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demonstrates just how essential, if little acknowledged, were women's contributions to natural history – particularly in the areas of collection, illustration and close observation. Her study provides a useful supplement to Samuel Smile's *Self-Help*, stocked as it is with mini-biographies celebrating the discoveries of male amateur and professional scientists. Whatever the differences in how scientific achievements of the period were recorded for posterity, scientific discovery and technological innovation were clearly a source of national pride – one linked, inevitably, with Britain's evolving imperial identity.

Technologies of travel, commerce and the British Empire

The opening of railway lines early in the era spawned a construction boom that created a kind of national circulation system – transporting people, goods and, inevitably, texts of all sorts from one hitherto remote part of the country to another in speedy and predictable fashion. Indeed, in *Sartor Resartus* Carlyle writes that 'Books, like invisible scouts, permeate the whole habitable globe, and Timbuctoo itself is not safe from British literature' (*A Carlyle Reader*, p. 185 [Ai]). Literature provides ample evidence of the ambivalence with which Victorians faced the inevitable and irrevocable alteration of the landscape. In 'On the Projected Kendal and Windermere Railway' Wordsworth asked, 'Is then no nook of English ground secure / From rash assault?' (in Cunningham, *The Victorians*, p. 15 [Aii]). The year 1837 saw the creation of the Great Western Railway (see figure 5.4), designed by I. K. Brunel (who two decades later would design the *Great Eastern*, the largest steam ship of the century). In 1838, the *Great Western* paddle steamer crossed the Atlantic in just under three weeks. By the middle of the century, some 8,000 miles of railway track were in place. Underground rail travel is also a product of the nineteenth century; the London Metropolitan line opened for passenger business in 1863, and by the end of the century the underground network was fairly well established.

The railway was only one of many innovations that led to faster and safer modes of communication and travel – on local, national, and worldwide scales. Improvements in roads and travel services gave men and women unparalleled opportunities to move beyond their own communities throughout the era. The sense of connectedness fostered by road and rail travel was enhanced by telecommunication – the telegraph, first, and, in the latter 1870s, the telephone. The transatlantic telegraph cable was ready for use by the middle of the 1860s. Steady improvements in steam-engine technology led also to dramatic changes in ocean transport; by the early 1860s, Britain had iron-hulled warships at its disposal. By 1888, London boasted the first electric power station. The century-long technology boom had numerous implications, especially in economic and commercial realms of activity; trade with China, Australia, India and the United States exponentially increased. Small wonder that the entrepreneur, Thomas Cook, the man behind the famous 'Cook's Tours', is a

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5.4 Joseph Mallord William Turner. *Rain, Steam and Speed – the Great Western Railway*. This painting, first exhibited in 1844 at the Royal Academy, is believed to depict the Maidenhead railway bridge (across the Thames between Taplow and Maidenhead). The view is to the east, toward London.

product of this moment in history, as is John Murray III, publisher of the popular and profitable series of tourist-oriented guidebooks.

Travel and tourism were commercial enterprises, and they prospered in part because of the momentum of expansion generated by a culture of imperialism. Victorian imperialism did not see its heyday until the latter third of the century, but the expansion of the Empire occurred gradually, if haphazardly, throughout the nineteenth century, and for several centuries before then. Still, it is worth noting that by the end of the century, Britain's colonies took up more than a quarter of the world's land. The confidence inspired by Britain's technological leadership and domination of world markets no doubt helped contribute to the impulse to explore and settle in many parts of a now far more accessible world – with resources that many Victorians were eager to appropriate and capitalise on. Jennifer Wicke reports that by the end of the Victorian period, Britain's 'imports exceeded even her massive exports', testimony not only to the nation's status as 'commercial colossus' but also to the growing power of the middle classes ('Commercial', in Tucker, *A Companion to Victorian Literature and Culture*, p. 63 [B]). With characteristic acerbity, Dickens spoofs the impulse to capitalise on world resources in the beginning of *Dombey and Son*: 'The earth was made for Dombey and Son to trade in, and the sun and moon

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were made to give them light' (p. 2 [Ai]). The imperial confidence that Britain's trade inspired, however well founded, shaded easily into a dubious moral superiority (as in Rudyard Kipling's idea of 'the white man's burden') and nurtured a kind of attendant anxiety about the ability of the nation to sustain its power and about contradictions in the national stance.

India dominated Britain's colonial landscape and was effectively controlled by the commercial East India Company and the British Government for much of the century. When the Suez Canal opened in 1869, travellers could journey from Britain to India in just a few weeks. An important rebellion against British rule that erupted in 1857 and 1858 would not have commanded so much attention if there had not already been concerns about the fragility of the British presence abroad. Known in Britain as 'The Indian Mutiny' (and in India as the 'First War for Independence'), it began when a group of Hindu and Muslim soldiers decided to disobey British orders after they had been commanded to do things precluded by or offensive to their religious beliefs; specifically, they were asked to use rifles whose cartridges had been greased with pork and beef fat. Were it not for an already existing fund of discontent – one based on hostility to Britain's administrative posture, economic policies and embrace of Christian Evangelicalism – the opposition would not have escalated, as it did, into a full-scale rebellion, the largest threat to British rule in the nineteenth century. Peasant uprisings, rapes and murder in various communities, and the seizure of Delhi engrossed and, for the most part, enraged, the public at home. British forces regained the city, using force equal to or worse than what had been used against them, and eventually took over rule of India from the East India Company, but the influence of the mutiny can hardly be reduced to structural or governmental changes that ensued. As Heather Sheets has written, 'British narrative accounts that emerged out of the conflict helped to shape beliefs and perceptions about colonialism, gender, and race in both Britain and India, the legacies of which still haunt historical interpretation in the present' ('The Rebellion of 1857: Origins, Consequences, and Themes,' n. p. [Ciii]). The fact that Queen Victoria took on the mantle of 'Empress of India' after an Act of Parliament in 1876 bequeathed it to her speaks volumes about the continuing role of India in Britain's national identity for decades after the rebellion.

Africa was another major arena for colonisation and missionary activity, and African exploration a manifestation of Victorian Britain's troubled relationship to the idea and reality of empire. Britain was certainly not alone in participating in the so-called Scramble for Africa; it competed actively with Belgium, France and Germany for its perceived share of African resources. By the mid-1860s, Britain's expansion inland into Africa was such that it occupied land in every quarter of the continent, although the historian Andrew Porter contends that while its presence in Africa at this point was 'territorially immense but – with the exception of the Cape Colony and

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the Transvaal – economically insignificant' (*Oxford History*, p. 6 [B]). David Livingstone, a Scottish missionary and doctor, published *Missionary Travels and Researches in South Africa* in 1857 to wide acclaim. In the Boer Wars at the end of the century Britain sought to enhance its access to South Africa's depositories of gold and diamonds; over 20,000 Afrikaner civilians died and Britain lost more of its imperial prestige.

By the end of Victoria's reign, Britain had colonies or occupied territory not just in India and Africa but throughout the world – e.g., the Caribbean, New Zealand and Australia, Hong Kong, Newfoundland and Canada. Much contemporary scholarship has sought to better understand the reality and consequences, both practical and symbolic, of Victorian Britain's embrace of imperialism. Edward Said's *Orientalism* and *Culture and Imperialism* have been especially influential in exposing the pernicious effects of a predominantly Western view of Eastern cultures and nations as fundamentally primitive and passive. Such a view is clearly applicable to many late-century novels, among them Conrad's *Heart of Darkness* (1902), whose narrator, Marlow, describes his group of fellow travellers to Africa as 'wanderers on a prehistoric earth' (p. 51 [Ai]). Recently Andrew Porter has written that historians 'no longer see in Empire the simple products of metropolitan designs imposed on comparatively inert indigenous peoples. They are much more alive to the varied processes of interaction, adaptation, and exchange which shaped the Imperial and colonial past' (*Oxford History*, p. 4 [B]). As his comment implies, it is necessary to recognise the distinctions between the acquisition of land and governance of people and the many other sorts of global activities and interests that drove Victorian Britons to explore (if not colonise) the world.

'Mightier than either pulpit or cannon': print technology and the press

The technology that facilitated so much activity beyond Britain also transformed daily life within its borders. Simply put, mechanisation dramatically changed the nature and function of the press. Newspapers began to use steam power for printing in the Romantic era; high-speed presses, innovative mechanisms for reproducing illustrations and, later in the century, advanced typesetting technology followed. In *Victorian People and Ideas*, Richard Altick goes so far as to say that 'To the Victorians, the printing press driven by a steam engine was . . . the most pregnant emblem of their achievement and aspirations' (p. 64 [B]). Improvements in transportation and communication in the Victorian age combined with rapid urbanisation, entrepreneurial capitalism and growth in literacy to help propel the literary market and periodical press into a formidable industry and cornerstone of Victorian culture. Many other factors converged to change the experience of reading itself, not least of which were the introduction of wood pulp (replacing rags) for paper production and