the relevant literature on medical history at that time; his name did not even appear. In their detailed description of how the fundamentals of modern haematology developed, Herbert Neumann (who is not related to Ernst Neumann) and Yvonne Klinger deal primarily with this remarkable omission. Moreover, their book sensitively reflects the historical development of the successive gain in knowledge of haematology through experimentation and the outstanding capabilities of new, aspiring generations of scientists intelligently to use and develop these new findings from the second half of the nineteenth century to the 1980s.

Herbert A Neumann, Professor of Internal Medicine and Haematology at the Elisabeth Hospital in Bochum, and Yvonne Klinger, who is a medical historian, have written a fascinating book about the fundamentals of modern haematology. Only by closely connecting special and experimental knowledge with past events was it possible to write this unique book. It is in most points intelligible and, with the exception of Chapter 12 entitled 'Zellkulturverfahren', in which, understandably, the authors cannot conceal their fascination with science, it does not require any specialized knowledge. Even though the text is well-founded and intensely absorbing, the publishers, regrettably, thought it necessary to draw attention to the book by binding it in inappropriate and loud covers which do not fit its overall character.

A very instructive book which Goethe's maxim fully applies: "We actually only learn from books which we cannot judge. The author of a book which we might be able to judge would have to learn from us." Thus, a reviewer's task is certainly very limited.

Stefan Grosche, Dresden

Jacques Gasser, *Aux origines du cerveau moderne: localisations, langage et mémoire dans l'oeuvre de Charcot*, Penser la Médecine, Paris, Fayard, 1995, pp. 335, FFr 140.00.

Jacques Gasser's book is a valuable contribution to the history of nineteenth-century neurology. This shorter rendering of the author's 1990 doctoral thesis is the best analysis to date of Jean-Martin Charcot's works on such important subjects as brain localization, aphasia and memory. Each section follows a classical structure where the author first reviews the general history of ideas on the three main subjects before turning to a detailed study of Charcot's own writings.

The largest section looks at Charcot's contribution to the localization of motor function. It was as a competent pathologist that Charcot contributed cases from the early 1850s to support or contradict claims by other researchers on the localization of different brain centres. In the mid 1870s he turned his attention wholeheartedly to the then very popular field of motor localization in the wake of the historic experiments of Gustav Fritsch, Eduard Hitzig and David Ferrier. Gasser traces in detail Charcot's evolving ideas on the subject, and in particular his important role in the incorporation into clinical medicine of the new physiological data. Gasser rightly stresses that Charcot insisted that he did not blindly accept such data and that it was only after detailed anatomo-pathological studies in man had confirmed the findings that he endorsed the physiological conclusions.

The chapters on aphasia and memory, though they are good reviews of French research on these subjects, reveal blatantly the lack of originality of Charcot's contributions to these fields. Charcot's teaching on aphasia relied extensively on Paul Broca's cases of the early 1860s and the writings of diagram makers such as Adolf Kussmaul and Carl Wernicke. However, Gasser makes the important point that though Charcot was much inspired by associationism, he never talked of conduction aphasias. The last section on memory in fact consists mostly of a good review of the writings of Théodule Ribot, whose teaching played a central role in Charcot's rather limited contribution to the field.

Though this book stands as proof of Charcot's erudition and superb teaching skills, one can only be struck by his lack of

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theoretical inclination or contribution. In fact, the long quotations from published and unpublished lectures of the "maître de la Salpêtrière" which Gasser uses extensively reinforce the impression that Charcot was a great compiler of new knowledge and clinical cases who failed to produce any revolutionary synthesis of import. His major contribution to medicine was indeed more in the field of nosography and medical specialization. As Charcot stated in a lively debate on motor localization: "Je suis empirique et reste empirique".

Bernard Brais, Montreal General Hospital

H A Snellen, *Willem Einthoven (1860–1927): father of electrocardiography: life and work, ancestors and contemporaries*, Dordrecht, Kluwer Academic Publishers, 1995, pp. 140, illus., £24.50, $40.00, Dfl 60.00 (0–7923–3274–1).

The nineteenth century saw some notable advances in the diagnosis of heart disease. Early on it was possible to detect cardiac enlargement by percussion and valvular lesions by auscultation, but abnormal cardiac rhythms, which intrigued many physicians, could not be diagnosed by these methods and it was much later that mechanical records allowed progress to be made in this field. Even so the nature of quite common cardiac arrhythmias, such as extrasystoles, remained a problem up to around 1900.

The instrument which was to prove the Rosetta stone to unravel these cardiac irregularities was the electrocardiograph, and in 1887 the first electrical record of the heart beat in man was obtained by the London physiologist Augustus D Waller, who invented the word electrocardiogram. He used Lippman's capillary electrometer but it gave only rather inadequate records of the heart beat. It was this apparatus and this discovery which stimulated Willem Einthoven, working in Leiden, Holland, to invent the modern electrocardiograph. Einthoven was a physiologist with a good grasp of mathematics and physics, and he worked at the problem of overcoming the defects of the electrometer with great persistence, intelligence and ingenuity. His answer was the string galvanometer, in which the tiny cardiac currents were led through a very fine metallic coated quartz thread suspended between the poles of a powerful electro-magnet, whose shadow was magnified onto photographic film. Einthoven's invention led to the precise recognition of cardiac arrhythmias and soon to the diagnosis of disease in the heart muscle itself.

Einthoven first reported his invention in 1901 and published his first electrocardiograms in 1903. In order to get tracings readily from cardiac patients he had the signals transmitted over telephone wires to his laboratory from the university hospital one mile away. By 1906 he was able to publish a seminal paper with recordings of several human arrhythmias, but even much earlier, in 1893, he had seen that electrocardiography would be a new method of clinical investigation. His galvanometer, together with Roentgen's discovery of X-rays, revolutionized clinical diagnosis. It was his idea to label the five electrical waves of the heart beat as P, Q, R, S, and T following the convention in physics, started by René Descartes, that points on a curve were labelled from P onwards.

But Einthoven's collaboration with the physician at the university hospital, Dr Nolen, was short-lived. Fortunately, however, in 1908 a young British doctor, Thomas Lewis, visited Einthoven and soon became the world's leading authority on clinical and experimental electrocardiography. He provided Einthoven with clinical expertise and the two men became close friends. Professor Snellen has already given an excellent account of their relationship in his book *Two pioneers of electrocardiography*, which reprints all their correspondence. He has also published a valuable book, *Selected papers on electrocardiography of Willem Einthoven.*

In the present volume the author devotes two chapters to various times in his life, with good