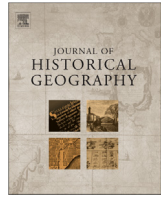




Contents lists available at ScienceDirect

Journal of Historical Geography

journal homepage: www.elsevier.com/locate/jhg

Survey science on trial: the geographic contours of geology's practical science debate in late Victorian Canada



Jason Grek-Martin

Department of Geography, Saint Mary's University, 923 Robie Street, Halifax, Nova Scotia B3H 3C3, Canada

Abstract

In 1884 the Select Committee on Geological Surveys convened in Ottawa to assess the practical contributions of the Geological Survey of Canada. Critics were concerned that the GSC was too focused on making theoretical contributions to geology rather than on the important task of locating, analyzing and reporting on Canada's promising mineral deposits. GSC officials repudiated this 'pure vs. practical' distinction, insisting that their territorially-extensive and intellectually wide-ranging reconnaissance surveys provided abundant practical knowledge to the Canadian public. As a result, GSC officials transformed the 1884 hearings into a spirited debate over what counted as practical science in service of the nation. This paper draws on Thomas Gieryn's insights concerning scientific 'boundary-work' and David Livingstone's efforts to 'think geographically about science' in order to analyze the hearing room as a short-lived yet consequential scientific 'speech space' in which the inherent geographic contours of the practical science debate came clearly into view when government-sponsored survey science was put on trial in 1884. Through a careful analysis of the testimony provided over the course of these hearings, the paper reveals the markedly different geographic perspectives advanced by GSC officials and their critics regarding the proper scale, orientation, and scope of a publicly-funded geological survey.

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Keywords: Survey science; Geological Survey of Canada; Practical science debate; Geographies of science; Boundary-work

...your Committee beg to report, as the result of their inquiry, that the present administration of the Geological Survey is defective in practical results; that a more systematized plan of its operations should be established...[and] that the field operations should be confined to subjects more closely allied, practically and scientifically, to a Geological Survey...¹

With these pointed remarks, the Select Committee on Geological Surveys arrived at the culmination of its April 7, 1884 report to the Canadian Parliament and rendered its verdict on the diminishing practical utility of the Geological Survey of Canada.² The Committee had been struck six weeks earlier, when Robert Newton Hall—a prominent lawyer, entrepreneur, railway director, and the new Conservative Member of Parliament for Sherbrooke, Quebec—petitioned the House of Commons for a parliamentary review of the GSC, insisting that 'there is a feeling

that this Survey is not keeping pace with the geological progress of the country.' Prime Minister Sir John A. Macdonald threw his immediate support behind his colleague's proposal, announcing that he 'had not the slightest objection to the Committee.' With Liberal leader Edward Blake agreeing that 'there could be no objection,' the motion was widely endorsed on both sides of the House. The result was a bi-partisan Committee comprised primarily of recently-elected MPs representing ridings (federal electoral districts) with significant ties to Canada's burgeoning mining sector. The first of the Committee's eighteen sittings commenced on Parliament Hill the following week, with the stated objective of obtaining 'information as to the methods adopted by the Geological Surveys of this and other countries, in the prosecution of their work, with a view of ascertaining if additional technical and statistical records of mining and metallurgical development in the Dominion should not be procured and preserved.'³

E-mail address: jason.grekmartin@smu.ca

¹ Report of the Select Committee Appointed by the House of Commons to Obtain Information as to Geological Surveys, etc. etc., Ottawa, 1884, 11. The full text of the report can be accessed at: <http://babel.hathitrust.org/cgi/pt?id=nyp.33433008674826;view=1up;seq=12> (accessed January 1, 2014).

² For the sake of brevity, the Geological Survey of Canada will commonly be referred to as 'the GSC' or 'the Survey,' the Select Committee on Geological Surveys will frequently be reduced to 'the Committee,' and the Dominion of Canada will often be shortened to 'the Dominion.'

³ For all details related to Hall's motion, including the remarks quoted above, see the *Official Report of the Debates of the House of Commons of the Dominion of Canada: Second Session, Fifth Parliament...Comprising the Period from the Seventeenth Day of January to the Eleventh Day of March, 1884*, Vol. XV, 47 Victoria, Ottawa, 1884, 515.

Mining statistics were far from the only topic of discussion, however. More broadly, the Committee looked closely at the Survey's various modes of operation, its allocation of personnel and resources, and, most significantly, its wider practical contributions to the economic progress of the nation. Over the course of the hearings, Hall and several of his colleagues couched their assessments of the Survey in terms of a presumed distinction between pure and practical science, leaving little doubt of their overwhelming preference for the latter. For these legislators, as well as for a number of witnesses who testified during the hearings, the Survey's scientists needed to set aside the increasingly esoteric contributions to geological theory that had preoccupied them for too long. From their perspective, the GSC could reassert its practical relevance by restricting its focus to the important task of analyzing promising mineral deposits and by carefully assessing—and, in turn, bolstering—the productivity of the Dominion's various mining operations.

In response, senior GSC officials—most notably Director Alfred Selwyn and Assistant Director George Dawson—argued that such a narrow definition of practical science was too limiting. In their testimony before the Committee, they insisted that there was also considerable practical value in conducting territorially-extensive and scientifically wide-ranging reconnaissance surveys in all corners of the Dominion, particularly in the newly-acquired territories of western Canada. Such preliminary reconnaissance work would help to put settlement and resource extraction on a rational footing by identifying districts rich in natural amenities. It would also spare much wasted effort, as surveyors took note of which areas were resource-poor and largely unsuitable for settlement. Thus, rather than accept the prevailing characterization of their work as predominantly theoretical in nature, GSC officials emphasized the practical aspects of their surveys and urged Committee members to recognize the broader utility of their extensive scientific pursuits.

At root, then, the 1884 Select Committee hearings took the form of a vigorous and illuminating debate concerning what should count as 'practical science' befitting a government-sponsored geological survey in the late nineteenth century. As I will demonstrate, this was a debate with considerable geographic resonance and, in the analysis that follows, I will draw on Thomas Gieryn's insights concerning scientific 'boundary-work' and David Livingstone's efforts to 'think geographically about science' in order to analyze the hearing room as a short-lived yet consequential scientific 'speech space' in which competing notions concerning the nature and limits of practical science were called forth and contested. In so doing, I will reveal how the underlying geographic contours of the practical science debate began to emerge as the hearing room resonated with the rhetorical cut and thrust of boundary-work throughout the late winter of 1884. In particular, I will discuss how divergent geographic perspectives regarding the appropriate scale, orientation and scope of GSC field operations became fundamental points of reference for the competing definitions of scientific utility aired throughout the hearings. Each side's attempts to define and defend the 'proper' boundaries of practical science implicated different material geographies of scientific knowledge production and dissemination, with important consequences for the spatial configurations and geographic contributions of Survey operations going forward.

Of boundary-work and speech spaces

By playing host to a broad-ranging discussion concerning the nature of government-sponsored practical science, the 1884 hearings constituted a brief yet revealing episode of what sociologist of science Thomas Gieryn calls 'boundary-work.'⁴ Despite attaining an increasingly privileged position in modern society, the epistemic authority of science has rarely gone unchallenged. Instead, Gieryn notes, scientists have increasingly been drawn into various 'credibility contests,' as participants compete for the significant rewards—including material resources, professional prestige, and influence in policy-making—which are often at stake in these encounters. Frequently, scientists have been required to assert their credentials, explicate their methods, and justify their relevance to the particular question at hand in order to demonstrate their epistemic authority. According to Gieryn, these demands call for science's prominent position to be promoted and defended through 'boundary-work:' a discursive process by which scientists attempt to draw a rhetorical boundary between science and 'some less authoritative residual non-science' by situating particularly reliable qualities, methods and truth claims within the bounded perimeter of the conceptual terrain labelled 'science.'

Crucially, Gieryn recognizes that boundary-work is not simply deployed in circumstances where science needs to be demarcated from other realms of knowledge. 'The same rhetorical style,' he asserts, 'is no doubt useful for ideological demarcations of disciplines, specialties or theoretical orientations *within* science.'⁵ Traditionally, one of science's most fundamental and enduring discussions concerns the demarcation of the elusive frontier between 'pure' (theoretical) and 'practical' (applied) scientific research—a frontier that has long been contested in institutional contexts where external validation and support is contingent on the perceived usefulness of the science in question. As Gieryn emphasizes, 'from the seventeenth century to yesterday, scientists have used the language of instrumental utility to legitimate their practices and to justify requests for material support from other sectors of society.'⁶ This was certainly the situation in 1884, as Committee members and a range of witnesses, including senior members of the GSC, each looked to draw a conceptual boundary between practical and pure science in a way that positioned their preferred scientific approaches and objectives on the practical side of the line. As is typical with boundary-work, the stakes were significant: the ability to define what counted as appropriate practical science worthy of government support would give participants an opportunity to either redefine or reinforce the GSC's scientific objectives, with far-reaching implications for the future allocation of material resources and personnel.

Yet, as Gieryn insists, 'science... has a robustness, a plenitude, a scale that defies complete mapping.' The pliability of its conceptual frontiers ensures that boundary-work is an episodic, localized and contingent process fundamentally shaped by the 'exigencies of the moment—who is struggling for credibility, what stakes are at risk, in front of which audiences, at what institutional arena?' Gieryn betrays an astute geographic sensitivity here, recognizing that boundary-work 'takes place in a variety of institutional or organizational settings, and the declared contents of science may also be affected by the peculiarities of each of these arenas.' In this regard, he notes that judicial and legislative arenas—such as Select Committee hearings—are particularly 'ripe spots' for 'juicy episodes' of

⁴ The discussion that follows is drawn from the Preface and Chapter 1 of T.F. Gieryn, *Cultural Boundaries of Science: Credibility on the Line*, Chicago, 1999.

⁵ T.F. Gieryn, Boundary-work and the demarcation of science from non-science: strains and interests in professional ideologies of scientists, *American Sociological Review* 48 (1983) 792.

⁶ Gieryn, *Cultural Boundaries of Science* (note 4), 74.

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