sample's careers, particularly in her discussion of specialization. Finally, she might have benefited from more time to reflect on the challenge her own evidence poses to the over-simple model of unified male opposition to women in medicine, a model that she draws upon in her first chapter. I very much hope that she has an opportunity to do so in the future.

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L. J. RATHER, PATRICIA RATHER and JOHN B. FRERICHS, *Johannes Müller and the nineteenth-century origins of tumour cell theory*, Canton MA, Science History Publications, 1986, 8vo, pp. ix, 193, illus., $15.00.

No single scholar has done more to make classic texts of German pathologists accessible to an English-language readership than L. J. Rather. Following the substantial volumes of Rudolf Virchow's *Collected essays on public health and epidemiology* (1985), he has compiled an excellent edition of papers relating to Johannes Müller's contribution to the origins of tumour cell theory. An extended essay on the parts taken by Müller, Schwann, Schleiden and Henle in elucidating the nature of plant and animal cells is followed by a translation of Müller's seminal paper 'On the Finer Structure and the Forms of Morbid Tumours'. Particularly welcome is the republication of Schwann's three preliminary papers on cell theory in which he developed the theory that plant and animal cells show a unity of structure. While such a rarity would have merited parallel German and English texts (as with the Loeb classical editions), one must congratulate the translators for their accurate and readable rendering of the text. While no attempt is made to assess contemporary responses to these publications (abstracts of foreign papers in British medical publications also provide an excellent way to verify terminology), these two papers elucidate a central and neglected problem in the history of cell biology by specifying the exact nature of the contributions by Müller and such other leading researchers as Purkinje to the origins of cell theory.

Given that Schleiden, Schwann, Henle and Virchow were all Müller's students, it is necessary to reconstruct the fruitful exchange of ideas among this brilliant group of budding biologists. Rather points out that Müller's interest in tumours led to recognition of cartilage corpuscles, which corresponded to Schwannian cells. Müller appreciated the analogy between plant and animal cells, which Schleiden's essay developed. What Müller referred to as 'cells' were empty containers. Despite further refinements, Schwann retained the view of the cell as a membrane containing a structureless ground substance.

Rather is sensitive to nuances of terminology and to the prevailing cultural and medical contexts. It is important to recognize how such basic biological concepts as "the cell" arose from pathological investigations. Despite his excellent knowledge of primary sources, Rather cites neither general studies of the history of cell theory, nor some very relevant secondary literature. This would include Kisch's classic study of Remak (an important corrective to an over-emphasis of Virchow's role), and the general accounts of cell theory by Baker and Hughes. If he had done so, the originality of Rather's contributions to the history of cell theory would have become clearer. The judicious selection of the important texts by Müller and Schwann will ensure that this volume is of lasting value.

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MARY A. B. BRAZIER, *A history of neurophysiology in the 19th century*, New York, Raven Press, 1987, 4to, pp. xiv, 265, illus., $83.00.

Studies of nineteenth-century neurosciences have recently received two fillips. The first of these was the publication late last year of Clarke and Jacyna's *Nineteenth-century origins of neuroscientific concepts;* the second is the arrival of Brazier's next volume of the history of neurophysiology, following her much acclaimed study of seventeenth- and eighteenth-century neurophysiology (*Med. Hist.* 1985, **29,** 225–26).

In their introduction, Clarke and Jacyna declared that "The human element in science is paramount . . .". Brazier's work reflects the truth of this, being principally structured around biographical accounts: Deiters (of nucleus fame), Heidenhain (of the surgical pouch) and Wedensky (of Wedensky inhibition) jostle with their more famous nineteenth-century colleagues and rivals. This concentration of personalities often obscures the experiments, ideas, and concepts that induced such friendships or rivalries. A similar criticism applies to neurophysiological apparatus. Several pieces are beautifully illustrated but there is little explanation of the need for, development of and actual use of such equipment. For example, Burdon-Sanderson's uncertainty in "electronics" [*sic*] is exemplified by his collaboration with F. J. M. Page and an inadequately described illustration of an electrometer built by Page. Fortunately the references permit one readily to find the technical information in the original papers. The bibliographies in this volume are a major strength and compensate to a large extent for a sparsity of detail which has probably served to keep the text to a manageable size. Also of considerable value are the descriptions of the Russian neurophysiologists and some of their work, as much of this material has not previously been available in English. Sadly there are several flaws: Claude Bernard was not concerned with the "milieu anterior" (p. 56); Sharpey-Schafer's first name was not Ernest (p. 103); and "awarded many honours, including knighthood" occurs so often that it comes as no surprise that Victor Horsley is knighted twice within six lines (pp. 172–73). The book is nevertheless valuable, especially for its illustrations and bibliographies, but will be most useful in conjunction with its predecessor, with which it overlaps slightly, and with the Clarke and Jacyna volume.

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PETER ZUPAN, *Der Physiologe Carl Ludwig in Zürich 1849–1855,* Zürcher medizingeschichtliche Abhandlungen no. 188, Zurich, Juris, 1987, 8vo, pp. 276, SFr. 60.00 (paperback).

Dr Zupan has provided us with an invaluable resource which contains a detailed analysis of the years that Carl Ludwig spent as Professor of Physiology in Zurich, and much more. Those were very important years not only for Ludwig but for the development of modern physiology. For Ludwig they represented his escape from Marburg to a reasonably well-funded chair of his own. They were also the years when both Adolf Fick and Lothar Meyer came under Ludwig's influence. Zupan begins his thesis with a brief overview of Ludwig's career, followed by painstaking documentation of the circumstances of Ludwig's call to Zurich. This, like most other parts of the thesis, is based on excellent primary source material, often reprinted in full, such as letters between Ludwig and the faculty which Zupan has retrieved from the Zurich archives. Not all of the documentary material is from unpublished sources; the letters to Du Bois-Reymond, for example, are familiar, but they are cited to great effect. After analysing Ludwig's work in Zurich, Zupan reviews each of the dissertations that were conducted under his guidance. In a section devoted to Ludwig as a person, Zupan reaches outside the Zurich experience to gather together later memories and impressions of Ludwig, as written by many of his pupils and colleagues. The previously unpublished material includes many letters from Ludwig to Justus Gaule, written not from Zurich but from Leipzig.

Zupan writes, "By these quotations we hope to give a real impression of the time and personality of Carl Ludwig." Zupan has done that, but he has done something else as well: he has assembled in one place much carefully selected material about Ludwig, both published and previously unpublished, and about his life and his scientific career. As a result, this thesis immediately takes its place as an indispensable source of information for any future student of Ludwig or of physiology in the last half of the nineteenth century.

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