

Essay Review

EDWIN CLARKE and L. S. JACYNA, *Nineteenth-century origins of neuroscientific concepts*, Berkeley, Los Angeles, and London, University of California Press, 1987, 8vo, pp. vii, 593, \$65.00.

This is an intriguing book, partly because of its content, partly because of its complex form and style. It is presented as tracing “the origins in the first half of the nineteenth century of certain anatomical and physiological concepts that have proved fundamental in the human neurosciences.” By 1850, it is claimed, Galenic and Hallerian concepts had been overthrown and the foundations of modern neuroscience had been laid. Such formulations suggest a book organized around modern notions, and so, *in part*, it is. They suggest, also, that traditional “contribution” histories of neuroanatomy and neurophysiology will be updated from recent historical literature, and rendered more critical and contextual; indeed, whole sections of the work are of this useful if unexciting kind. But the book as a whole does not fit this pattern. Medical readers will wonder why generally it stops around 1850, when many of the concepts under review were scarcely secure or even formed; historians will be pleased that among much technical detail there are important general arguments about conceptual development and the role of romanticism. The two goals of this book—the exploration of conceptual roots, and the exploration of a period—are not easily reconciled. Let us deal first with the “roots”.

The six main chapters of the book are entitled ‘The cerebrospinal axis’, ‘The nerve cell’, ‘The reflex’, ‘Nerve function’, ‘Brain functions’ and ‘The vegetative nervous system’. The first is concerned with the shift away from a “top down” view of the central nervous system, in which the spinal cord was but an extension of a more or less unitary brain. In the new view, the system was a federation of units, ganglia for example. This historiographical focus is novel and specific; the chapter carries a strong explanatory argument. A similar argument is explored in the next chapter: the brain had been a ‘pulpy mass’, but it became a collection of nerve cells and nerve fibres, though the relations between the two were still much disputed at mid-century. Here the account focuses on Purkyně and Valentin and their philosophy of nature. ‘The reflex’ is a more familiar historical subject, if only because of the attention that has already been given to the British actors, especially Bell and Marshall Hall; here the treatment of the latter is particularly full. More novel is the discussion of ‘cerebral reflexes’, which draws on German sources, and again stresses the importance of comparative and genetic perspectives.

The chapter ‘Nerve function’ is largely concerned with the role of ‘animal electricity’. Here, uniquely, the story is largely Italian: from Galvani and Volta to the work of Matteucci. It is good to have an accessible account of the latter, and here as elsewhere the authors have been generous in discussing and quoting the receptions of the views explored. In this way, they offer a much fuller guide to the period than could be obtained from most accounts of conceptual developments. But here, too, the problem of chronology becomes evident. Important though Matteucci was, he can hardly be considered to have *established* “the foundation of the modern view”. The work of the German school, of du Bois-Reymond and Hermann, is only sketched.

A similar problem arises with ‘Brain functions’, interpreted as cerebral localization. There is a good discussion of Gall (who got it right, sort of), and an excellent treatment of Flourens, who got it wrong so well as to hold localization back until the 1870s. In the last chapter, the focus is on Bichat and the concept of a vegetative nervous system, functionally separate from the animal nervous system. This whole subject is so complicated that “right” and “wrong” become even more difficult to apply. It is clear that by 1850 no one was clear about the autonomic.

Even where it is “presentist”, this book has many virtues, not least the wide range of references and the full bibliography. The introduction contains a useful survey of the approaches which

investigators have used in studying the nervous system which includes notes on the difficulties encountered. It is helpful for historians to be reminded that to understand the results of Flourens we need to know not only about the peculiarities of his "brain", but about those of pigeons too. But it would in any case be unfair to brand this whole work as simply presentist. The arrangement, and parts of the text, rely on "modern views" but within this frame the treatment of early nineteenth-century "neuro-science" is catholic, wide and very well-referenced. And as I have indicated, there are sections which are novel, imaginative and fully contextual.

It is in these sections that the authors claim their major contribution to historiography: that "changes in ideas of the function and structure of the nervous system during this period were stimulated by the romantic philosophy of nature that exerted a major influence upon biological thought in the first half of the nineteenth century." The claim is not that ardent *Naturphilosophen* were crucial, but that the principles of the approach were widespread and influential. These general principles could be found in the programmes of Timothy Lenoir's (Kantian) vital materialists and they persisted in the work of ex-romantics like Griesinger (see p.134); they were found in the work of French transcendentalists like Geoffroy Saint Hilaire, and in that of such British (comparative) physiologists as Carpenter. Jacyna has already published important work on British cell-theory and on neurophysiology, in which he explored this theme. Here the argument is expanded to cover nerve cells, ganglia and cerebral reflexes.

As the authors recognize, there is scope for much more investigation, and indeed for presentations in a form rather different from the present one. This book was not the place to attempt a closer analysis of the "romantic" arguments, or the possible sources of these ideas outside *Naturphilosophie*. But this needs doing: some of the methodological principles involved were very important. It has, for example, been far too easy to assume that 'comparative physiology', especially arguments *from* lower animals, was a product of evolutionary thought. This is obviously wrong. Here, as in morphology, Darwinism gave a new kind of explanation for resemblances already well-explored by biologists searching for common principles, rather than common ancestors.

This first became clear to me when I was trying to explain how 'absorption'—which in the late eighteenth century had been a property of a special system (the lymphatics)—had become, by 1830, a general property of living tissues. One answer was an argument employed in France by Blainville and his disciples:

It is an incontestable principle that what is observed in the lowest animals, in which animality is, so to speak, reduced to its most simple expression, must recur in the higher animals.¹

It is this principle, chiefly, which Clarke and Jacyna see at work in the new "from below" view of the cerebrospinal axis, and of cerebral reflexes. In a recent article, Sir Andrew Huxley has shown how the same principle led investigators of muscle contraction to ignore cross-striations; these were found only in higher animals (and there only in 'voluntary' muscles), so they could not be fundamental.²

As these examples show, this was a heuristic principle which could be very misleading; but it was close to the heart of a revolution in the conceptualization of the body. "Classical bodies" were seen as wholes, and man was the reference point. By the 1830s, bodies were being understood "bottom up", from their parts, and simpler animals were a major clue to the nature of these parts. The explanation of that complex (Copernican?) shift is, to my mind, a major issue for historians. It will require careful unpicking of the principles involved, and of their articulation in the various national contexts.

To this general endeavour the present book, though hardly designed for this task, makes a major contribution. There is much on German, French and British biology to benefit historians of science and medicine. Those in search of the "origins of neuroscientific concepts" will find some and miss others; they will discover that "origins" have to be read in context; that concepts familiar in today's laboratories may descend, in fact, from quite a "foreign country", where

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“neuroscience” was done very differently. It is a lesson Canguilhem taught for the early history of reflexes;³ but one that few have learned. Here it is presented again, moreover backed by such a wealth of detail as to constitute, also, a major work of reference.

John Pickstone
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¹ Charles Dhéré, *De la nutrition d'après les idées de Ducrotay de Blainville*, Paris, 1826, p.138.

² A. F. Huxley, 'Looking back on muscle', in A. L. Hodgkin *et al.*, *The pursuit of nature. Informal essays on the history of physiology*, Cambridge University Press, 1977.

³ Georges Canguilhem, *La formation du concept de réflexe aux XVIIe et XVIIIe siècles*, 2nd ed., Paris: J. Vrin, 1977.