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Civil society and the political economy of GMO failures in Canada: a neo-Gramscian analysis

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Despite the government of Canada's close relationship with the biotechnology industry, critical social movement organisations have had a significant impact on the adoption of genetically modified organisms in that country. Two cases of products rejected after widespread resistance – recombinant bovine growth hormone (1999) and herbicide-tolerant Roundup Ready (RR) Wheat (2004) – are revisited. Informed by empirical research that brings to light new factors shaping the RR wheat outcome in particular, two theoretical arguments are advanced. First, in response to those critics of a neo-Gramscian framing of hegemony who see it as overly deterministic, these cases highlight just how deeply alliances with hegemonic ambitions may be forced to compromise. Second, these cases demonstrate that any study of civil society must still pay close attention to institutional and material 'relations of force' when seeking to explain the impact of social movements on environmental governance.

Keywords: GMOs; biotechnology; bovine growth hormone; roundup ready wheat; Gramsci; social movements; civil society; hegemony

Introduction

The government of Canada is widely recognised as a key proponent of genetically modified organism (GMOs) in agriculture (e.g. Falkner 2009, Prudham 2007), so much so that some authors suggest that anti-GM activists have had almost no impact on the industry and its regulation in that country (Stoett and Gore 2008).¹ Schurman and Munro (2009) make a similar observation about the western side of the Atlantic as a whole. In contrast to such claims, here I demonstrate just how deeply the biotech industry in Canada has been affected by its critics by revisiting two cases of GMOs that were

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rejected due to resistance initiated by social movement organisations (SMOs). Following McKenzie (2002), SMOs are herein defined as social groups that pursue broad agendas of social change intended to transform modes of production and consumption, as well as social organisation, values and personal lives. SMOs can be contrasted with NGOs, defined as institutionalised technocratic problem-solvers oriented towards reforming government policies (Ford 2005, Magnan 2007). Along with church organisations, service clubs, business associations and others, SMOs and NGOs are elements of ‘civil society’, which Gramsci (1971, p. 306) refers to as ‘the ensemble of organisations commonly called “private”’ (and which thus also includes business actors and trade unions, in contrast to Hegelian readings of civil society). The first case examined here is Monsanto’s recombinant Bovine Growth Hormone (rBGH), a GM veterinary drug designed to increase milk production. Despite its introduction to US dairy production in 1993, it was rejected by Health Canada in 1999. The second is Monsanto’s Roundup Ready (RR) Wheat, which was withdrawn from formal regulatory processes in both Canada and the United States (US) by the company in May 2004.

My goal in revisiting these cases in tandem lies in understanding the conditions that allowed SMOs critical of genetic engineering to succeed in these particular struggles over business and state interests supportive of GMOs, despite not having prevented the first generation of GM rapeseed (aka canola), soy and maize. These cases were selected because they are the most high profile biotech ‘failures’ in Canada. Together, they help to substantiate my argument about the vulnerabilities of the agricultural biotechnology project even in its heartland of North America. This point has theoretical implications for the way that ‘hegemony’ is conceptualised, as discussed in the next section. These cases also support a second argument, which is that researchers interested in the politics of civil society, and the impact of SMOs in particular, ought to situate their analysis within a broader political-economy framework, such as the neo-Gramscian approach employed herein, if they wish to accurately interpret SMO impacts on governance.

Broadly speaking, most studies of the politics of GMOs are rooted in such a ‘political economy’ perspective, drawing together (within various nuanced theoretical approaches) an analysis of discursive, material and institutional forms of power (Cox and Hettne 1995). For example, in early work in this field Krimsky (1982, 1991), Wright (1994), and Krimsky and Wruble (1996) traced the effects of the controversies over recombinant DNA technology, and particularly the impacts of scientists, industry actors and their critics, on the establishment of regulatory structures in the US and the UK.² As a wider range of actors became involved in these debates, some analysts began to frame the politics of GMOs through the lens of social movement theory, but still with attention to how those movements interacted with industry and the state (see contributions to Tokar 2001, Schurman and Munro 2003). For example, Schurman (2004) and Schurman and Munro (2009) identify aspects of industry structure that are key to understanding their vulnerability to challenges by

SMOs, including the relationships within supply chains, inter-firm competitiveness, and the nature of the goods being produced – all issues that resurface in the discussion below.

In contrast, however, several recent papers look exclusively at the anti-biotech movement itself, trying to understand what has made it successful or not in specific settings. For example, Munro and Schurman (2008) provide an account of the early anti-genetic engineering movement in the US. Their observations on the professionalised makeup of this movement are insightful, but a narrow focus on SMOs also has limitations. Two papers published on the RR wheat case in Canada illustrate these lacuna. Magnan (2007) documents the way that the development of a consistent framing of the issue was critical to the success of the diverse coalition that coalesced against RR wheat. Eaton's (2009) work shows how Canadian farmer interests figured centrally in the RR wheat struggle. Both author's conclusions are important, but they simply make the assumption of a causal link between SMO activities and Monsanto's 2004 decision. Missing is an analysis of *how* and *why* SMOs affected the company to the point where it had no choice but to back down. The two cases revisited here – which include RR wheat to address this gap – show that analysts need to examine a broader range of political and economic forces to understand both contextual factors and SMO pathways of influence. (Notably, the story of how SMOs actually mobilised around these cases is not the central focus here. For detail on RR wheat campaigning see Andrée and Sharratt 2009, Magnan 2007 and Eaton 2009; on rBGH, see Sharratt 2001 and Mills 2002.)

Theorising hegemony

Adopting a neo-Gramscian approach is less about applying Gramsci's conclusions outside of his historical context than it is about adopting a Gramscian method of analysis, or as Morton (2007, p. 1) puts it, 'thinking in a Gramscian way'. With its roots in Marxism, this theoretical lens assumes the centrality of the struggles that capitalist relations of production engender to contemporary politics. Where Gramsci (1971, p. 184) and his followers differ from 'economistic' Marxists, however, is in their dismissal of the assumption that the material *base* necessarily defines ideological *superstructure*. Instead, these theorists encourage an analysis of three sets of 'relations of force' (ibid. pp. 181–184) – the material, institutional and discursive – and their interplay across three levels of mutually constitutive political activity: civil society, the State, and global order (Gill 1998).

Like Marx, Gramsci sees the State as the key sphere of 'direct domination' of one social group by another (Gramsci 1971, p. 10), but Gramsci is careful to avoid according too much power to the State, narrowly defined. It is really the 'extended' or 'integral' state which governs, including 'both the apparatuses of government and the judiciary and the various voluntary and private associations and para-political institutions which make up civil society' (Forgacs 2000, p. 429). Neo-Gramscians thus foreground civil society 'as the

terrain for legitimising as well as challenging' governance structures (Ford 2005, p. 318) and carefully track the complex relations between civil society and the State (Long 2008).

In the context of the research, development and commercialisation of GM crops and foods, Gramsci's (1971, p. 366) concept of an 'historical bloc' – which I have previously termed the 'biotech bloc' (Andrée 2007, pp. 45–78) – aptly describes the depth of the relationships between the biotech industry and supportive arms of specific State and civil society bodies. Neo-Gramscians define an historical bloc in two ways, each relating to a different level of analysis. First, it is an alliance of social groups around a set of material practices and justificatory discourses for which they seek to establish widespread acceptance. This is the meaning of historical bloc intended by 'biotech bloc' above. Second, it refers to the convergence of material forces of production, coercive forces of the State, and supportive discourses that together 'stabilise and reproduce relations of production and meaning' (Levy and Newell 2005b, p. 50). This more encompassing definition is closely tied to Gramsci's understanding of 'hegemony', which refers to 'not only a unison of economic and political aims' exercised by coercion, 'but also intellectual and moral unity' established through consent (Gramsci 1971, p. 181).

For Gramsci, hegemonic consent is achieved through 'an educational relationship and occurs not only ... between the various forces of which the nation is composed, but in the international and worldwide field' (*ibid.*, p. 350). 'Organic intellectuals' (*ibid.*, p. 33) are those individuals and groups, emerging from within an historical bloc, that frame transformations in a way that make sense to the public at large. Generating such widespread consent requires that the interests of the dominant social group be framed in such a way that they can be accepted as the shared interest of society. For an historical bloc, understood in terms of an alliance, to gain hegemonic influence inevitably requires some accommodation towards subordinate groups.

One question raised by these concepts is at what point is it appropriate to describe an alliance around a shared cause, such as the biotech bloc, in terms of the second definition of historical bloc, that is with the hegemonic power to reproduce relations of production and of meaning? The problem here is that Gramsci's use of the term historical bloc in two different ways raises the possibility that a new historical formation like the biotech bloc is simply assumed to be hegemonic, with the goals of its instigators fully realised, without sufficient attention paid to the processes of resistance and accommodation to which it is continuously subjected, and which may eventually lead to its downfall or reconstitution. This possibility has led neo-Gramscians to be criticised for being overly structuralist, simply assuming that 'abstract forces of technology and global systems such as capitalism and trade liberalisation, strongly linked to business interests, are shaping global politics' (Bled 2007, p. 3). Long (2008, p. 74) argues that descriptions of hegemonic processes 'stand in danger of being dismissed for being little more than a crude caricature' because they 'skate too superficially over the multiplicity and complexity of

elements involved'. Lundsgaarde (2005, p. 129) articulates the problem in this way: 'Without documentation of the extent of hegemonic power in shaping existing ... practices it is hard to know whether a ruling coalition is really being displaced or reformed at all'.

I tackle this question by, on the one hand, demonstrating the power of an historical bloc with hegemonic ambitions and its ability to affect specific practices. On the other hand, I illustrate just how deeply the leaders of a bloc may be forced to compromise to move a larger project forward. Examined in a Gramscian way, our cases demonstrate how the composition of the biotech bloc that the agrichemical industry relies on to ensure its project's success – a structure that necessarily includes the participation of key State and civil society actors – also entails vulnerabilities that may harm some of the leading group's immediate interests. This analysis sheds light on when hegemony is, and is not, an appropriate descriptor. It also shows that hegemony remains a useful concept even if rarely fully realised.

The contested 'biotech bloc'

Over the last three decades, the biotech bloc – this multifaceted alliance rooted in the material capabilities of genetic engineering and led by agrichemical companies in cooperation with promotional and regulatory arms of US, Canadian and Argentine governments as well as key civil society organisations such as agricultural universities and farm groups – has been actively working to establish hegemony for the GM project in agriculture (see Andrée 2007). This bloc emerged in the late 1970s and early 1980s. It initially set its roots in North America, and the US in particular, as a result of the convergence of three main factors: the engineering drive of molecular biology (Keller 2000); a globalising agri-food system centred on the North American livestock industry (Friedmann 1994); and state-sanctioned commercialism in US academic science (Krimsky 1991, Wright 1994). By the early 1980s, when genetic engineering became a project led by agrichemical companies, there was a unity of intent among the academic, industry and government agencies involved: Their goal was commercial applications of this new technology for the benefit of society through agronomic and veterinary products. Notably, this was a public goal intimately tied to private interests as evidenced by the first generation of GM crops, which were designed to facilitate the continued use of these same companies' herbicides (HT crops) or to (partially) replace their insecticides with proprietary plant-based toxins (Bt crops; see Charles 2001).

In addition to material strategies that focused on traits designed to complement pesticide sales, the bloc's organisational strategies included building support among industry-friendly NGOs like the Consumers Association of Canada (Andrée 2007). At the level of the State, its institutional efforts included the recognition of patent rights over genetic material and subsequent pursuit of legal enforcement (Prudham 2007). Perhaps most importantly, the bloc adopted discursive strategies designed to minimise public dissent by

employing the narrative of a 'biotechnology continuum', which frames GM as just another step in the human manipulation of living organisms, in line with selective breeding and the use of yeast to make beer, dating back thousands of years (Amalu 2004, p. 538). In Canada, these strategies began to reap rewards by the mid-1990s when the first commercial applications in agriculture were approved for use and then adopted by farmers. However, the fact that rBGH was actually to be the first GM product approved, but that this decision was stalled through the 1990s, shows that the biotech bloc's vision was not being realised without resistance.

Up to the early 1990s, this resistance was organised through professionalised NGOs, much like in the US (Schurman and Munro 2003). NGOs with scientific and legal expertise like the Canadian Environmental Law Association had been active participants in early government consultations around the establishment of the Canadian regulatory system (Winfield 2002). Then, with the imminent arrival of commercial GMO production, a wider alliance of SMOs became involved, including organisations with broad bases of public support such as the Council of Canadians (a multi-issue anti-globalisation SMO in favour of 'economic sovereignty'; COC 2009, p. 1), the Sierra Club of Canada and Greenpeace (both environmental SMOs with large national memberships) (Sharratt 2009). On some specific issues, such as rBGH and RR wheat, these SMOs were also joined by farm organisations, as outlined later.

The challenge facing those fighting against GMOs as a class is that the first generation of GM maize, canola and soy to be released in Canada was a difficult target to campaign against (Sharratt 2008). These herbicide-tolerant and Bt crops were actually welcomed by many farmers as time and cost-savers and their products were also almost invisible to consumers since they were primarily used in their processed forms or as animal feed. This latter factor made them difficult targets for consumer campaigns in the absence of the kind of health-scares and regulatory failures that European SMOs could exploit (Sharratt 2008).

Conversely, as the first GM crops and foods were first being exported from the US, Canada and Argentina in the mid-1990s, resistance to these products in other countries – especially the potential importers of GM products – was more successful. This reaction was motivated by a variety of factors well documented by others (Schweiger 2001, Schurman and Munro 2009), but one of the issues that clearly gave it widespread traction, especially in Europe, was the furore over bovine spongiform encephalopathy (BSE) (Levidow 1999). In early 1996, the UK government admitted that the deaths of at least ten people were linked to the consumption of animals infected with BSE, despite years of statements that there were no health risks. Only two weeks later, the EU approved the introduction of the first GM product, RR soy shipped from North America (Charles 2001), and European SMOs were quick to point out that it could also lead to unanticipated health effects despite government assurances of safety. Public resistance instigated by SMOs influenced government policy in the EU in terms of the enactment of labelling laws for products made of GM

ingredients in 1998, a *de-facto* moratorium on the approval of new GMOs starting in 1999 (and ending in 2004 – though whether it actually ended depends on one's level of analysis; Lieberman and Gray 2006), and the establishment of more rigorous regulatory framework in 2003. In 2001, Japan and Korea also brought in labelling laws due to similar public pressures (Sharratt 2008).

rBGH and RR wheat

The failures of rBGH in 1999 and RR wheat in 2004 are best explained through an analysis of the very same factors that underpinned the biotech industry's *success* with other GMOs introduced in Canada. This section is thus organised around the responses of three sets of civil society actors as well as various arms of the State. I show how these actors had a critical role to play in their response to GMOs in general, and also to the SMO campaigns waged to stop these products in particular.

Farmers

Farmers represent a complex group for any examination of biotech politics (Eaton 2007). On the one hand, some farm organisations, such as Canada's National Farmers Union (NFU), are best characterised as an SMO with goals of social change that (could) line up with the goals of other SMOs of interest here such as Greenpeace and the Council of Canadians. The NFU is Canada's pro-family-farming organisation, now affiliated internationally with the global peasant movement La Via Campesina and its call for radical changes to food and agricultural policies based on the principles of food sovereignty (Desmarais 2007). However, most other farm groups involved in biotech politics in Canada entered into the fray primarily to ensure their immediate economic interests were not harmed, so we need to examine their participation from this perspective.

In the case of biotech crops in general, farmers have proven a critical, albeit fickle, ally. Despite considerable grumbling among farm groups about the restrictive user agreements that accompanied them, the first generation of GM soy and maize were welcomed by sufficient numbers of North American farmers to ensure their uptake (Charles 2001). One early US study found that the relative profits for switching from non-Bt to Bt cotton, for example, were as high for the farmers as they were for the biotech company involved (Falck-Zepeda *et al.* 1999). On the other hand, the need to ensure that farmers would benefit came to haunt Monsanto for both rBGH and RR wheat.

With rBGH, opposition in the agricultural community built slowly, but it eventually proved crucial to the product's failure. The NFU initially took up the cause alongside other SMOs. This organisation was specifically opposed to rBGH (though not against the first GM crops) because the product was seen as unnecessary and expected to negatively impact the livelihoods of small dairy

farmers as well as animal welfare. Furthermore, the perception that a 'pure and natural' product like milk was potentially going to be tainted with a genetically-modified hormone shaped some NFU member perceptions on this issue (Sharratt 2001, p. 386). This dynamic backs Schurman's (2004) assertion that the nature of the product itself – which I would clarify as the perception thereof – may be critical to an industry's vulnerability.

The NFU has a relatively small constituency among farmers in Canada so the subsequent entrance of the Dairy Farmers of Canada into the debate was an important watershed. The DFC is a national policy and lobbying organisation, founded in 1934, and representing all of Canada's thirteen thousand dairy farmers (DFC 2009). In a direct response to the lobbying of Canadian SMOs against rBGH that highlighted potential health risks (e.g. the 'Pure Milk Campaign' of the early 1990s; see Sharratt 2001), the DFC framed the issue purely in economic terms, raising concerns that consumer reaction to milk from rBGH cows could lead to a drop in milk sales.

Notably, dairy farmers also had a second concern about rBGH and its consequences that was not tied to the pressure of SMOs, but which proved particularly important in shaping the formal regulatory response. This was connected to the nature of the supply management system in Canada (Mills 2002), which pools milk regionally and pays producers (who buy the right to produce a certain 'quota' of milk) based on a formula in relation to their costs of production. Most of this milk is then sold into the domestic market. The worry for dairy farmers in Canada was the reported higher incidence of mastitis (an udder infection requiring the administration of antibiotics) in cows treated with rBGH. Mills (2002) notes that in the US this issue was framed as a problem that producers could overcome through careful herd management. For Canadian farmers, on the other hand, 'the mastitis issue was viewed in the light of Canada's supply management system' (p. 132), which would impose a fine, or require the farmer to buy milk to make up the quota, if s/he had to throw out milk because it was contaminated with high somatic cell counts (a consequence of mastitis) or antibiotic residues. Canada's supply management system essentially meant that farmers had less to gain from the introduction of rBGH than their US counterparts – quotas creating little incentive to increase production – and they also had more to lose.

With RR Wheat, Monsanto had expected the product to become popular among reduced-tillage farmers, just like the RR canola that preceded it. These farmers, who number about half of Canada's Prairie farmers (Thomas, Leeson, and Van Acker 1999), drill their seeds directly into fields which have had their weeds 'burned off' by herbicides like Roundup (glyphosate). However, many became RR wheat's greatest critics. Their main concern was that RR wheat would lead to the loss of Canadian export markets for *all* wheat. Through the Canadian Wheat Board (CWB), the federally mandated marketing body for all of western Canada's 75,000 wheat and barley growers co-directed by government appointees and farmer representatives (CWB 2009), 70% of this wheat is exported to Asia and Europe (Burroughs 2005). In response to an

active campaign by SMOs in Europe and Asia, millers in these regions had let the CWB know that they did not want GM wheat (Greenpeace 2003). Furthermore, buyers stated that if any Canadian farmers grew GM wheat commercially, they would reject all Canadian wheat (even non-GM) because of the potential for contamination (Roshier 2005).

Another concern raised by Prairie farmers was also connected to SMO campaigning. A University of Manitoba survey undertaken in 2003 found that 'corporate control of the food supply' – a framing defined by SMOs in their larger fight against neoliberal globalisation (see Part III of Tokar 2001) – ranked second after market issues among farmer concerns over RR wheat (Mauro and McLachlan 2003). The case of Percy Schmeiser, a Saskatchewan farmer sued by Monsanto for having the company's proprietary RR canola in his fields in 1997 and 1998, brought this issue to the fore. Schmeiser argued that the RR genes found their way into his own canola accidentally from seeds falling from passing trucks or from pollen drift (Anonymous 2004). However, the Supreme Court of Canada upheld the Monsanto patent, noting that it did not matter how the RR genes came into his crop (Percy Schmeiser vs. Monsanto Canada Inc. 2004). The Schmeiser case – adjudicated in the midst of the RR wheat debate from 2002 to 2004 and highly politicised by SMOs as a David vs. Goliath story³ – struck a chord with wheat farmers, about half of whom save their own seed (Van Acker and Entz 2001).

Canadian wheat farmers also raised agronomic and environmental questions around the potential introduction of RR wheat. These issues were not initially central to SMO campaigns, and some suggest that they came to be focussed on (through the CWB) only because they fit within the mandate of the CFIA, the regulatory body responsible for evaluating the environmental implications of novel crops (Van Acker 2005). These questions revolved around the potential for RR wheat to become a new weed, whether for the adopters themselves or neighbouring farmers.

Supply-chain partners

From a neo-Gramscian perspective, the realisation of any political project requires appropriate material relationships to underpin it, and as Schurman and Munro (2009, p. 163) point out, 'actors at all the key nodes must be "enrolled" in the network'. In order to succeed with its biotech revolution, the agrichemical industry needed to bring food processors, retailers, and grain traders onside. In Canada, the evidence shows that these companies stood together on many issues regarding GMOs. For example, they spoke with one voice against the mandatory labelling of GM food, successfully arguing that it was not scientifically warranted, would mean new costs for the entire supply chain, and would stigmatise a good portion of the products already on supermarket shelves (CBC News Online 2004). On the other hand, competitive behaviour among firms (Schurman 2004), or what Falkner (2009, p. 226) terms 'business conflict', also represented a point of vulnerability for

the biotech bloc. When consumers, encouraged by SMOs, started rejecting GM products in Europe in the late 1990s, some Canadian food processing companies followed their lead and removed GM ingredients from their products (Reschke 2001). These moves ultimately spelled the end for Bt potatoes in Canada.

Supply-chain dynamics became a significant factor in both the rBGH and RR wheat stories, and in each case this was tied to the potential loss of markets associated with the ability of SMO campaigns to target milk and bread directly (Sharratt 2001, Andrée and Sharratt 2009). With rBGH, the National Dairy Council of Canada, the national body representing milk processors, joined the debate in 1994 because of fears that sales would drop if rBGH were approved. The Council demanded that the government be liable for any resulting lost income, and eventually called for a two-year moratorium on the product's introduction (Mills 2002). With RR Wheat, Monsanto had learned some important lessons from the loss of rBGH and Bt potatoes. In 2000, the firm began to work proactively with its main 'stakeholders' in North America to help the company plan an 'orderly release' for RR wheat (Monsanto 2004, p. 1). In response to its 'Wheat Industry Advisory Committee's' advice, Monsanto stated that the company would not commercialise RR wheat until six conditions were met, including: regulatory approvals in the US, Canada and Japan; buyers identified; marketing arrangements in place in major export markets; and the establishment of 'appropriate' grain handling protocols to 'provide a meaningful choice for customers' between biotech and conventional grain (Monsanto 2004, p. 2).

This pledge was not enough, though, particularly when scientific research (discussed below) pointed out that handling protocols *could not* provide the level of purity of non-GM grain that overseas markets were demanding. This research led the big grain traders, ADM (Rampton 2004) and Cargill to raise questions. René Van Acker (2005), one of the scientists producing research on the agronomic risks of RR wheat, reports getting phone calls from Cargill representatives because his research suggested that grain shippers might face containers rejected from distant ports due to unanticipated contamination. Van Acker (2005) phrased the Cargill position based on his research in this way: 'This is not about whether or not we support biotechnology. This is about limiting our liability. We have no recourse in law to translate that liability back to you [Monsanto].' Cargill's emerging position would have placed considerable pressure on Monsanto given how tightly these companies are knit together (Heffernan 1999).

Academics

Getting academic scientific bodies onside was critical to the early successes of the biotech revolution. Many of these scientists were the organic intellectuals of the biotech bloc: They shared an active material and ideological interest in the success of the revolution (despite being seen by many in the public as

independent) and were in a position to ‘educate’ society on the need for change (see Andrée 2007, pp. 64–66). From the outset, however, there were also critics within academia, particularly among ecologists (see Krinsky 1991, pp. 133–151). Some of these individuals became the organic intellectuals of the nascent anti-biotech movement, and one area where they had the greatest impact was in convincing the US and Canadian governments to establish refugia for Bt crops. This strategy, which meant that 20% of farm fields were planted in non-Bt crops, was designed to ensure that the development of insect resistance to the Bt toxin would be slowed (NRC 2000).

Intellectuals from within the environmental movement, such as Samuel Epstein (1990), also played key roles in the rBGH conflict, raising the human and animal health concerns that eventually found themselves at the heart of public and regulatory debates. The human health questions were around whether recombinant rBGH was more likely than natural BGH to lead to allergic reactions, and whether the substance called insulin-like growth factor-1 (IGF-1), known to be elevated in treated cows, was a health risk (Mills 2002). The main animal health issue was the potential for increased rates of mastitis. Mills (2002, p. 103) notes that a ‘surprising’ degree of consensus was eventually established that the evidence showed little likelihood of risk to human health but that more research was needed for a definitive answer (Mills 2002). It was also agreed that there was a statistically significant increase in animal health disorders, which regulators in these two countries then interpreted differently. More important than the eventual consensus, however, was the scientific debate itself, which SMOs used to show that consumers would be subjected to potential risks without benefits (Mausberg and Press-Merkur 1995), and which led industry players to fear losing consumer confidence in milk.

Critical reactions from academics also played an important role in the RR wheat case. Economists suggested that RR wheat ‘weeds’ could force farmers to use more expensive and more toxic herbicides (Furtan *et al.* 2002). Meanwhile, studies by weed scientists (at least one of which was directly commissioned by the CWB) suggested that stewardship of the RR trait in wheat might not be possible for agronomic reasons, and that stewardship problems could lead farmers to abandon reduced tillage practices – techniques lauded for reducing soil erosion (Van Acker and Entz 2001, Van Acker *et al.* 2003, Brule-Babel *et al.* 2003). These were the studies that eventually affected Monsanto through the grain traders.

The State

From early on, the biotech bloc included economic development arms of the US, Canadian and Argentine governments that saw genetic engineering as providing a competitive edge in the emerging knowledge-based economy (Wright 1994). These alliances were later supplemented with the addition of regulatory branches. Evidence that regulators in these countries generally

supported the vision of the biotech bloc can be found in the permissiveness of the regulatory frameworks established in Canada and the US. In Canada, for example, this framework formally maintains a narrow focus on science-based safety considerations, thereby excluding socio-economic or ethical issues (Government of Canada 1993). However, this permissiveness does not mean that the biotech industry has been able to direct the regulatory approvals process, with the prescribed Bt refugia being a case in point. In fact, the Canadian State could eventually turn against Monsanto, as we see in our two cases. Notably, this shift took place after the debates were lifted out of the bureaucratic realm (where all GM approvals have formally been made) and into the realm of Ministers and Members of Parliament.

For rBGH, the 1994 House of Commons Standing Committee on Agriculture and Agri-Food hearings represented an important juncture (SCAAF 1994). Shortly afterwards, the Canadian Broadcasting Corporation aired a documentary on rBGH that included allegations from a Health Canada scientist of attempted bribery by Monsanto (The Fifth Estate 1994). All of this attention led the Minister of Agriculture to negotiate a delay with Monsanto on the use and sale of rBGH in August 1994 and then a year-long moratorium (Mills 2002). Then, in 1997 and 1998, reports emerged that scientists inside Health Canada had found fault with Monsanto's data but were being pressured by their managers to set aside those concerns (Canada AM 1998). One Health Canada scientist, Shiv Chopra, stated 'we are being pressured to pass drugs of questionable safety in favour of the pharmaceutical companies' (Chopra 2009, p. 240). Around this same time, the Senate unanimously passed a motion urging the government to defer the licensing of rBGH until further study of long-term health risks. The Senate Committee on Agriculture and Forestry then held hearings where Chopra and two other Health Canada regulators in the Bureau of Veterinary Drugs testified (Senate of Canada 1998). The regulators alleged that they were under pressure from their managers to approve rBGH despite information gaps in Monsanto's data submissions that raised safety concerns (Health Canada 1998). Significantly, each step along the way was widely reported by the SMOs following the story and encouraging the whistle-blowers (Sharratt 2001). As a result of the loss of public confidence engendered, and in a last attempt to resolve the issue within the confines of its 'science-based' regulatory system, Health Canada commissioned two independent scientific studies. The one produced by the Canadian Veterinary Medical Association concluded that there were significant animal health and welfare concerns, thereby providing the basis for Health Canada's formal refusal to approve rBGH in 1999.

Canadian Parliamentarians first became involved in the RR wheat debate through a series of hearings on the issue held by the House of Commons Committee on Agriculture and Agri-Food in 2003. The Minister of Agriculture was also brought into the debate at this time. Initially, he responded to the joint SMO/farmer coalition by stating that the government was not in a position to block RR wheat if it passed the required safety assessments

(Andrée and Sharratt 2009). However, by March of 2003 he admitted that a committee had been formed to develop a voluntary policy framework for the ‘commercialisation of novel agricultural products ... [that] makes sure the concerns of consumers and buyers of novel products are met’ (Anonymous 2004, p. 1).

That the Minister was looking at how to keep RR wheat off the market appears to have given Canadian regulators a strong hand when examining this product. As a result, and despite the fact that all HT crops that had previously been submitted for approval had received it, RR wheat faced tough scrutiny by the CFIA. The CFIA focussed on the fact that HT ‘volunteers’ (plants growing where or when they were not wanted) were becoming an increasing problem in western Canada. The academic studies referred to above eventually informed a ‘deficiency letter’ sent by the CFIA to Monsanto in September of 2003 asking pointed questions, especially on management options for non-adopters of the technology that could be left controlling glyphosate-tolerant weeds previously controlled with glyphosate (MacDonald 2003, p. 1). Monsanto never responded to this letter prior to withdrawing its CFIA application (MacDonald 2005).

Conclusions

Some may read these two cases as examples of scientific regulatory processes working properly. Regarding rBGH, the process concluded that the product was too risky on animal health grounds, and for RR Wheat the CFIA asked technical questions that Monsanto could not answer so the company pulled back. The evidence presented here tells a more complicated story, however, one which illustrates the centrality of political economic factors, and especially the responses of key actors to the effect of SMO campaigns on signals that mattered most to them.

In each case, the key issue for the majority of farmers was about the potential loss of markets, and this was directly connected to SMO activism (within Canada in the case of rBGH, and in Europe and Asia for RR Wheat). For other supply chain actors such as the dairy processors and grain handlers, the potential for market losses for all milk and wheat, and not just those batches that are GM, also proved critical. With RR wheat, the grain traders only realised their vulnerable position once they listened to the arguments of academics like Van Acker, demonstrating the catalytic role that intellectuals can play in these debates. This analysis reaffirms that other supply chain partner responses to SMO activities (Schurman and Munro 2009) – what neo-Gramscians would term SMO impacts on material relations of force – are critical to a GMO success or failure. Notably, neither Magnan (2007) nor Eaton (2009) pay this area much attention in their studies of the RR wheat conflict. Companies like Monsanto may be powerful, but they are dwarfed by the grain traders ADM and Cargill and food companies like Nestle and Unilever (Shand 2001), so the opinions of these other players matter. This was

true for the European resistance to GM foods circa 1999; it was true for the NDC's position on rBGH; and it was true for ADM and Cargill's views on RR wheat.

These cases also demonstrate the central role played by arms of the Canadian State in undermining these GM products, illustrating the importance of disaggregating the State when attempting to make sense of the impact of SMO campaigns on institutional relations of force. In other words, Gramsci's integral state is also potentially a divisible one in times of conflict. For example, the quasi-governmental CWB lobbied politicians, mobilised farmers, and even commissioned some of the research that undermined Monsanto's positions on the likelihood of crop contamination. While farmer resistance to RR Wheat was also witnessed in the US during this period (Krebs 2004), it appears as if the resistance was all the more united, organised and influential in Canada because of the institutional power of the CWB. Both cases also demonstrate the role that high level political scrutiny, in the form of Parliamentary committee hearings and Ministerial intervention, can have in intervening in the cozy relationships that frequently develop between State regulators and industry in capitalist states.⁴ This tension between elected representatives and the civil service deserves further exploration in the study of hegemony formation and contestation. On the other hand, it is important to acknowledge that there were also institutional factors here that are not immediately attributable to the impact of SMOs, such as the way the milk marketing system shaped farmer perceptions of their interests regarding rBGH. This dynamic played a critical role in how that debate developed in Canada in comparison to the US (Mills 2002).

A final word is deserved on the role of intellectuals in the integral state. The organic intellectuals aligned with anti-GM SMOs can help to make or break a new product with the issues they bring to the fore. However, their arguments do not *necessarily* turn the tide against a product on their own. The fact that organic canola markets would be destroyed by GM canola, for example, never gained much traction in public or regulatory debates although with the right set of supporting factors it might have.⁵ In concert with other factors such as those identified here, however, such concerns can provide the *rationale* for rejecting or slowing the development of new products in the context of formally 'science-based' regulatory structures. That scientific research, and especially how this is framed discursively, can make a difference is nothing new to the students of environmental politics. What these cases illustrate is a Gramscian reading of these dynamics: The CFIA's deficiency letter to Monsanto on RR wheat, and the rBGH ruling on the veterinary panel's advice, both demonstrate that the regulatory arms of the 'integral state' include non-State academics and expert bodies, and this can shift the formal response of the coercive arms of the State itself.

In terms of research methods, these cases demonstrate that social movement analysts need to adopt a broad scope, paying close attention to the complex relations among civil society and State structures to understand SMO

impact on governance. And what does this analysis tell us about hegemony? Gramsci states:

Undoubtedly the fact of hegemony presupposes that account be taken of the interests and the tendencies of the groups over which hegemony is to be exercised ... But there is also no doubt that such sacrifices and such a compromise cannot touch the essential ... in the decisive nucleus of economic activity. (1971, p. 161)

Sassoon (1980) interprets Gramsci to mean that a defining feature of a hegemony formation is that 'in any compromises ... the essential economic function of the directing class remains'. Elsewhere, Gramsci states that while hegemony is exercised through civil society, it necessarily includes the State (1971, p. 10). Based on these two factors, and contrary to what I have written previously (Andrée 2007), where I suggested that the biotech bloc was hegemonic in North America, what we have here is an example of a bloc that is seeking to establish a hegemony but has simply not attained it. The fact that these products failed due to widespread SMO mobilisation, aided by contextual factors such as the structure of supply management and the emerging science of genetic contamination, illustrates an incomplete hegemony. Reaction to this activism ruptured otherwise solid relationships among supply chain partners and led arms of the State to break ranks despite the biotech bloc's earlier gains. In fact, these cases show just how much accommodation may be required to move a wider vision forward, which has now become the establishment of a social, economic, and political environment that is *largely* favourable to the biotech purveyors. Still, this conclusion does not take away from the value of hegemony as an analytical concept. Thinking in a Gramscian way may be less about establishing a definitive description of when an historical bloc is or is not hegemonic than it is about bringing to light the complexity of the processes of coercion, consent, and resistance involved in large-scale social change.

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Notes

1. The terminology in this field can be confusing and is highly politicised (see Andrée 2007). The term Genetically Modified Organisms (GMOs) is used herein to describe organisms developed through the use of recombinant DNA technology, also known as 'genetic engineering'. These are organisms whose DNA has been purposefully altered in a way that does not occur naturally by mating and/or natural recombination. The term biotechnology (or biotech) is reserved to refer to those companies that develop new crops or medicines with the use of genetic modification among other techniques.
2. This is not to suggest that these studies are all coming from the same theoretical perspective. Krinsky's (1991) social history of industrial genetics draws on the

theoretical insights of Lewis Mumford on the relations between technology and culture. Wright (1994), on the other hand, builds on Foucault and clearly foregrounds discursive power in the establishment of regulatory frameworks. What situates Wright's work within a broader 'political economy' framing (along with Krinsky), and what distinguishes her from many other constructivists, is her emphasis on the interrelationships between discursive power and the structural biases shaped by material interests.

3. Both before and after his Supreme Court trial, SMOs toured Schmeiser around the world to speak out against the growing threat of GM crops for farmer rights to save seeds.
4. This is not to say that regulators were necessarily 'captured' by industry in either or both of these specific cases.
5. A detailed comparison between the politics of regulating RR wheat and RR canola in Canada would be a valuable future research project.

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