CULTURES OF SCIENCE

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Leaning Tower of Pisa

In 1863 the New Zealand *Southern Monthly Magazine* expressed its enthusiasm for Darwin's theory of evolution. Darwinism, so the magazine's readers were told, had cast new light on the process of colonization by showing how a "weak and ill-furnished race" necessarily had "to give way before one which is strong and highly endowed" (quoted in Stenhouse 1999: 83). Darwinism, evidently, suited to perfection the needs of New Zealand imperialists. It enabled the Maori to be represented in the language of savagery and thus to provide scientific legitimacy for the land-hungry settlers who welcomed the prospect of Maori extinction. As John Stenhouse (1999: 81) has observed "New Zealanders embraced Darwinism for racist purposes." In the American South, things were different. Here Darwinian evolution was routinely resisted by proponents of racial ideology. For it could destabilize long-held views about the separate creation of the different human races and undermine the belief that they had been endowed with different levels of cultural and intellectual excellence by the Creator. In this environment, the Darwinian idea that all humans were descended from a common stock could be politically disturbing (Stephens 2000). For racial reasons, it seems, Darwin's theory enjoyed different fortunes in Wellington and Charleston. Thus we find the New Zealand materialist and physician Alfred Kingcome Newman using Darwinian language in 1882 to callously condone the extinction of the Maori by a 'superior race' in the struggle for existence between nations. By comparison, in the southern states of America, the anti-Darwinian John McCrady devised his own 'law of development' to sustain his belief that the South was a higher form of civilization superseding the rest of the United States and that each race was a distinct species limited to its own geographical province.

Of course we should not generalize too readily from these particular cases. In both New Zealand and the American South different evaluations of Darwin's theory were to be heard during the second half of the nineteenth century. But these two episodes do nevertheless expose something of how scientific theories are encountered differently in different cultures and can be used as resources to justify various - sometimes contradictory - causes. In the light of these circumstances, it is clear that the meaning of any scientific theory is not stable; rather it is mobile and changes from one place to another. In one location Darwinism could be read as underwriting long-standing racial politics; in another it was seen to imperil traditional race relations. In each situation the meaning of Darwinism, and its implications, were locally constructed.

Other examples could readily be enumerated. Nineteenth-century Russians, for example, resisted Darwin's competitive metaphor of a struggle for existence but embraced versions of the theory that played up cooperation between species - a stance that mirrored the Russian political economy which was devoid of a market-driven middle class (Todes 1989). Besides, the climatic extremes of the Siberian north just did not seem like the kind of environment Darwinians had in mind when they spoke of teeming life-forms, lush vegetation, and tight ecological niches. Both the political and physical geography of Russia conditioned how evolutionary theory was construed. In Canada, it was only when romantics began to depict the harsh northern reaches as the wellspring of the race and the source of vigor and vitality that the language of Darwinism began to blossom. Not surprisingly, when Canadian scientists did turn to the application of Darwinian theory they tended to focus on the geographical distribution and morphological adaptations of Arctic plants (Zeller 1999).

All of this confirms that, just like covered bridges or private wealth, scientific knowledge is not uniformly distributed across the face of the earth. Its complexion differs from place to place, and across the spectrum of scales. Because scientific knowledge is produced differently in different spaces, because it is confronted differently in different arenas, and because it migrates from one location to another, it makes sense to think of scientific enterprises as geographically constituted. This is beginning to be recognized both by geographers and sociologists who have, in recent years, begun to explore more systematically the role of space in the making and circulation of scientific knowledge (for example Ophir & Shapin 1991; Livingstone 1995, 2003; Demeritt 1996; Shapin 1998; Smith & Agar 1998; Withers 1999). The range of ways in which scientific culture may be geographically interrogated, of course, is vast. Here I want to tackle the issue on just three fronts. First I want to dwell at the regional scale in order to uncover something of the ways in which scientific endeavor has been shaped by regional culture. Second, the focus sharpens and attention falls on specific sites of scientific inquiry. Here the significance of spaces of knowledge - laboratories, libraries, stock farms, museums, tents, field stations - in cognitive enterprises can begin to be glimpsed. Finally, because people, ideas, and instruments move from place to place, scientific undertakings disclose distinctive geographies of reception and consumption. Just what bearing these have on the local construction and meaning of scientific theories warrants scrutiny.

Regional Cultures of Science

Something of the scientific significance of regional dynamics surfaces when we turn to the making of scientific Europe several centuries ago. It is important to recall at the outset, of course, that Europe has never been a self-contained or uncontested space, and that the scientific developments that took place here were fashioned in profound ways by extramural influences. Chinese alchemy, for example, exercised an immense influence on European medicine; Islamic geodetic methods of determining the 'sacred direction' of Mecca for daily prayer informed European astronomy and cartography (see Goodman & Russell 1991). At the same time a variety of Greek medical and scientific works, such as Archimedes' mathematics and Ptolemy's geography, were translated in Baghdad and from there spread west through Europe. In numerous ways, Europe owed much to cultural transmissions from 'the East' (Montgomery 2000).

Inside Europe too, regionalism was crucially important in the shaping of scientific knowledge. When Voltaire crossed the English Channel, he entered a different world. "A Frenchman arriving in London," he wrote in 1734, "finds things very different, in natural science as in everything else. He has left the world full, he finds it empty. In Paris they see the universe as composed of vortices of subtle matter, in London they see nothing of the kind. For us it is the pressure of the moon that causes the tides of the sea; for the English it is the sea that gravitates towards the moon . . . In Paris you see the earth shaped like a melon, in London it is flattened on two sides.... The very essence of things has totally changed." Voltaire's rhetorical gibe at the supposed universalism of European natural philosophy advertises something of the regional geography of scientific knowledge at the height of the Scientific Revolution. This had long been the case as a brief consideration of conditions in two European regions during the sixteenth century - the Italian and the Iberian peninsulas - will disclose.

Cultural circumstances in sixteenth-century Italy made it, at once, one of the most precarious yet productive regions in Europe for engagement in what would now be considered scientific pursuits. On the one hand, the Italian peninsula was already one of the most highly urbanized areas of the world with the flourishing of such centers as Palermo, Milan and Venice, a culture of book gathering, and a history of banking. The home of such venerable universities as Bologna and Padua, it stood at the center of the Renaissance revival of ancient learning. On the other hand, the impulse towards theological surveillance, manifest in the emergence of the Society of Jesus (1540), the Council of Trent (1543), and the Index of Prohibited Books (1543), made Italy a precarious enough environment for certain kinds of scientific endeavor.

For scientific inquiry to flourish in this environment, princely patronage was of critical importance, not least because technological innovations could bring financial rewards. Commercial potential, but, just as often, a lust for prestige and distinction, prompted dynastic families, like the Medici, to invest in natural philosophy as cultural capital. In such circumstances, it was much to the advantage of anyone with a taste for empirical inquiry to seek out ways of presenting to baroque rulers some scientific boon that would bring renown to them. Name a newly observed star after one of them and a hitherto precarious future could be guaranteed. In turn, good standing with the princely powers conferred on practitioners of scientific arts legitimacy in matters of natural knowledge. It worked both ways: rulers got glory, philosophers got credibility. In such a knowledge economy, neither observational nor computational skills were enough to deliver to a scientific practitioner the right to be heard. What counted was courtly status and esteem. And this casts an important light (though by no means the only light) on the infamous case of Galileo whose advocacy of heliocentrism led to his being condemned as a heretic in 1633.

That story really begins when Galileo secured the patronage of the Medici family when he shrewdly named the satellites of Jupiter 'the Medicean stars.' Soon he found himself at the court of the Grand Duke of Tuscany, a move that dramatically improved his status yet brought him closer to watchful pontifical eyes where any departures from Aristotelian orthodoxy were likely to attract attention. At the same time the shape of Galileo's developing science bore the stamp of seventeenth-century Italy's courtly culture (Biagioli 1992). Established conventions of debate at the court encouraged Galileo to develop a theatrical style of rhetoric and a combative tone that would have been regarded as inappropriate in, say, the gentlemanly culture of seventeenth-century England's Royal Society. There, by contrast, sensationalism in natural philosophy was regarded as vainglorious conceit. In Italy scientific bravado earned courtly esteem; but it cost Galileo the very papal legitimacy he sought and led to his eventual denunciation. Here the particularities of regional culture had much to do with the struggle between the new astronomy and ecclesiastical authority.

Along Europe's western margins, on the Iberian peninsula, regional culture conditioned empirical inquiries in a rather different way (Goodman 1988). Proximity to North Africa, for example, meant that the diffusion of Arabic astronomical and medical works made their influence felt. But the peninsula's maritime impulses were no less significant and fostered a tradition of scientific endeavor markedly different from that of the Italian court. Here navigational matters were to the fore even if there is little solid evidence for the existence of the nautical academy that Prince Henry 'the Navigator' was supposed to have established at Sagres. For imperial and commercial purposes, Iberian monarchs actively promoted what has been called the haven-finding arts by retaining the services of a range of remarkable Jewish practitioners of practical mathematics, astronomy and cartography - particularly the Cresques family. The Iberian scientific tradition thus bore the stamp of imperial utility. Advances in the study of terrestrial magnetism, medicinal botany and mercantile mathematics, for example, were all marked by what might be called the expeditionary 'far side.' On his voyage to India in the late 1530s, Joao da Castro engaged in investigations of terrestrial magnetism to challenge current orthodoxy on the issue of magnetic declination, the pharmaceutical value of tropical plants like the mango and camphor was investigated by the physician Garcia d'Orta, and computational methods of working between different weights and measures were developed by Gaspar Nicolas.

These two cases can be seen as emblematic of how, in one way or another, regional particularity may impose itself on scientific enterprises. Iberian science, fashioned on an imperial template was a rather different activity from the performances that entertained the Italian court and landed advocates of the new astronomy in deep theological water. In one situation, credibility was a function of courtly status; in another, it was proficiency in the practicalities of reading land and sea that delivered cognitive authority. This means that scientific endeavor in different regional arenas meant very different things - in what was investigated, who had the power to make knowledge, and why certain lines of inquiry were pursued. Of course this does not mean that there were no common threads knitting together scientific Europe, nor that regions were hermetically sealed off from one another. There is nothing fixed about regions; they are contingent, mobile, unstable. Yet they are sufficiently robust to confirm that it makes sense to append them as geographical adjectives to particular kinds of scientific endeavor and to speak coherently of, say, *French* physics in the eighteenth century, *English* geology in the Victorian period, or *German* medicine under the Nazis.

Local Sites of Science

Scientific endeavor carries the imprint of the regional culture in which it is practiced. But it is also conditioned by the specific sites in which inquiry is conducted. The range, of course, is enormous. Laboratories, hospitals, observatories, libraries, museums and field sites are all recognizable as spaces of scientific endeavor. But scientific knowledge has also been made on ships' decks, stock farms and exhibition stages, in tents, coffee shops, and cathedrals. The list could go on and on. Take the Victorian public house, for example, a place not usually associated with scientific endeavor. Here, during the early decades of the nineteenth century, artisan botanists would congregate on Sunday mornings to engage in discussion about plants, to share expertise, to exchange specimens, and to consult botanical texts (Secord 1994). In the cozy atmosphere of the village inn, florists, gardeners and herbalists - many of whom had an enviable command of Linnaean taxonomy - pushed forward the frontiers of botanical science and, from time to time, attracted the attention of gentlemen botanists like those at Kew Gardens who resorted to


Warsaw Palace of Culture and Science clock

them for quality samples. The pub provided them with a distinct social space that enabled them to challenge traditional distinctions between philosophers and practitioners, between head work and hand work. It was a cultural location that contested the dominant scientific arenas of the time.

Sites of scientific pursuits influence practice in various ways. Often the site is constructed so as to foster or constrain communication; often it is regulated by formal and informal mechanisms of boundary policing to control access to the space and to mark an invisible line between 'insiders' and 'outsiders.' At the same time, it is in these sites that scientific practitioners acquire and reproduce the core values, customs and conceptions of their tradition of inquiry. In these, and numerous other ways, the microgeography of knowledge-production sites fashions scientific practice. So whether it is Robert Boyle carrying out experiments on the physical properties of air in the basement of his sister's London residence, Charles Darwin doing his barnacles at home in Down House, Bronislav Malinowski inquiring into social institutions in the Trobriand Islands, or Josef Mengele carrying out investigations into what was euphemistically called 'racial hygiene' at Auschwitz, the site-specific conditions of knowledge-making were hugely different, as were the ways in which the knowledge acquired migrated from its source out into the public sphere.

Something of the geographical dynamic at work in sites of scientific production can be glimpsed by considering a range of different *forms of spatiality* that are in play in a range of scientific engagements. The rudimentary taxonomy that I am advancing here, of course, is intended to be suggestive rather than comprehensive. Though at best a first approximation towards a more thoroughgoing spatial interrogation of science, the classification I am developing nonetheless serves to highlight dominant cognitive forces that are embedded in different sites of inquiry.

The laboratory is often taken as a space, *par excellence,* of scientific performance because here the aim is to manipulate the natural order through experimental interrogation in such a way that investigators can make sense of how the physical world operates. Laboratories, then, can be thought of as *sites of manipulation.* In such locations, geography matters in various ways. Take the early laboratories that developed in seventeenth-century England. Here we can profitably distinguish between two zones.

First, there is the 'back space' where what was called the 'trying' of an experiment was carried out. Here various servants, mechanics, and laborants struggled to make the experiment work, to make nature behave in certain ways. Often things did not go according to plan, and the experiment would be tried over and over again. Only when the processes were thoroughly mastered - when nature was made to properly perform - did the experiment move out into the 'front' region of 'showing.' This was when the natural philosopher would demonstrate the fruits of his endeavors to peers in order to secure their warrant and to confirm his results. Only when this circuit was successfully completed could a claim achieve the status of knowledge. The justification of a scientific claim required that it move from the private space of delving into the public space of demonstrating. The production of laboratory knowledge was thus a fundamentally geographical activity. And it was geographical in another way too. Only when the showing had been approved by accredited observers did it pass as genuine knowledge. But not just anyone could be a witness. Only those with the right social standing and appropriate credentials counted. To be included in the knowledge-making community, then, one had to simultaneously occupy a spatial triad: physical space (the laboratory site itself), social space (be a member of the gentlemanly class), and epistemic space (be an accredited natural philosopher). No wonder that Steven Shapin (1988) observes that only 'geographically privileged persons' had the right to make scientific knowledge.

Spatial occupancy is crucial to the making of knowledge in other sites too, notably in *sites of expedition.* Here, raw experience of unmanipulated nature is typically portrayed as fundamental to the acquisition of real knowledge. Sneering at the speculations of the armchair philosopher, the heroic explorer typically despises stay-at-home theoreticians for their lack of field experience. Hence the Victorian glacial geologist James David Forbes repudiated the claims about glacial motion that the Cambridge mathematical physicist William Hopkins had put forward, precisely because Hopkins had never experienced what Forbes referred to as "protracted residence among the Icy Solitudes" (quoted in Hevly 1996: 70). To Forbes, experimentation on liquids and forces in the lab just could not deliver reliable scientific knowledge about glacial motion. Plainly for him *where* knowledge was acquired counted as a critical component in its reliability. Of course, the sites of expedition in which field work is carried out routinely present epistemological predicaments of various stripes. Replication cannot easily be effected in the field, the environment cannot be rigorously controlled, and - perhaps most significant of all - the very presence of field scientists constitutes what passes as 'the field' through the academic projects they pursue. The geographies of field sites thus shape both epistemo-logically and practically the knowledges that are produced there. Besides this, there are occasions when the objects under scrutiny in the field are actively constructed by the performances of field workers. In one celebrated case, anthropologists studying native Amazonians cast them as sociobiological entities and stood by watching while they were devastated through the use of a defective vaccine. Real people were translated in anthropological vision into Darwinian life forms and scrutinized for their adaptive responses to a dramatically new aggressive environment.

Sites of presentation differ from both the laboratory and the field in significant ways. In sites like museums, botanical gardens, and zoos, it is the arrangement and display of specimens and artifacts that predominates. As storehouses for collected articles, these seem unproblematic spaces of accumulation. But, historically, the amassing of objects of one kind or another constituted a radically new form of knowledge. It was the seventeenth-century natural philosopher Francis Bacon who gave legitimacy to this style of inquiry by insisting on the importance of collecting particular items in opposition to the syllogistic reasoning of his day (Daston & Park 1998). The opening up of sites of accumulation was thus a critical new epistemic move. But spatiality is engaged in these sites in another way too. In addition to acquisition, museums and botanical gardens are implicated in presentation - spatial arrangement of one sort or another. Early botanical gardens, for instance, sought to recover the glories of the garden of Eden by laying out plants according to what was thought to be divine patterns. Later, during the era of the voyages of reconnaissance, gardens were arranged into four quarters, one each for plants from Europe, Asia, Africa, and America. By what was called 'geographical planting' the symmetry of global botany could be re-presented (Prest 1991). Practices of this sort, of course, could have directly political implications. The Victorian anthropologist Henry Pitt-Rivers was convinced that the proper placing of the specimens in his ethnological museum itself constituted a political text. Disclosing the slow, gradual, progressive pattern of anthropological history, he believed, could counter radical inclinations. "Anything which tends to impress the mind with the slow growth and stability of human institutions," he wrote, " . . . must, I think, contribute to check revolutionary ideas" (quoted in Asma 2001: 260). The proper placing of exhibits was thus an inherently political exercise. Sites of presentation are essentially about spatial formations of knowledge.

Sites of manipulation, expedition and presentation are not static spaces. Frequently they are also nodes in systems of interchange through which ideas, objects, practitioners and instruments pass. This recalls to our attention the importance of mobility in scientific ventures and underscores the role played by *sites of circulation.* Consider botanical and zoological gardens. These are centers in the circuitry of scientific commodities. Kew Gardens, for example, became one of the great exchange houses of the British empire by harvesting the world's botanical bounty, redistributing specimens to satellite gardens, and serving the needs of British agronomy (Drayton 2000). Such practices were emblematic of the more general principle that metropolitan science depended for its life-blood on a global capillary network through which species, specimens, and samples all coursed.

At the same time, sites of circulation are often centers of calculation. When items of scientific interest are transported from their point of collection to an assemblage space, they can be compared with samples from the other side of the world, modified by instrumental devices of various kinds, reorganized into a host of new taxonomic associations, subjected to a suite of statistical manipulations, and so on. The sites where such transformations take place wield immense power for they have the capacity to break the world apart, put it together in new combinations, and reduce it to the scale of a map, chart, table, or catalog. Out of the miscellaneous materials they acquire - physical objects, photographic representations, mathematical symbols, sketch maps, satellite images - sites of circulation forge global panoramas. As Bruno Latour (1999: 39), fastening on the way in which plant specimens brought back from the Amazon forest to the laboratory circulate and recombine in new conceptual formulations, puts it "The plants find themselves detached, separated, preserved, classified, and tagged. They are then reassembled, reunited, redistributed according to entirely new principles that depend on the researcher, on the discipline of botany."

Geographies of Scientific Reception

So far our attention has been directed, by and large, to the production end of the scientific knowledge circuit. Where scientific knowledge originates and how different spatial settings shape scientific inquiry have been at the forefront of our concerns. The consumption sector of the knowledge economy now demands scrutiny. For scientific texts and theories are received in different ways in different geographical locations. What James Secord (2000) has judiciously referred to as 'geographies of reading' is relevant at this point, as is Edward Said's (1991) insistence that as theory travels from place to place it is transformed. In matters of intellectual transmission, migration is never mere replication. Just as scientific claims are always the product of time and place, so they are always appropriated in time and place.

Two cases of how scientific works were differently read in different settings will illustrate something of what attention to the geography of reading can deliver. Then a few reflections on how Darwin's theory was encountered in two Victorian cities will demonstrate something of how the meaning of a scientific theory and its wider implications are the products of local circumstances. Taken together these exhibit what I have in mind by the 'geographies of scientific reception'.

How Alexander von Humboldt's writings were received in a variety of national settings during the first half of the nineteenth century usefully introduces the theme (Rupke 1999). His major work, *Kosmos,* for example, for which he is now most remembered by geographers, enjoyed much less attention in his own day than his researches on Mexico, no doubt on account of the latter's geopolitical and commercial implications. Moreover, Humboldt's contribution to scientific endeavor was rather differently evaluated in different contexts. English reviewers of his Mexican writings, for instance, were far more critical than French and German reviewers. They were also far more inclined to judge the work by how it handled questions that British natural scientists routinely brought within the scope of natural theology.

And while their continental counterparts tended to dwell on Humboldt's improved determinations of latitude and longitude, it was the work's strategic significance for global traffic - not least Humboldt's proposals for excavating a navigable canal route between the Pacific and the Atlantic - that most attracted British interest.

As the geography of Humboldt's reviews makes clear, textual meaning differs from place to place. It is not stable. Whatever Humboldt may have intended by his various pronouncements, his readers heard him say different things. If this realization prompts us to query the unitary simplicity of notions of 'the author' and 'authorial intention,' it renders no less problematic the idea of 'the audience.' Humboldt had many audiences, and the meaning of the Humboldt phenomenon was differently construed by each. All this implies that distinctive cultures of reading exist within regions and between them, within cities and between them, within neighborhoods and between them. We can thus appropriately speak of 'geographies of reading.' This is the phrase that the historian of science, James Secord, calls upon in his elucidation of how, in different spaces, the sensational Victorian evolutionary work by Robert Chambers, *Vestiges of the Natural History of Creation* (which was first published in 1844) was encountered (Secord 2000). A controversial pre-Darwinian portrayal of cosmic evolution, it caused a furor at the time in its presentation of a speculative developmental account of everything from the solar system to the human species. And its meaning was variously made in various locations. Amongst London's aristocratic readers, it was regarded as poisonous, and refutations from the pens of scientific critics were warmly embraced. To progressive Whigs, by contrast, it was boldly visionary and gloriously free of bigotry or prejudice. In Unitarian conversation, the book's emphasis on change from below was seen as a telling blow against a smug ecclesiastical establishment. Outside London, the book also fared differently. In Oxford it was read as supportive of new scientific insights. In Cambridge it was vilified by writers like the clergyman-geologist Adam Sedgwick, who thought it an example of the most degrading species of materialism. In Liverpool, where it stirred up more sustained print controversy than anywhere else in Britain, the way it was read mirrored the social microgeography of the city. It sold briskly among those pressing for urban reform, for example, because it could be taken as scientific justification for social improvement.

One further factor in this particular case highlights, I think, the significance of the cultural geography of textual encounter. Originally *Vestiges* was published anonymously. The reasons why need not detain us here. What is noticeable is that what might be called a geography of authorial suspects rapidly surfaced. As Secord (2000: 24) puts it: "Names that seemed likely in Liverpool or Edinburgh were barely canvassed in Cambridge or Oxford; those that were common in London's fashionable West End were barely known in the Saint Giles rookeries only a few blocks away." Speculation was intense. All sorts of candidates were put forward. Why? Because *aligning an author* was required for *fixing a reading.*

From even these cursory remarks, it is clear that textual encounter is not to be thought of as a passive 'consumption' of knowledge. To the contrary. Textual reception is an active hermeneutic engagement. For the meaning of a text is made and remade through the diverse ways in which it is read. And the ways in which meanings are created through how a text, not least a 'classic' text, is edited, introduced, staged, reprinted, and so on, further complicate the story. If we are to discern something of how texts are confronted, interpreted and mobilized for particular causes, I think we will need to attend in a more sustained way to the geographies of reading, that is, to the spaces in which textual encounter literally takes place.

In the light of these textual cartographics, it is clear that scientific theories display distinctive regional geographies of reception. Darwin's theory of evolution, for example, enjoyed different fortunes in different cities because he was heard to say different things and because different rhetorical strategies were deployed in these theaters of operation to meet the challenges he was taken to be provoking (Livingstone 1999). Let me briefly illustrate.

In late nineteenth-century Belfast and Edinburgh, radically different assessments of Darwin's evolutionary theory were to be heard. Generally speaking, angry opposition to the theory was to be heard from leading churchmen in Belfast while it was warmly embraced by their counterparts in Edinburgh. Why? Two public spectacles, each of which made headline news at the time, profoundly conditioned just

Piazza del Duomo, Pisa

how evolutionary theory in general, and Darwinism in particular, were read by the religious elites in the two cities. In the Belfast case, the coming of the British Association for the Advancement of Science to the city during the summer of 1874 was crucial. For on that occasion, the Darwinian materialist, John Tyndall - himself an Irishman - in his infamous 'Belfast Address' took the opportunity of attacking conventional religion's dabbling in scientific affairs and pushed forward his campaign to divert cultural authority away from the old clerical brigade and into the hands of the newly professionalized scientific fraternity. His challenge so traumatized religious leaders in the city that they hastily put together a set of winter lectures for the general public in which they systematically sought to defend the faith from scientific assault. In this environment it was extraordinarily difficult to read Darwin or his allies sympathetically. Tyndall just made conciliatory readings of evolution well nigh impossible. In Edinburgh, a few years later, the ecclesiastical trial of one of Scotland's leading scholars, William Robertson Smith, made headline news. Smith had become acquainted with German critical scholarship and had applied it to the Bible arguing that it embodied various mythological elements. He developed too anthropological theories of early sacrifice, ritual cannibalism, female infanticide, and polyandry which, while profoundly impressive to figures like Durkheim and Freud, did little to endear him to members of his own religious community. In this environment, and given Scotland's long-standing enthusiasm for solid empirical science, Darwin seemed tame and *The Origin of Species* was perceived to pose few threats of epic proportions. Evidently, the meaning of Darwin and Darwinism was constructed very differently on each side of the Irish Sea. How evolutionary theory was read in each space was shaped by contingent public events that challenged, to the core of their being, the cultural identity of elite groups in both cities.

Conclusion

Science has many geographies. Both the production and consumption of scientific knowledge are stamped by geographical factors. Here I have focused on the importance of regional culture in the emergence of European science, on the significance of very specific sites in the generation of scientific knowledge, and on how works of scientific scholarship are differently read and mobilized in different cultural settings. The episodic examples I have drawn upon are only intended to be suggestive of the range of subjects that come under the rubric of 'cultural geographies of science.' Numerous other issues merit scrutiny, of which the geographies of scientific finance, the role of buildings in the building of science, the impact of technological change on scientific culture and geographies of scientific popularization are only a few examples. The study of the geographies of scientific culture, I believe, has only just begun.

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