

## Making Medicine Scientific: John Burdon Sanderson and the Culture of Victorian Science

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In recent years, the debate on the role of science and its many guises in nineteenth century medical practice, has been reinvigorated by new studies which have shown the dense complexity of the interweavings between science and medicine. Arguments that medical science had little or no impact upon therapeutic practices and was simply a rhetorical device, used to underpin claims for increased professional status, have been tempered and balanced by those such as W. F. Bynum. In *Science and the Practice of Medicine in the Nineteenth Century* (Cambridge University Press; Cambridge, 1994), Bynum shows that in fact, science served many masters. For some practitioners, 'scientific medicine' was simply the use of a stethoscope, while for others it was a mixture of bedside observations, chemical analysis and experimental work.

In *Making Medicine Scientific*, Romano builds on this perspective and is explicit about her aim to explore 'the many meanings of scientific medicine' in Victorian Britain through the life of John Burdon Sanderson.(p. 2) Taking a chronological approach, she traces Sanderson's career and attempts to relate each stage of his work to the wider Victorian environment. He was educated at Edinburgh, and benefited from teaching which reflected the new ideas from Europe: pathological anatomy which had been established in the Paris hospitals of the early 1800s and the German cell-theory developed by Theodor Schwann and Matthias Schleiden. Both John Goodsir, Professor of Anatomy and John Hughes Bennet, Professor of Institutes of Medicine, saw the microscope as a central investigative tool and regularly used it as part of their lectures. After winning the Gold Medal for his thesis on blood corpuscles that had included animal research, Sanderson left Edinburgh for Paris. He studied the organic chemical compounds found in animal tissues in the laboratory of Adolf Wurtz, visited the Paris hospitals and attended the physiology lectures of

Claude Bernard at the College de France. Bernard's insistence that physiology was the 'primary science of life' inspired Sanderson and he also learnt much about experimental techniques through practical sessions.(p. 26)

By 1852 he was ready to return to London. He had no doubt that what he wanted to pursue was scientific research; the question was how could he make a reasonable living, particularly as his marriage to Ghetal Herschell in 1853 meant he had a wife to support. After several minor appointments his first break came in 1856 when he was appointed as Medical Officer of Health for Paddington. John Simon, medical officer of the Privy Council, had introduced the posts of medical officer as part of his drive to establish scientific enquiry as a tool for sanitary reform and his list of credentials for potential applicants asked for skills in scientific and microscopic work, as well as in pathology and chemistry. Although the post was part-time, the salary was enough to support Sanderson and Ghetal and subsidise Sanderson's research. It was an appointment he was to hold for over ten years and it afforded him diverse opportunities to apply his scientific skills. His remit consisted of reporting to the vestry every fortnight and compiling quarterly and annual reports on matters such as food adulteration and the condition of dwellings and slaughterhouses. He brought his science to use whenever possible, for example, testing the specific gravity of milk as a means of checking adulteration. By 1860 his reputation was such that he was chosen by Simon to be an inspector for the Medical Department of the Privy Council. The position involved travelling outside London and his first duty was to inspect vaccination practices in the country.

Romano shows well Simon's strengths as a dedicated and strategic player in the battle to win state funding for scientific enterprise. His approach was low-key; he often began by obtaining funding for a small, defined project which, on completion, he argued, had proved a need for ongoing research in that area.(p. 73) There was at the mid-point of the nineteenth century little established funding for scientific enterprise. Medical practitioners like Sanderson, who, given the choice, would have preferred to devote themselves fulltime to research, were prevented from this by the necessity of earning a living. Simon's approach of installing scientific research as the foundation of practical action contributed importantly to the furthering of pathological and physiological research and created 'a new climate in London'.(p. 73) Simon grew to respect Sanderson's judgement and research skills and this ensured Sanderson received a regular supply of research work.

It was thanks to the efforts of those such as Simon, that the role of laboratory research started to integrate with other public health strategies. One of the first occasions where this integration was apparent was the establishment of a Royal Commission on Cattle Plague in 1866. There had been outbreaks of cattle plague in London the previous summer and by January 1866, more than 120,000 animals were known to be infected. Although there was no direct threat to food supplies, the failure of government and veterinarians to control the outbreak led to the establishment of a Royal Commission. Members were mainly from medical backgrounds and Sanderson was appointed as one of the researchers. It increased an already heavy workload, but Romano describes it as a 'pivotal moment in his career', signifying both the recognition of his research skills and also the role of pathological research in public health.

Sanderson's area of research was an investigation of the 'natural history' of the disease, and one of his key findings was that the blood of an affected animal 'contains an agent which can produce the plague in another animal'. The importance of this finding was recognised by the Commissioners, yet coverage of the research in the medical press ignored this point. Romano uses this as an illustration of the way in which the laboratory was not yet accepted as a source of new knowledge. Medical journals at this point, in common with many medical practitioners, portrayed pathological research as little more than a 'collection of clinical observations'.(p. 69)

In 1864, Sanderson joined the physiology laboratory at University College, London, under the direction of Professor William Sharpey. Sharpey was also an Edinburgh graduate and had been appointed to the chair of anatomy and physiology in 1836. His innovative approach to physiology centred on functional organisation and included a key role for histology and the use of the microscope. His strength was his bent for teaching. He had a natural facility to enthuse students by demonstrating experimental work carried out by

contemporaries such as Claude Bernard in France. In order to effect such teaching he developed a round table with a built-in groove for holding a microscope. This could be passed from student to student. In the 1860s, teaching of physiology focused on microscopy work but after 1870 more attention was paid to practical experimental work, a change supported by the Royal College of Surgeons and Royal College of Physicians who introduced a requirement for examination students to have passed a course in practical physiology.

The emergence of physiology as a separate experimental discipline was one of the key changes of nineteenth-century medical science and Sanderson contributed to this when, in 1874, he took over from Sharpey as Jodrell Professor at University College. He organised courses in practical physiology which contained chemical, mechanical and functional experimental work, much of it carried out on living animals. He was also one of the first to produce specific manuals and handbooks for course work. But it was a contentious area. Britain has always stood out from other countries in its concern with animal welfare; the Society for the Prevention of Cruelty to Animals was established in 1824 and from the mid-nineteenth century there was increasing public concern about the use of laboratory animals. In 1873, Sanderson fuelled the antivivisectionist debate with the production of a *Handbook for the Physiological Laboratory*, which he edited. It was published in two volumes and was intended to be a practical guide for students working in the laboratory. Giving full details of animal experiments, it showed how these were now the focus of physiological experimental work, and in the majority of cases there was no mention of the use of anaesthesia. A year later, at a meeting of the British Medical Association in Norwich, the demonstration by a French physiologist of the effects of alcohol injected into some dogs brought a prosecution of wanton cruelty. The trial was eventually unsuccessful but drew so much public and medical attention that animal experimentation became a political matter. (Bynum, p. 129)

A Royal Commission was established to examine the whole remit of experimental medicine and their recommendations were incorporated into the Cruelty to Animals Act that was passed in 1876. This declared that both individuals and institutions involved in such work had to be registered with the Home Office, anaesthesia had to be used in the majority of experiments and annual reports of experiments had to be submitted. It was the end-point of a tranche of private experimental work carried out by men such as Marshall Hall the neuro-physiologist and the anaesthetist and epidemiologist, John Snow; neither held an academic post and both carried out all their research at home. As part reaction to such public pressure, Michael Foster from the Cambridge school of physiology and other physiologists formed an association that became the Physiological Society. The Society held regular scientific meetings in members' laboratories, offering support against the anti-vivisectionist movement. Britain was alone in producing legislation to cover this area and although physiologists at the 1881 International Medical Congress sympathised with the fate of their British counterparts, the movement had generated positive outcomes as well. Opposition to the anti-vivisection movement provided an incentive for physiologists to offer each other mutual support and consolidate their interests into a coherent specialty.

By the 1880s, British physiology was gaining recognition, largely thanks to the groups of men who worked in Cambridge under Foster and at University College under Sharpey and then Sanderson. When Sanderson moved to Oxford as the first Waynflete Professor of physiology in 1882, he was succeeded by Edward Schafer, one of the main instigators of research into hormones. In Oxford, Sanderson became embroiled in the attempt to establish a school of physiology, which was intended by those such as Henry Acland, the Regius Professor of Medicine, to rival Michael Foster's school of physiology in Cambridge.

Romano explains the failure of the establishment of an Oxford school, partly in terms of Sanderson's personality – he had no charisma for leadership, and despite his highly-acclaimed skills in the use of complex instruments, he did not have the ability to plan a 'big picture' research programme – and partly due to local factors: the opposition of anti-vivisectionists and the lack of general support amongst Oxford academics. Despite these initial problems, Sanderson established himself at Oxford and in 1895 achieved a personal ambition by becoming Regius Professor of Medicine.

Sanderson emerges from this study as a man willing to engage in science in all its nineteenth-century forms.

Romano succeeds in showing how it was his motivation to use science to the benefit of medicine that unified an apparently random mixture of activities. What could be made more explicit through the narrative is the way in which Sanderson's own approach to research was shaped during his lifetime by the wider influences of Victorian science. So, in the early 1850s, the work he undertook for Simon reflected the analytical approach to science of his generation. It was a science that had grown from roots in areas such as botany and natural history. It was supported by microscopic work and chemical analysis. By the 1870s, Sanderson and many others, strongly influenced by the work of Bernard, started to concentrate on animal experimentation as a means of studying the processes of living systems. A plethora of physiological instruments were developed and a body of knowledge of practical experimental techniques, such as the idea of a control within an experiment, began to be built. This is the point when physiology truly begins to establish itself as an independent medical science, rather than as an adjunct to anatomy.

Sanderson was also involved in many of the major scientific and medical debates of the nineteenth century, some of which are covered in this book. One area that would have contributed nicely to the portrait of the way in which understandings of science were constantly evolving through these years, was Sanderson's work on septicaemia: in particular, the role he played in the debates of the late 1860s and 1870s on Listerism. It was Sanderson's suggestion, made in 1871, that if germs were tiny living organisms then they could be easily killed by drying air currents, which inspired Lister to extend his work on sepsis into the areas of fermentation and putrefaction.<sup>(1)</sup> Another area which would have been of interest (if space allowed), was an analysis of the influence of Sanderson upon his nephew, John Scott Haldane, who worked with his uncle at Oxford. Haldane also specialised in physiology and carried out experiments on mine gases and physiological function in miners and he developed the Haldane apparatus for measuring oxygen and carbon dioxide which became the key piece of equipment for respiratory physiology.

The shadowy figure of Ghetal, Sanderson's wife is one of the most interesting characters in the narrative. Like so many other Victorian wives of professional men, she was intelligent and capable, contributing vastly to her husband's achievements by compiling and writing reports, as well as sustaining him through periods of depression. There are brief glimpses of the tensions created by the impact of his work on her own interests. In 1881 for example, she failed to gain an appointment to the council of Somerville Hall, one of the woman's colleges at Oxford, because of the opposition of Frances Cobbe, leader of the antivivisectionist movement.(Romano, p. 150)

A minor criticism is the inconsistency in the references to Sanderson; for example on page 24 we read within a matter of lines of 'Sanderson', 'John Sanderson' and 'John Scott Sanderson'. Although Sanderson himself began to use the double name of Burden Sanderson in the 1850s in order to differentiate himself from another medical practitioner, there is a strong argument for consistency within the realms of this text so as not to detract attention from the line of the narrative.

*Making Medicine Scientific* is a carefully researched and written work which takes on board the tangled mixture of activities that to the nineteenth-century practitioner of medicine stood for science in its most accessible form. It enlarges our view of the power-struggle for autonomy over medicine by both doctors at the bedside and scientists in the laboratory and extends the picture of the relationship between science and medicine in the late nineteenth century.

## Notes

1. See M. Worboys, *Spreading Germs. Disease Theories and Medical Practice in Britain, 1865-1900* (Cambridge University Press; Cambridge, 2000).[Back to \(1\)](#)

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[2]

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