The past in current application

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Electricity and Medicine: History of Their Interaction. By Margaret Rowbottom and Charles Susskind. *Macmillan, London/ San Francisco Press, Box 6800, San Francisco, California: 1984. Pp. 303. £25. Price in the United States not known.*

In 1743, so we are told by a contemporary German source, Johann Gottlob Krüger, who was professor of philosophy and medicine at the Lutheran University of Helmstädt, was asked by a student what possible use there could be for electricity — then the new rage in all the drawing rooms of Europe. After a moment's consideration, he replied that as it could be of no possible value in theology and jurisprudence, there remained nothing left but medicine. The first "practical" application, indeed, was in medicine, long before the discovery of the incandescent lamp or the electric motor; and thus began the long association between electricity and medicine, chronicled in detail in this richly illustrated book.

This fascinating story has been largely ignored until recently and the reasons are not hard to fathom. The early history of electrotherapy, especially, contains elements that appear distinctly unscientific, certainly do not fit easily into the conventional view of what science is about, and the treatments have (with hindsight) little modern theoretical significance. Those who were primarily concerned with the pedagogic value of the history of medicine saw little point in burdening their students, or themselves, with the topic.

Besides electrotherapy, or "medico-electricity" to use an eighteenth-century term, Rowbottom and Susskind have examined many other aspects of the interaction between electricity and medicine. Six broad periods can be identified in their book. The first is the use of frictional electricity, or electrostatics, from the 1740s until the end of the eighteenth century. This was followed by the application of current electricity or "galvanism", after Volta discovered the electrochemical battery in 1800, which in turn was superseded by the induced current or "faradization" of Golding Bird, Duchenne and others. Up to this time, electricity was seen as a cure-all for a vast range of complaints, ranging from consumption to venereal disease and from nervous headaches to rheumatism. Treatments were based on contemporary physics, physiology and medical theories, and on a corpus of experimental work on the reactions of organisms to electricity. An important development of the mid-nineteenth-century was the rise of electrophysiology. The application of electricity, too, became more specific, thanks in the first instance to Duchenne and Remak. It began to be used increasingly in clinical medicine and physiotherapy (in the treatment of damaged muscle tissue), as an aid to diagnosis with a large variety of electrical devices, and in electrosurgery. The final three broad periods, which bring this history up to the present, are the application of high-frequency currents (begun by D'Arsonval in the late 1880s) and of electromagnetic radiation such as X-rays and radioactivity, and the impact of electronics and the computer on twentieth-century medicine.

The book is largely a factual and very detailed account of these multifarious developments. The narrative is rather impersonal and bland, in the style of a lengthy report, but even so the fascination of the subject comes through. What is still required, however, is a deeper historiographical analysis. Matters that emerge from the book, and which could be explored further, are the speed with which new discoveries in physics found their way into medicine, even when the scientific principles involved were not fully understood (a good example is ionic medication), the significance of the underlying philosophical and scientific frameworks in the formulation of the medical problems and in the acceptance of new forms of treatment, and the importance of the placebo effect. For instance, eighteenth-century electrotherapy and Mesmer's "animal magnetism" had a common ancestry; the former is now an important tool in neurophysiology, while the latter has evolved through Charcot and Freud as a means of studying the human psyche. These aspects, hinted at in Rowbottom and Susskind's pioneering work, are well worth further study. □

Electrical treatment in the late eighteenth century — passing a discharge through a part of the patient's body. (From W. van Barneveld's Geneeskundige Electriciteit, *published in Amsterdam in three volumes between 1785 and 1789.)*

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Stranger to physics

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The Young Einstein: The Advent of Relativity. By Lewis Pyenson. *Adam Hilger: 1985. Pp.246. £19.95, $28.*

Little more can be learned about the cognitive structure of the origins and devlopment of special relativity by Einstein and his early followers. It is fruitful, however, to explore the cultural and social milieu in which the young Einstein lived and worked, in search of a greater understanding of the context in which the theory of special relativity was formulated. In this effort lie both the strengths and limitations of Pyenson's approach—strength particularly in his examination of the multifaceted relationship between mathematics and physics in Wilhelmian Germany, limitation because the focus upon Einstein tends to become blurred in such a broad-gauged analysis and because it is difficult to pin down the precise intellectual roots of Einstein's early development as a scientist, except by inference.

The first three of the nine essays comprising the volume deal with specifically biographical materials: how Einstein's world-view was influenced by his education, his family's electrical machinery business and his Jewish roots, respectively. The identification of Einstein as a loner—*Einspänner*—in the context of German jewry is wholly believeable (while hardly surprising), as is the application of Simmel's notion of the social "stranger" and Park's "marginal man". Less credible is the possible effect on Einstein's mentality of the family electrotechnical business; such surroundings may have whetted young Albert's appetite for physical questions, yet Pyenson's speculation that Jakob Einstein's clockmeters were a possible stimulus in the genesis of special relativity seems to be stretching the evidence to its maximum. The case for the influence of secondary-school education on the mature scientist, although inferential, is nevertheless quite strong, for it rests on understanding the nature of the changing relationship between mathematics and physics in the 1890s, when Einstein was a student.

Most compelling is Pyenson's discussion of the notion of the pre-established harmony between mathematics and physics as an ideology which informed much of the discussion in special relativity. Leibniz's doctrine, stripped of its theological underpinnings, became, in the hands of pure mathematicians, both a justification for pure mathematics and a support for acausality in physics. By applying the concept, mathematicians, in Pyenson's view, were able to "de-relativize" the special theory and cast it as a theory of absolute space-time. Against this background,