reification, and representation of museum artifacts. Implicating the Human Genome Project and a couple of other biotechnological initiatives, the writers argue that "biotechnology represents the appropriation of foreign and exotic entities as genetic information in a dominant culture's collection"[21] and their subjective interpretation and valuation of that information. Unlike the activities of early collectors of natural and cultural samples of "exotic" materials, biotechnology emphasizes the commercial exploitation of information with little or no altruistic interest in domiciliation of knowledge in the public domain. Picking on both the theme of globalization and resistance, this chapter concludes that even though increasing globalization and monopolization of information in the era of biotechnology forces people to negotiate on the terms put forward by the dominant interests, at the same time, there are extensive and well-organized pockets of resistance and countermeasures to genetic capitalization, distortion of cultural framings of life, and undervaluation of diversity.[22]

Reconnecting to the theme of social cohesion, this time in regard to university research communities, the last chapter[23] examines the hot button question of how the multidisciplinary nature of biotechnology has yielded an emerging collaborative research dynamics, including syndicated R & D funding and tense competition over intellectual property in universities and corporate establishments. Re-echoing the theme of commercial emphasis in biotechnology development in this last chapter, the writer associates the advent of biotechnology with the shift from the old Republic of Science model to a new research dynamic. Supported mainly by public funding, the former was curiosity-driven and essentially disciplinary. The latter is "transdisciplinary and problem-driven research structured around knowledge application",[24] and feeds on institutional arrangements and communication networks that link university, governments, and industry researchers/financiers. The writers illustrate the new research dynamics by spotlighting the controversy surrounding Myriad Genetics, Oncormed, University of Utah, and other clusters of stakeholders in the US and Europe in the isolation of the breast and ovarian cancer genes (BRACA1 and BRACA2) and the intellectual property (patent) conflict on its trail.

With emphasis on an "opportunities and threats" paradigm, the chapter identifies some features of the new research dynamics. They include greater emphasis

on commercialization, the emergence of new actors, the blurring of traditional organizational or practice frontiers between private- and public-sector interests in research and development, syndicated and increased funding from multiple sources, bigger and more global research consortiums or networks that encourage efficient utilization of expert knowledge, and purpose-driven and short-term commitment to research. Among the major "side effects" of these new research dynamics are questions about ethics, conflict in research strategies and in the use and allocation of research resources, human and material, and perhaps most importantly, conflicts about ownership of intellectual property rights and diffusion of research results.

In all, this collection of essays is really an ambitious project in disguise. It touches, in varying depths, many contentious issues associated with biotechnologies in their multidisciplinary essence. The essays are presented in accessible language sufficiently filtered of disciplinary jargons. Because of their accessibility, they provide a primer on the subject for the "casually curious", as well as fair intellectual, theoretical, and policy insights on specific subject matters for more probing readers. The book is a welcome break from traditional criticisms of biotechnology and a shift to more engaging, thoughtful, and practical analyses of its impact on social cohesion to which many can relate.

However, there is little deliberate effort in each chapter to tie the respective "case studies" to the theme of social cohesion and to identify target communities. For the most part, this connection is implied. After succinctly setting out the project's theoretical thrust and objective, Mehta appears to have permitted the contributors to determine for themselves if and to what extent they would deliberately sustain the readers' focus along those lines. In the end, Mehta's introductory chapter and the second chapter prove to be extremely helpful for the reader to make the required connection between the subject of each chapter and the book's general theme and thesis. This connection is more easily made in some chapters than others. For the most part, readers have to identify for themselves what community or communities are implicated in each "case study", and to situate the theme of social cohesion. This situation is not unusual with a collection of essays in which the editor does not have absolute power to "enforce strict compliance" with the work's conceptual framework as a sole writer would. Given the diversity of focus among the chapters, the editor may have had a tough challenge putting them together in some interrelated order. It may be noted, however, that chapter five on the Norwegian GMF "case study" would have made a perfect concluding chapter, since it represents a successful approach in the management of the conflicting issues invoked by the biotechnology debate. Otherwise, each essay stands alone, even though there is a thematic cohesion among them that is aptly highlighted in the editor's introduction.

In regard to the "case studies", it may be a little inaccurate to classify each chapter as a case study in the traditional or strict sense in which the term is associated with field work and other matters of empirical detail. However, for the most part, they focus on specific topics within stated geographic confines. This way, they are "loose" forms of case studies. Readers would also be challenged by the seeming ambiguous title of this work. One gets the sense that the essays explore how biotechnology is complicit in "ungluing" or eroding the sociocultural dynamics of fragilely cohesive societies, rather than how the vulnerabilities of these societies help to expose or "unglue" biotechnology. I guess either interpretation could be correct. The first is more logical and obvious from reading the book. But, on the face of it, the title itself leans toward being read from the latter perspective.

As a multidisciplinary effort that tackles a fundamentally multidisciplinary subject matter like biotechnology, this book will be a helpful resource to persons directly or remotely involved in biotechnology. For sociologists, philosophers of science, and those involved in deliberative democracy and the challenges posed to public policy by biotechnology and science in general, it is interesting literature that engages critical areas of public concern about the impact of biotechnology. For lawyers, legal scholars, and members of interdisciplinary research communities who are interested in "ungluing biotechnology" for various reasons, this is an accessible work that incorporates useful information on many aspects of biotechnology from diverse sources and perspectives. This project, however, is not comprehensive in its scope. For instance, subjects like intellectual property rights; indigenous peoples and their knowledge, religion, and beliefs systems; disability; gene therapy; and gene profiling, to name a few, deserve a central place in a project that explores biodiversity and social cohesion. In appreciation of this, Mehta acknowledges that "this book is only a starting point"[25] on its subject. It is a preliminary attempt at what portends to be a long and complex conversation.

Notes:

[1] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1970).

[2] Philip Kitcher, *Science, Truth and Democracy* (New York: Oxford University Press, 2001) at 117; see also Ulrich Beck, *Ecological Politics in an Age of Risk* (Cambridge, UK: Polity Press, 1995); Michael D. Mehta, ed., *Biotechnology Unglued: Science, Society, and Social Cohesion* (Vancouver: UBC Press, 2004) at 74.

[3] Mehta, *supra* note 2.

[4] *Ibid.* at 1.

[5] *Ibid.* at 6.

[6] *Ibid.*

[7] *Ibid.* at 23.

[8] Jacqueline E.W. Broerse & Joske F.G. Bunders, "Agricultural Biotechnology and Developing Countries: Issues of Poverty Alleviation, Food Security, and Sustainable Development" in Mehta, *supra* note 2, 26 at 36.

[9] *Ibid.* at 40.

[10] Christopher K. Vanderpool, Toby A. Ten Eyck, & Craig K. Harris, "Legitimation Crisis and Genetically Modified Organisms" in Mehta, *supra* note 2, 51 at 52.

[11] *Ibid.* at 57.

[12] *Ibid.* at 60.

[13] *Ibid.* at 64. Curiously, the author observes that "there is little overt consumer demand for GMOs". This may not be true. It belies a fundamental flaw in the chapter's analysis, namely its omission to explore the role of price dynamics in making GMFs attractive.

[14] Margareta Wandel, "Genetically Modified Foods in Norway: A Consumer Perspective" in Mehta, *supra* note 2, 70.

[15] *Supra* note 2 at 8.

[16] Kyle Eischen, "Commercializing Iceland: Biotechnology, Culture, and the Information Society" in Mehta, *supra* note 2, 95 at 111.

[17] *Ibid.*

[18] Neil Gerlach, "Biotechnology and Social Control: The Canadian DNA Data Bank" in Mehta, *supra* note 2, 117 at 121.

[19] *Ibid.* at 126.

[20] *Ibid.* at 125.

[21] Annette Burfoot & Jennifer Poudrier, "Biotechnology as Modern Museums of Civilization" in Mehta, *supra* note 2, 133 at 157.

[22] *Ibid.* at 158.

[23] Robert Dalpé, Louise Bouchard, & Daniel Ducharme, "The Production, and Use of Knowledge in Biotechnology: The Discovery of BRA1 and BRAC2 Genes" in Mehta, *supra* note 2, 161.

[24] *Ibid.* at 163.

[25] *Supra* note 2 at 11.