SECTION

V

Finding the Nation in Nature

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"Trust in Bread and Bologna: Promoting Prairie Wheat in the Twentieth Century"

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Trust in Bread and Bologna: Promoting Prairie Wheat in the Twentieth Century

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There is a story about an exchange, which may or may not have actually taken place, between a prairie farmer and one from Ontario. The prairie farmer asked his counterpart what he thought of the Canadian Prairie landscape—with all its open vistas, fascinating palette, and, of course, its big, never-ending sky. The Ontarian replied, "Well, it's nice enough, but I really can't see anything." The Ontarian asked in return for a report on the Ontario landscape—with its rolling hills, towering deciduous trees, and sheer, rocky outcroppings. The prairie farmer replied, "Well, it's nice enough, but I really can't see anything." These two were clearly on opposite sides of an issue that was, as we say, a matter of perspective: the prairie farmer perceived an open expanse of space as, in itself, something to see, while the Ontarian perceived that same space as nothing but emptiness.

Without overstating its importance, I like this story because it provides an apt parable for historians seeking creative ways of thinking and writing about prairie environmental history. I will proceed by making a few general points concerning this story's relevance for environmental historians of the prairies. In doing so, I will introduce the core interpretive concept of this paper, *trust,* and suggest how thinking slightly differently about this sociocultural phenomenon might influence historians' source selection, and how trust engenders new insights into connections between science and technology, on one hand, and environmental history, on the other. This brief discussion will set the basic methodological and theoretical stage on which my sustained empirical example is set. The example, a narrative about bread, flour, and Canadian cereal scientists' roles in marketing Canadian wheat, takes us across the Atlantic Ocean, to Bologna, Italy, and back. Finally, I will return to some experiences that I have had while writing environmental histories of a place

that is viewed by many to be utterly empty, and explore some ironies that emerge from the narrative, especially vis-à-vis the theoretical and methodological angle I present. Having visited the empirical example we can then (dare I say it?) knead the theoretical and methodological considerations into the real-world story about marketing Canadian wheat.

Introducing the Prairies

A brief description of the Canadian Prairies is in order. For many Canadians, the word "prairie" itself generally refers to a vast expanse of relatively flat land, like that which lies along either side of the Trans-Canada Highway between Winnipeg, Manitoba, and Calgary, Alberta. To outsiders it seems flat, expansive, vast, endless, and even monotonous. The stretch between Winnipeg and Calgary is but a relatively small subsection of a much vaster central plain that bisects the continental United States and Canada—spanning nearly 40 degrees of latitude, and running in a north-northwesterly direction from the Gulf of Mexico in the south to the Arctic Ocean in Canada's north. In Canadian territory this long central plain is hemmed on its western boundary by the Cordilleran region, and on its northeasterly margin by the Precambrian Canadian Shield.

The prairies are underlain by flat layers of sedimented rock, ranging in origin from Cambrian to Tertiary times (anywhere from 500 to 1 million years ago). The present-day Rocky Mountains were forced skyward approximately 85 million years ago, thus creating a steep eastern slope, down which masses of sand and gravel flowed over the ensuing millennia, fanning out to form a vast alluvial plain—part of the basis of today's prairie soils.[1] Also integral to the Plains' landscape formation have been more recent episodes of glaciation, which arrived cyclically within the Pleistocene Epoch. For the most part, the Plains' pre-Pleistocene relief features were not altered significantly in the sense of being "scoured," or carved, as might be expected when a one-kilometre-thick ice sheet moves across uneven terrain. Pleistocene ice sheets did, however, deposit across the Plains' Tertiary landscape massive amounts of gravel, sand, and "rock flour," carried within the advancing ice sheets from exposed rock formations much farther north. By the same token, retreating ice sheets left behind a legacy of outwash plains, spillways, meltwater channels, and large glacial lake basins—all in evidence to varying degrees across the southern regions of today's Prairie Provinces: Manitoba, Saskatchewan, and Alberta.[2] The largest and best known example of a glacial lake basin is that of Lake Agassiz, which, at its maximum extent, covered over 800,000 square kilometres.[3] Far and away the largest body of fresh water on the planet at the time (around 8,400 years ago), Lake Agassiz contained vastly more fresh water than is available in all the world's lakes today combined. It encompassed large tracts of present-day Manitoba and northwestern Ontario, and smaller fingers of the lake reached into Saskatchewan. The future site of the city of Winnipeg lay an incredible 200 metres beneath the lake's icy surface.

The land eventually surfaced from Agassiz's depths and, shortly thereafter, humans arrived to take up permanent occupancy of the area. Since then, cereal grains, minerals, animal skins, and petrochemicals have, at different times, flowed out. Such interactions have been visible to historians, and the subjects of history. However, there have been other, less-obvious interactions that also deserve attention. Just as the prairie farmer in our story was able to do, prairie environmental historians must learn to appreciate apparently empty spaces—that is, to interrogate some of the harder-to-see kinds of interaction between the prairies and other parts of the world.

Trust and Bologna

The most important of these spaces, I suggest, is the conceptual space that still persists in many historians' minds, between science and technology, on the one hand, and environment, on the other. The relatively abstract concept of trust sheds helpful light on this conceptual space. I am not referring here to the confidence or faith we might have in another person, but rather to the eminently impersonal experience we face in the modern world. We are all reliant to an unprecedented degree on other people, often (usually) operating at considerable distance from ourselves, whom we are unlikely ever to meet.[4] The streetcar driver whisking office workers along bustling streets; the elevator operator, launching workers skyward in newly erected skyscrapers; indeed, the structural designers of those skyscrapers are examples of the many, many figures in whom we have tacitly placed our trust over the past century or so.[5] In an ironic sort of way, the putatively impersonal and cold modern world is entirely dependent on a deep and abiding kind of trust.

Despite its ubiquity in the modern world, trust does not appear organically, as if out of nowhere. Like everything else, it develops in deeply contingent social, political, and environmental contexts. In the story that follows we witness an instance of trust in the making. Here, Canadian scientists attempting to promote Canadian wheat struggled to elicit (albeit implicitly) a sense of trust abroad in Canadian systems of wheat-quality testing. However, despite having the appearance of objectivity that is generally conferred by science, the systems they employed tended to downplay certain properties of Canadian wheat that were potentially troubling, and emphasized others that were favourable. These properties were determined by and in prairie soils, of course, making this an abidingly environmental story.

By the early 1920s, Canada was a global force in the exportation of cereal grains such as barley, oats, and, mostly importantly, wheat. A mere 1.2 million acres of wheat were planted in the prairie region in 1896, but this had risen to 10 million acres in 1913 (thanks to the work of an unprecedented wave of immigrants), and 23 million acres by 1928.[6] The technological complexities of moving so much grain from the continental interior to ports in the East were significant. The most complex task of all fell to the Canadian government, which through its Department of Trade and Commerce (DTC) held responsibility for determining grain quality, and assigning quality designations, called "grades," to all export shipments. Government grain graders worked at local, regional, and terminal grain-receiving points (known as "elevators") in order to take samples of incoming grain, and assign grades according to federal grading statutes.[7]

Working at a slightly removed though no less important level of the process were employees of the Department of Trade and Commerce's main scientific laboratory, the Grain Research Laboratory (GRL), located in Winnipeg, Manitoba. In the Laboratory, which opened in 1913, scientists conducted experiments on the grain samples taken from export shipments. For GRL scientists, experimentation largely entailed milling wheat samples into flour, and then baking that flour into bread. This "scientific" bread baking was geared toward two mutually reinforcing purposes. On one hand, scientists compared their experimental results—i.e., loaves of bread—with the quality designation given to the wheat sample from which the loaf had been baked—a high grade given to the wheat presumably presaged a top-quality loaf of bread. The idea here was to check and, if necessary, recalibrate the quality assessment skills of graders working on the ground. In other words, if graders' quality designations were found to overstate the wheat's ability to perform in baking practice, then alterations had to

be made, lest the reputation of Canadian wheat suffer in foreign markets. On the other hand, their experiments also rendered results (again, loaves of bread) that were commonly used themselves as marketing devices by DTC representatives travelling abroad. What better way to market Canadian wheat to prospective customers than to travel with delicious, beautifully shaped loaves of bread?

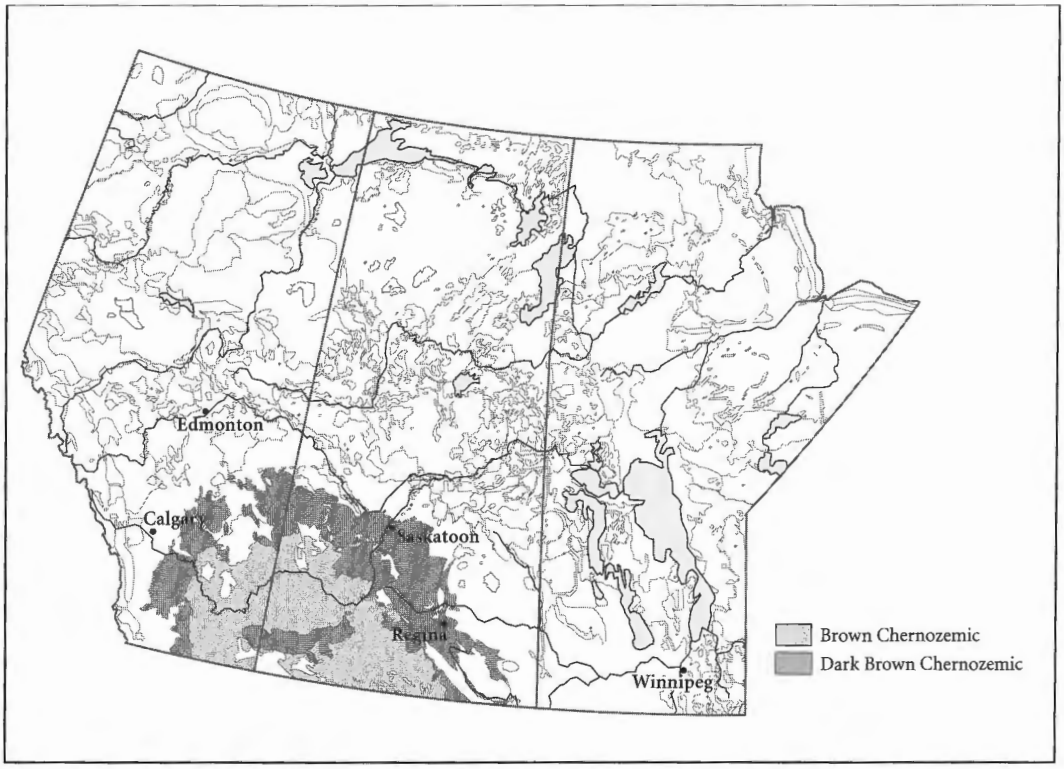
While both sides of the GRL's activities were integral to the smooth functioning of the wheat economy, marketing grew in relative importance throughout the 1930s, thanks in very large measure to plunging world wheat prices and chronic oversupply, which even a horrific period of drought on North America's Plains did not offset. In 1932, the GRL's first chief chemist, Dr. F. J. Birchard, took the first of what would turn out to be many trips abroad to endorse the quality of Canadian wheat. That year, Dr. Birchard represented Canada at two international, bread-related events—the first International Bread Congress in Rome, and the International Exhibition of Breadmaking Machinery and Accessories, held in Bologna, under the auspices of the "National Fascist Federation of the Baking and Kindred Trades."

In preparation for the Italian events, which were opened officially on June 21 by Premier Benito Mussolini,[8] the chief chemist and his staff produced hundreds of loaves of bread and other baked goods for exhibition and demonstration. Although everything was carefully packed and handled cautiously, Birchard's report of the trip reveals that many of the loaves of bread and dinner rolls had become less visually pleasing during the long trans-Atlantic journey.[9] This surely caused Birchard some concern, for imperfect bread products portended a marketing disaster in two ways. In the immediate and explicit sense, unpleasant looking loaves were, by definition, unlikely to attract the attention of foreign wheat buyers. But more than that, misshapen loaves seriously threatened to derail a key opportunity for Canadian cereal scientists to establish trust abroad in their ability, through standardized and carefully devised science, to control and guarantee the highest quality wheat and flour in the world. By the time of the Italian visit, there had been at least a decade of developments in techniques by which Canadian wheat had to be handled in order for its optimal baking capabilities to be shown. Thus the implicit function of Birchard's trip was to forge trust in (read, acceptance of) the procedures that his lab had developed to make Canadian bread appear as impressive as possible. Birchard was bearing not just bread, but symbols of both Canadian nature and science—and it was as symbols that the bread had more important, enduring consequences.

There were very good reasons, having to do with the environmental conditions in which Canadian wheat grew at the time, why Canadian scientists were actively engaged in creating trust among potential buyers, as opposed to leaving it to chance and hoping it would emerge naturally. The largest proportion of prairie wheat offered for sale on international markets grew in the long rain shadow cast by the Western Cordillera, in the relatively dry, medium-grass prairie zone, and in either Brown or Dark Brown Chernozemic soils (see Figure 10.1).[10] Though this zone does not qualify as arid by strict definition, it is drier than most wheat-growing areas in other exporting nations such as the United States, Australia, and Argentina.

Relative dryness meant, in turn, that Canadian wheat tended to be lower in starch content, and higher (often considerably higher) in protein content than that from competing nations. The relationship between dryness and protein content has two significant dimensions. First, wheat protein, known as gluten, is formed when the wheat plant takes up available, soluble nitrogen stores in the soil. In slightly wetter climes, or even in especially wet years on the prairies themselves, wheat

Figure 10.1 CHERNOZEMIC SOILS IN WESTERN CANADA



Brown and Dark Brown Chernozemic soils, concentrated in southern areas of the prairies, produce particularly high-protein wheat. Fourteen percent protein content was common in these areas, whereas 11 percent was typical of wheat grown to the north.

Source: This map is based on CanSIS, Soil Landscapes of Canada v.2.2, Component Mapping, Agriculture Canada.

plants will produce more seed-holding heads, which means that the available nitrogen is spread across a greater number of seeds, resulting in lower proportionate protein content per seed. As for the availability of soluble nitrogen in the first place, relatively dry soils will be richer for two reasons. First, lower levels of rainfall mean that smaller quantities of nitrogen, a highly water-soluble compound, will be washed out of the soil, or down into unreachable depths or nearby watercourses. Second, dry soil nitrogen is less susceptible to a bacterial decomposition process known as "denitrification"—through which soluble nitrogen is returned to a gaseous form, unavailable for use by the wheat plant. Dryness equals high proportionate levels of protein in wheat seeds.

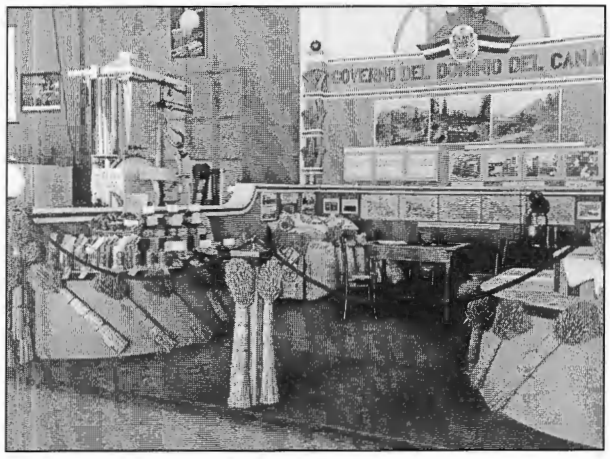
What has any of this to do with promoting bread and dinner rolls at international conferences? There are two related answers. First, by and large, high-protein wheat had been considered a premium product for the purposes of making bread for decades leading up to the 1930s. With the advent of economic depression and corresponding wheat surpluses, however, large buyers (milling and baking firms) were less and less interested in paying premium prices for high-protein wheat. Canada's top-grade wheat sold for between five and ten cents per bushel more than its leading competitors. From a Canadian point of view, this in itself was a difficult problem in wheat marketing.

More complicated, but still related, is the fact that high-protein wheat produces high-protein flour, and high-protein flour can be unusually difficult to manipulate for the purposes of getting bread dough to leaven, or "rise," sufficiently. If especially abundant, flour proteins must receive an especially rigorous "beating" in the kneading process. Too little kneading and the flour fails to perform, at least where performance means that the bread rises to the most voluminous point possible, a preference widely shared among North Americans, but not, for the most part, by European consumers. Thus, Birchard had to demonstrate at once the quality of actual bread loaves while simultaneously fixing in the minds of congress attendees a link between the loaves he showed and the presumably unvarying experimental procedures his lab employed. The two—loaves and procedures—worked in tandem to confirm the "naturalness" of each: fine loaves seemed to trumpet "careful, fastidious procedures," while, in turn, those precise procedures promised never-ending reliability in terms of quality control.

Selling Consumers on Science

This story about naturalness and science augured perfectly with trends, also relating to trust, in consumer purchases of all manner of baking-related items. The rise of consumer activity in the 20th century, which essentially entailed the replacement of home-produced goods with industrially produced ones, was utterly reliant on forms of trust, however banal they may seem. An emergent and increasingly prominent theme in flour advertisements throughout the 1920s and 1930s was, certainly, that of trust: "you no longer need the 'knack' of making cakes . . . you don't need good luck," an ad for Swans Down Flour assured prospective customers in 1928.[11] The consumer was being told that she, perhaps a city woman living a great distance from wheat fields and having no intimate knowledge of the flour's environmental provenance, could trust that the contents would perform as the packaging promised, and that successive packages of the same kind could be counted upon to do the same, in exactly the same way. Yet another ad celebrated the end of "magic" as a feature of baking with flour of uniform chemical make-up.[12] Again, consumers could trust in the reliability of products produced and standardized by others, elsewhere.

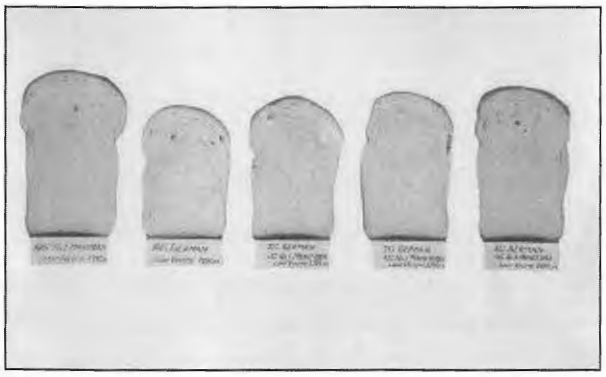
Figure 10.2 Grain Research Laboratory Display at the International Exhibition of Breadmaking Machinery and Accessories, Bologna, Italy



The GRL's Bologna display featured contrasting images of Canada's ultramodern wheat science facilities and sheaves of actual wheat. On the wall, photos of lab facilities, protein maps, and experimental bread are displayed under images of the Rocky Mountains.

Source: © Canadian Grain Commission. Reproduced with the permission of the Minister of Pubic Works and Government Services Canada (2007). Library and Archives Canada/Department of Agriculture fonds/Accession W2000-01119-5/Box 1, item 20.

Figure 10.3 EXPERIMENTAL BREAD LOAVES



One of the photos featured in the Grain Research Laboratory's display. The loaf on the far left was produced with Canadian flour. The others, from left to right, reflect the "strength" of Canadian flour, when blended in increasing amounts with "foreign" (in this case, German) flour.

Source: Photo courtesy of Canadian Grain Commission.

Turning to Birchard's Bologna display, we can appreciate how three things interact and become co-determining factors in this story: an apparently ideal loaf, the environment, and trust. In Figure 10.2, a photograph of the GRL's Bologna exhibit, we see featured front and centre on the exhibit's backdrop three large photographs of Canada's mountainous west. There is no photograph depicting the prairie wheat fields, which were obviously more relevant to the substance of the exhibit. As the row of photographs below those of Canada's Western Cordilleran region suggest, it was considered more important to situate Canadian wheat in its laboratory context than it was to depict it in a realistic ecological/environmental setting. From left to right are photographs of baking-test results conducted over the years by Birchard and his laboratory assistants. These photos depict loaves baked from "foreign" and Canadian wheat, and from combinations thereof (Figure 10.3). Foreign wheat produced smaller loaves than Canadian wheat did. Admixtures of Canadian and foreign flours, however, produced larger loaves than were rendered by foreign flour alone—the common phrase being that Canadian flour tended to "carry" others.

Beneath these highly rhetorical images were four depictions of laboratory facilities, apparatus, and procedure in action. In the next lower row, Canada's wheat-producing region is, at last, depicted, but *only* in the form of brightly coloured maps that plotted the Prairies' "protein zones" for prospective buyers to see for themselves. (For more about the rhetorical properties of maps, see Matthew Evenden's chapter in this volume.) Exhibit visitors were hereby invited to assume the elevated gaze of the scientific manager and, to a degree, perceive Canadian wheat as being handled within a highly rationalized, controlled, and therefore trustworthy system. The *modus operandi* of this aggressive marketing strategy was to bake the ecological complexities of a vast bioregion (to say nothing of the social and political exigencies of life within it) into a North-American-centred image of good bread. This Canadian vignette helped witnesses peer behind the curtain into a process of industrial-style precision, where a rigid scientific enterprise ensured the accuracy of brightly coloured maps that marked precise wheat-quality divisions.[13] Further, the photographed line of bread loaves offered strong rhetorical support for the ultimate legitimacy—precision, accuracy—of the GRL's entire scientific enterprise. Consumers could be confident that from farmers' fields (although there are no actual fields in this vignette) through laboratory practice and procedural stringency, to the finished, mechanically produced bread loaf, the loop was closed.

To the extent that the GRI's exhibit sought to engender trust in Canadian wheat by showing how scientists were in control of the complicated reality of wheat production, it surely fit well with the Exhibition's expressed purpose: "to diffuse among members of the bakery trade in all parts of the world a knowledge of breadmaking machines and their methods of working, and also to encourage Italian bakers to modernize their plants in accordance with sound principles of management."[14] Furthermore, the Canadian display's location in that section of the Exhibition occupied primarily by manufacturers of baking ovens and "macaroni equipment" was also a matter of rhetorical significance. The world's far-flung wheat exporting nations were now embroiled in a market competition that differed qualitatively from any they had known before—one in which the muscle-bound image of abundance, of wheat fields as far as the eye could see, was of less importance than the implication that wheat, flour, and bread were all produced in a seamless, scientific system, the complexity of which could be handled by experts alone. Thus, by contrast to other kinds of Canadian marketing campaigns, which invoked themes of nostalgia and romance as reasons for purchasing Canadian wheat, here was a decidedly different conviction rooted in the chemical properties of raw materials, and their links to industry abroad.[15]

There were two mutually related problems with the Canadian program in Bologna, however. On one hand, trust in the Canadian process of rendering consistent, standardized wheat quality was linked to a specific kind of bread that Europeans did not necessarily like. Whereas Canadian chemists conflated voluminous bread with good bread, neither European bakers nor consumers made the same inherent connection. Whereas Birchard may have been impressed by his scientific results, it is highly likely that images of towering Canadian loaves next to diminutive Italian loaves offended Italian bakers, not least owing to the vaguely racial and ethnic messages implied by the improving power of a Canadian input.

Italian bakers were also troubled by the experimental inflexibility on the part of Canadian scientists. Thus, the second, related problem: European bakers could make much more effective use of European wheat than Birchard and his assistants had done in their test-baking procedures. By subjecting flour from Italian wheat to their slow-speed mixers, by employing high-sided pans, and by using a short fermentation process, bakers in many European countries, not just Italy, were "able to make fairly good bread with the baking systems they employ[ed]."[16] In other words, Canadian experimental practices not only favoured Canadian wheat, but also were prejudiced against European wheat. Canadian wheat was not as indispensable to European bakers as Canadians tried to suggest.

All the same, successful marketing of Canadian wheat, with its particular properties and distinctive baking qualities, depended on the impression that a single, invariant procedure ought to be used for testing flour—all flour, ideally. The Canadian vignette in Bologna implied that while there is nothing wrong with differential baking practices in and of themselves, they did set an effective limit on just how thoroughly the world's wheat fields, flour mills, and bread factories might be integrated into a seamless process. There was no way Canadians could brook, let alone show respect for, Italian bakers' artistic skill if Canada was to have any serious hope of promoting its wheat.

Such was the paradox of the Canadian position in Depression-era wheat marketing. Small-scale bakers in Europe and the United States confounded Canadian efforts with their continued application of adaptive skill in pursuit of their own specific ends: they had the skill to make perfectly desirable bread with cheaper, low-protein wheat. Ironically, even if Italian bakers did find themselves

wanting to use costly, Canadian wheat, they would have had great difficulty in doing so. For one thing, using Canadian wheat to achieve the effects created by Birchard (assuming that such a goal was of interest) required capital investment in the same high-speed mixers employed by the well-equipped GRL. Few, if any, commercial mixers being used in Europe at the time would have worked this high-gluten flour tenaciously enough to permit its use in commercial baking. In other words, the unspoken but self-evident proposition of Canadian wheat marketing was that European buyers should invest not only in high-priced Canadian wheat, but also in the expensive mechanical devices necessary to use this wheat to optimal effect. It was an absurd proposition, perhaps, but it was essential to the process of establishing trust in the methods by which Canadian Prairie wheat was produced and offered for sale on the world market.

Trust and Environmental History

The research, writing, and interpretation of this story were influenced by a few distinct bodies of literature, which warrant brief discussion here. First, literature dealing with the ever-increasing circulation and exchange of goods in the world has been an implicit influence throughout.[17] Whereas economists have always tended to focus on the material and logistical aspects of circulation (encompassing transportation systems, storage facilities, standardization of quality, and so forth), many others have struggled to understand circulation and the exchange of goods in a more inclusive way, one that accounts for social, cultural, political, and even spiritual dimensions of the exchange process. From the 1920s onward, anthropologists such as Marcel Mauss and Bronislaw Malinowski led the charge toward more inclusive views of exchange. Claude Lévi-Strauss, another influential anthropologist of the 1960s and 1970s, set about studying what he called the "total social fact" of exchange, a term that gestures at his desire to understand how exchange processes are woven deeply into forms of social structure and organization. Clearly, the story I have told here about wheat promotion is consonant with the interpretive concerns of these pioneering anthropologists, insofar as it deals with circulating goods (wheat and flour, but also knowledge and trust), and to the extent that it does not treat goods-exchange as a material phenomenon isolated from social, cultural, and political factors.

Modernity theorists, especially those who have considered the status of science and technology in modern societies, exerted more explicit influence in the early stages of conceptualizing this research. Among the many key figures in this category—including Jacques Ellul, Jürgen Habermas, Max Weber, Karl Marx—the most important for this paper is Anthony Giddens. Giddens's work reminds us that technologically mediated societies are profoundly, if tacitly, trusting ones—a point that guided my pursuit of wheat science all the way down to the most apparently mundane of practices, such as experimental baking. But besides pointing out this central irony of modernity, what makes Giddens' work evocative is his emphasis on the mutually related matters of trust and the actual mechanisms by which social meaning is "lifted out" of local contexts and, in his words, "stretched" across space and time. Standardized currency is a prime example of such a mechanism for Giddens. Young historians wishing to deal with the movement and circulation of goods in modern societies must be aware of these two bodies of literature, as I have been through my research and writing process.

Nevertheless, the interpretive limitations of both become apparent after a certain point, and must be circumvented through the use of other helpful sources. For instance, although Giddens does an excellent job of identifying trust, his work bears the troubling implication that the phenomenon is a finished and/or obvious outcome of modern existence—it just appears. As one delves deeper and deeper into a topic like wheat promotion and cereal science, however, it becomes clear, as it did to me, that historians have little choice but to approach the word "trust" itself, and the concept it signifies, as being open in the sense of evolving and developing in contingent historical circumstances. This is not easy to do because the word, like "love" or "goodness", seems to describe something mutually agreed upon by—and self-evidently positive to—the parties involved. On the contrary, trust is forged intentionally rather than won deservedly or born organically.

Giddens and many other modernity theorists take a similar, *a priori* attitude when it comes to technologies, especially those that might be easily dismissed as banal, such as experimental baking.[18] Like trust itself, technoscience seems simply to appear; social processes themselves are considered complex and contingent, but the technologies that emerge from such processes are not often treated with the same nuance.

Although I arrived at this topic as an environmental historian, I found that the best antidote to these and other shortcomings is the important work of historians of technology and science. This subfield of history is far too large and varied to discuss in any detail here, but suffice to say that it steered me toward sources and subjects that I surely would have overlooked had I approached the topic strictly as an environmental historian. In any case, there certainly was an initial temptation to castigate such things as dough-testing machines and experimental baking ovens for being part of the 20th century's muscle-bound rationalization of nature. On first glance, it is easy to consider such things as complicit in the process by which nature is said, by environmental historians and modernity theorists alike, to have been "demystified," conquered, or otherwise "killed."[19]

Reading the history of science and technology gradually helped me avoid this conclusion. Armed with a sense of contingency, I grew more and more curious about things like dough-testing machines, experimental baking ovens, and, for that matter, bread, which itself started to seem like a technology within this context. Given contingency, I wondered what on earth might be involved in the conceptualization and shaping of such peculiar apparatus. One phenomenon definitely involved in the shaping of these and other technologies was trust. F. J. Birchard's constant construction of his lab's technoscientific practices had, as its implicit goal and undeniable reward, the trust of others in Canadian wheat and flour. Technoscience and trust went hand in hand. Birchard's trip to Bologna, and the experimental work leading up to it, shows that neither trust nor technoscience preceded the other. They were shaped and forged in tandem; both were subject to historically situated circumstances. The bottom line is that a willingness to think about trust and technoscience as mutually contingent helps to clarify the historical significance of what seem to be obscure technologies.

Also important to bear in mind are the different scales of interpretation represented by technoscience, on the one hand, and trust, on the other. Laboratories and bread conferences tend to operate on the micro scale, whereas trust is a broader social phenomenon, mostly operating on the

macro scale (see Ruth Sandwell's chapter in this volume for a more sustained discussion of scale). Nevertheless, these scales intersect and interact constantly. If trust, operating on the macro-social level, breaks down or is otherwise compromised, then discrete technologies are sure to undergo alteration, and vice versa. This realization has methodological implications, for seemingly insignificant sources relevant to the micro scale, such as experimental testing recipes, can hold secrets to machinations on the macro level.

Finally, and most importantly for would-be environmental historians, one can routinely expect to find a significant environmental story where trust and technoscience intersect. In the case presented here, the interaction of trust and technoscience had significant implications for how (and how much of) the resources of the non-human world were made manifest in the lives of humans. Birchard's role (and rolls) had serious implications for the disposition of wheat that covered anywhere from 15 to 25 million acres of Canadian Prairie.

But the non-human world was more than merely implicated in the development of trust and bread science. We have seen how environmental exigencies were determinative in the conceptualization, design, and sociopolitical functioning of the GRL's technoscientific apparatus, including Birchard's bread—and simultaneously in his tacit quest for trust. He had something to show, but he also had something to hide, the latter stemming from the environmental conditions of wheat growth in the prairies. Birchard had to suppress some dimensions of prairie agriculture, which he and others accomplished by sequestering certain realities in machines and procedures. The task of suppressing these realities was handled through control and manipulation of technologies and procedures, with trust acting as a legitimating force between the two. Thus, far from being "killed" or utterly "demystified" in modern societies, the non-human world becomes embedded deep in the design and application of the very technoscientific practices of modernity. In other words, the non-human world is very much "alive" in many of the machines (experimental baking machines, in this case) that might otherwise be considered complicit in the "killing" of nature in the first place. Moreover, here we see an instance of how the forging, acceptance, and contestation of trust can feature important, if hard to detect, environmental determinants. Trust is often, and perhaps always, an important element in environmental stories.

My experience suggests two basic, related things. First, consider that what initially seems mundane in your research can turn out to be very significant. White bread may be a contemporary metaphor for banality, but the environmental dimensions of its manipulation in the hands of scientists are anything but simple. Best to assume that what appears mundane is perhaps very important, and risk discovering otherwise. Second, when you pursue matters of trust in the making, you will invariably encounter and rely upon sources that might not strike other historians as interesting. Insofar as winning trust is often self-serving (and here "self" will include social groups, cultural groups, and political movements, among others), evidence proving its creation is sure to be correspondingly subtle, possibly even deliberately misleading. Like the prairie farmer in my opening parable, would-be environmental historians of the Canadian Prairies have to undertake their own process of seeing substance in spaces that appear, at first glance, to be empty.

Discussion Questions

1. What role does the environment play in this story?
2. What analytical status does the author seem to grant the environment: active agent or subjugate of human activity?
3. Why, according to the author, does the prairie environment not feature prominently in the Grain Research Laboratory's Bologna display?
4. What does the author mean by the word "trust"? Does this differ from other possible uses of the word?
5. What complications did Birchard encounter in his quest to engender trust?
6. The author analyzes trust. Does this seem paradoxical? (Should we simply "trust trust"?) Is a "history of trust" possible? Does everything have a history?
7. The author identifies interpretive shortcomings in the work of modernity theorists. What are they, and do you think the author redresses them effectively?
8. What ironies are made evident in this paper?

Notes

1. See Canada, Department of Agriculture, Research Branch, Soils of Canada Vol. 1. Ottawa: Supply and Services Canada, 1977, pp. 43–45.

2. For a highly readable description of glaciation and its aftermath, see E. C. Pielou, *After the Ice Age: The Return of Life to Glaciated North America* (Chicago: University of Chicago Press, 1991).

3. S. Perkins, "Once Upon a Lake," *Science News* 162 no. 18 (2002): p. 283. For contrast, Lake Superior is 82,000 square kilometres.

4. Perhaps the most vocal discussant of trust has been sociologist Anthony Giddens, *Conversations with Anthony Giddens: Making Sense of Modernity* (Cambridge: Polity Press, 1998): pp. 94–117. The concept of trust is the obverse of another, perhaps even more widely discussed dimension of modernity: *risk*. See Ulrich Beck et al., *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order* (Cambridge: Polity Press, 1994).

5. The transition was not always seamless. See the opening pages of Keith Walden's *Becoming Modern in Toronto: The Industrial Exhibition and the Shaping of Late Victorian Culture* (Toronto: University of Toronto Press, 1997).

6. John Herd Thompson, *Forging the Prairie West* (Toronto: Oxford University Press, 1998): p. 77.

7. The story of earlier, American attempts to segregate diverse grain lots into abstract, rationalized categories is told by environmental historian William Cronon in his important book *Nature's Metropolis: Chicago and the Great West* (New York: Norton, 1991). For a more detailed explanation of the Canadian grading system and its complexities, see John F. Varty, "On Protein, Prairie Wheat, and Good Bread: Rationalizing Technologies and the Canadian State, 1912–1935," *Canadian Historical Review* 85 no. 4 (December 2004): pp. 721–53.

8. The event's Italian location was especially auspicious, for nowhere else in Europe were efforts aimed at food self-sufficiency quite so intense. Mussolini's famed "Battle of Wheat" was seven years old in 1932.

9. Canada, Dominion Grain Research Laboratory, *Annual Report* (1932): p. 18.

10. A rain shadow is created when an especially high-relief barrier (mountains) causes rain-laden clouds (such as those off the Pacific Ocean, in this case) to rise in altitude, at which point they cool, and their moisture content condenses and falls either as rain or snow in the mountains themselves. The adjacent region, lying in the lees of the mountain barrier, is thus cut off from significant rainfall.

11. *Winnipeg Free Press,* February 22, 1928.

12. This appeal to the scientifically guaranteed precision of ingredients was not confined to flour. "[W]hat woman is going to continue the old-fashioned, risky methods" of jam making when "Certo never fails," *Canadian Grocer* asked on April 21, 1922. And consider the ironic use of *magic* in Magic Baking Powder—the product's "magical" qualities created by scientists and attested to by "cookery experts" from the Provincial School of Domestic Science, the Chatelaine Institute, and Canadian Home Journal: See *Canadian Grocer* 9 (February 1934).

13. The industrial analogy had been very powerful since the advent of Frederick Winslow Taylor's 1911 work on "scientific management": *Principles of Scientific Management* (New York and London: Harper, 1911) was a leading influence in ideas about the importance of rationalizing and systematizing all productive processes. Taylor's work argued for the breakdown of whole processes into discrete, repeatable tasks; and although his work normally refers to smaller production facilities such as factories, its sensibilities were transferred to all manner of productive activity, including large-scale agriculture.

14. Canada, Department of Trade and Commerce, Grain Research Laboratory, *Annual Report* (1932): p. 18.

15. Throughout the late 1930s the Canadian Wheat Board's advertising campaigns played on genetic lineage metaphors, including those emphasizing Canadian wheat's putatively aristocratic parentage. Booklets with titles such as *The Aristocracy of Canadian Wheat* and *The Kinsmen* were conceived. See Canada, Department of Trade and Commerce, Canadian Wheat Board, *Report of the Canadian Wheat Board, 1937–1938* (Ottawa: King's Printer, 1939): pp. 5–7.

16. W. F. Geddes, "The Nature of Quality in Wheat and Flour," *Grain Marketing Methods in Canada,* reprint from June 1935 issue of the *C.S.T.A. Review,* held in the library of the Canadian Grain Commission, p. 23.

17. The exchange of goods, even on a large scale, is not a new phenomenon. It is apparent, however, that the 19th century witnessed a considerable spike both in terms of the sheer quantity of goods moving about, and in terms of the economic phenomenon known as "convergence"—the merging of prices and costs across great distances. For reading on the antiquity of large-scale trade, see Andre Gunder Frank, *The World System: Five Hundred or Five Thousand Years?* (London and New York: Routledge, 1993). For informative reading about aspects of the 19th-century economy see Kevin O'Rourke and Jeffrey Williamson, *Globalization and History: The Evolution of a Nineteenth-Century Atlantic Economy* (Cambridge, MA: MIT Press, 1999).

18. The relationship between modernity theory and the history of technology is explored in an excellent collection by Thomas J. Misa, Philip Brey, and Andrew Feenberg, eds., *Modernity and Technology* (Cambridge, MA: MIT Press, 2003).

19. The list of sources making this allusion is long. See Carolyn Merchant, *The Death of Nature: Women, Ecology and the Scientific Revolution* (San Francisco: Harper and Row, 1980), and Bill McKibben, *The End of Nature* (New York: Random House, 1989).

Further Readings

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