The practice of neurology has evolved over many centuries. Founded on analysis of the structure and function of the brain and spinal cord, the localization and clinical significance of symptoms in health and disease, in time this knowledge led to a continually changing nosology of nervous disease. Many historical ideas now appear fragile or ill-conceived, leaving the concepts of antiquity gradually discarded and replaced by more modern notions and attitudes, though these too may fragment as new discoveries and observations emerged.

Physicians in Britain and abroad lent their names to the hypotheses and disorders they had fathered, but common to them all was a discipline of increasing refinement that depended on the classical methods of intuitive history taking, a carefully honed clinical examination, and selective investigation. The neurologist seeks the mode of onset, and senses the evolution of symptoms and signs, as clues that may disclose the underlying disease mechanisms.

After the anatomists of the Alexandrian school and Galen’s unassailed dictates there was a long period of intellectual stagnation. In one remarkable ‘decade of the brain’, the 1660s, (Compston, 2009)—until which time the biology of disease was shrouded in ignorance and dominated by witchcraft and superstition—we see the beginnings of a fresh understanding that at last disputed the almost unchallenged ancient dogma. Novel ideas and a new era were afoot. Thomas Willis (1621–75) began to observe clinical symptoms and signs and to correlate these with changes he saw at autopsy, making both scientific and philosophical deductions about the disease process. He coined the term ‘neurology’ (from the Greek: nerve, sinew or tendon); ‘the whole neurology or the doctrine of the nerves’.

The publication in 2012 of a biographical survey of British neurologists entitled History of British neurology by Frank Clifford Rose (1926–2012) traces the origins of clinical neurology in Britain. We read that trails were laid for modern practice by Willis (Hughes, 1983; Compston, 1997) and medical explorers such as Robert Whytt (1714–66), Charles Bell (1774–1842) and others, whose investigations opened up several obscure areas of neuroanatomy and physiology. John Hughlings Jackson (1835–1911) and David Ferrier (1843–1928) were to establish cerebral localization, which enabled clinical deductions and diagnoses with unprecedented accuracy and encouraged the beginnings of neurosurgery.

Knowledge of the nervous system in health and disease advanced slowly. In contrast to French and German schools where neurology was often integrated with psychiatry, in Great Britain during the late 19th and early 20th centuries neurology emerged as a specialty in its own right. Rose’s book traces the landmark contributions from British clinicians and scientists on structure, function, pathological anatomy and clinical assessment, which developed into the neurosciences: neurophysiology, microscopic pathology, neurochemistry and neuroradiology. Contemporary textbooks and monographs reflected these areas of progress.

Neuropathology

After early classification by Morgagni (1682–1771), neuropathology blossomed in early 19th century France with Philippe Pinel (1745–1826), Xavier Bichat (1771–1802) and Jean Cruveilhier (1791–1874). At about the same time, British pathology flourished through the work of Matthew Baillie (1761–1823) and Robert Hooper (1772–1835). In Edinburgh, from 1751, Whytt gave influential written accounts of clinical neurology, particularly initiating ideas of reflex action in the nervous system. Baillie’s celebrated Morbid anatomy of the human body, published in 1793, and its accompanying atlas which appeared 2 years later, constitutes the first book that replaced Morgagni’s symptom-based classification with organ-based pathology. Hooper practised as a physician in Savile Row, accumulating a valuable collection of pathology specimens. As well as his Anatomist’s vade mecum and
A compendious medical dictionary &c (1798), he wrote and illustrated The morbid anatomy of the human brain, being illustrations of the most frequent and important organic diseases to which that viscus is subject (1826); in this work he categorized the principal morbid changes in the brain: inflammation; tumours (with eight subdivisions); disease without tumefaction; morbid collections of fluids between membranes and in the cavities; and extravasated fluids.

Outside the UK, the new compound microscope, techniques for tissue fixation and embedding, and the use of Benedict Stilling’s (1810–79) microtome were essential inventions for describing the histology of the nervous and other systems. Robert Remak (1815–65; Pearce, 1996) and his former student, Rudolph Albert von Kölliker (1817–1905) initiated the application of these methods to neural tissue. However, the crucial demonstration of the ways in which axons and neurones waste in various degenerative diseases was the work of the Augustus Volney Waller (1816–70) in England and Theodor Schwann (1810–82) in Germany. Born in Kent in 1850, Waller reported to the Royal Society that if nerves are cut, the distal segment containing axis cylinders disconnected from the nerve cell undergoes degeneration (Waller, 1850). As the cell body and proximal stump remain intact for a long period, Waller inferred that the nerve cells nourish nerve fibres. This made it possible to trace nerve fibres and, hence, their diseases. In 1894, a surgeon at Lincoln, Joseph Swan (1791–1874) demonstrated regeneration in the sciatic nerve after section. This complemented the studies of peripheral nerve cells described by Georg Prochaska (1749–1820) and later by Schwann in 1839 (Kareenberg, 2000). Combined with Auguste Forel’s seminal studies, Waller’s work was a necessary foundation for the ‘neurone theory’.

Sir Charles Bell also made progress in surgical and neural pathology, as did the ‘artist-pathologist’ Robert Carswell (1793–1857) who became first the professor of Pathological Anatomy at University College, London in 1828. Carswell’s description is in the splendidly illustrated publication of 1838. Of his 1034 paintings, 99 were of the brain and cord and plate 4 in the atlas depicts the first images of of multiple sclerosis several decades before Jean-Martin Charcot’s (1825–93) De la sclérose en plaques (1868), and Walter Moxon’s (1836–86) Eight cases of insular sclerosis of the brain and spinal chord (1875).

Texts

John Cooke (1756–1838) wrote the first systematic text of clinical neurology and its history (Cooke, 1820–23). More specialized accounts of neurology appeared later in the 19th century in Europe with the outstanding books of Moritz Heinrich Romberg (1795–1873), Carl Wernicke (1848–1905) and Hermann Oppenheim (1858–1919). But certainly none matched two texts from Great Britain: A manual of disease of the nervous system (1886) by Sir William Gowers (1845–1915) and the personal, comprehensive and descriptive contribution of Samuel Kinnier Wilson (1878–1937), Neurology (1940). Both furnished unparalleled one-author descriptions and historical perspectives covering the whole subject; each is still frequently consulted. New specialized monographs also flourished.

Cerebral localization

There was a further ‘Memorable decade in the history of neurology’ (Spillane, 1974) between 1874–84. Shortly after the investigations by Gustav Fritsch (1837–1927) and Eduard Hitzig (1839–1907), the doctrine of cerebral localization was pioneered in Britain by Jackson and Ferrier. Jackson’s ideas about epilepsy, the hierarchical organization of functions of the brain and localization—‘Localization of function is the law of all organization’—still permeate neurological thinking (Taylor, 1958; Critchley and Critchley, 1998; York and Steinberg, 2011). And, crucially, his friend Ferrier carried out original experiments on cerebral localization at the West Riding Pauper and Lunatic Asylum in Wakefield under James Crichton-Browne (1840–1938; Pearce and Lees, 2013). A precise map for motor functions was drawn based on low intensity Faradic stimulation of animal cortex; the same areas when lesioned produced a deficit that corresponded to the results of stimulation. High intensity stimulation induced seizures which confirmed Jackson’s belief that epilepsies were discharging lesions of the different cerebral centres. This was original, experimental medicine of the highest order. Indeed, E.D. Adrian (1889–1977) in 1939 referred to this time as: ‘a classical period in the history of medicine, the period when neurology became a science’.

It therefore occasions no surprise that British neurologists were a major influence on the formative decades of American neurology, which evolved from the 1870s with the American Neurological Association (1874) inspired by William Alexander Hammond (1828–1900) and Silas Weir Mitchell (1829–1914). They were succeeded by George Beard (1839–83), Tracy Putnam (1894–1975), who with H. Houston Merritt (1902–79) discovered phenytoin (Epanutin). However, distinguished American physicians such as James Jackson Putnam (1846–1918) and Stanley Cobb (1887–1968) independently nurtured the specialty but were slow to accept the separation of neurology from William Osler’s (1849–1919) monistic internal medicine, and neuropsychiatry.

Neurophysiology

In considering Rose’s The history of British neurology, we should remember pioneers such as Rudolf Virchow (1821–1902), Hermann von Helmholtz (1821–94), Charles-Édouard Brown Séquard (1817–94) and Claude Bernard (1813–78) who established the scientific roots of modern medicine. The fundamental concept of reflex function stemmed from Whytt, Bell and Marshall Hall (1790–1857). In physiology, Sir Charles Sherrington (1857–1952) and Adrian later were acclaimed worldwide as instigators of basic neuroscience. In The discovery of reflexes (1960), E.G.T. Liddell included chapters on important area of progress: the nerve cell and the microscope; animal electricity; experimental approaches; and ‘Sherrington and his times’ (Creed et al., 1932), to which we may add neurotransmission, though of course all are interrelated. Sherrington explained the propagation of the nerve impulse through synapses, and defined the efferent and afferent functions of nerve and muscle and the physiology of the stretch reflex. In The integrative action of the nervous system (1906) he showed that regulation of reflex activity required an
intact cord with interaction of neighbouring segments and reciprocal inhibition and facilitation of agonists and antagonists for normal motor and postural functions. In 1932, Adrian and Sherrington shared Nobel Prize for work on the function of neurons. In the same period, Sir Henry Hallet Dale (1875–1968) and Otto Loewi (1873–1961) were recognized for their work on chemical transmission between nerves (Pearce, 2009).

This new physiology connected neatly with Camillo Golgi’s (1843–1926) silver staining techniques (‘the black reaction’) to demonstrate the nexus between dendrites, neurons and axons, and with Santiago Ramón y Cajal’s (1852–1934) demonstration that individual neurons are the fundamental units of the nervous system (the neuron doctrine). All neural organization depended on the conducted nerve impulses that connected axons, dendrites and the cell bodies. Together Cajal and Golgi received the Nobel Prize in 1906 for their studies of the structure of the nervous system.

Against the background of interest in the electrical activity of the brain, Adrian developed techniques for recording electrical activity from the peripheral nerve fibres. Demonstration of intracellular recordings eventually founded studies of neural transmission by the 1963 Nobel laureates Sir Andrew Huxley (1917–2012), Sir Allen Hodgkin (1914–1998) and Sir John Eccles (1903–1997).

Clinical discipline

Amongst early 20th century clinicians, Henry Head (1861–1940), Gordon Holmes (1876–1965), Sir Francis Walshe (1885–1973), Sir Charles Symonds (1890–1978) and Lord Brain (1895–1966) in London established an inimitable quality of clinical practice and teaching. The rigours they imposed were peculiarly British: ‘To be trained by him [Holmes] was a severe but most salutary discipline’, remarked Walshe. Similarly, Macdonald Critchley (1900–97) observed: ‘He could coax physical signs out of a patient like a Paganini on the violin’. From their painstaking clinical precision these neurologists inferred and tested much of basic neurological physiology and clinico-pathological correlation presented in their respective texts. Their writings still have compelling vitality, disarming candour and fertile ideas. Many of their maxims survive to this day.

History of British neurology

Most of these landmarks of neurological progress are sketched in the History of British neurology (2012), the last of Rose’s prolific list of publications. Rose had a lifelong interest in medical history and was a founding editor (1992) of the Journal of the History of Neurosciences. A great organizer of international conferences he ably edited a host of monographs from their contributed manuscripts. Rose covered variations of this book in: A short history of neurology: the British contribution 1660–1910 (1999), and Twentieth century neurology: the British contribution (2001). His Historical overview of British neurology also appeared in Chapter 39 of the Handbook of clinical neurology (2010).

The contents of History of British neurology include brief notes on British neurology before Willis, a substantial chapter on Willis: ‘the founder of neurology’ and Rose then summarizes the works of neurological exponents of the 17th, 18th and first half of the 19th centuries. He describes advances made at the National Hospital Queen’s Square covering many neurologists and neurosurgeons mentioned above, and he paints an informative picture of the development of the specialty in London. There follows biographical accounts of the latter part of the 19th and 20th centuries. Having considered these cardinal figures, he systematically observes the evolution of knowledge and techniques, again highlighting the most important exponents. Neurosurgery, head injuries, paediatrics, neuropathology and neurophysiology are discussed in turn, ending with investigators of other neurosciences, mainly of the last 70 years.

Rose’s book has to be set against a daunting collection of earlier histories of clinical neuroscience. Walther Riese’s A history of neurology (1959) is a respected, quasi-philosophical monograph omitting biographical data. Clarke and O’Malley’s The human brain and spinal cord, 1968 (Norman, 1996), deals with the evolution of predominantly anatomical and histological knowledge from Graeco-Roman times to the 20th century. Garrison’s history of neurology by Lawrence McHenry (1969) provided a more comprehensive picture. Marvellously succinct but more accurate biographies arranged by discipline are found in Haymaker and Schiller’s The founders of neurology (1970). For a scholarly and detailed appraisal and source of reference, the neurologist cannot improve on J.D. Spilane’s The doctrine of the nerves (1981). The dictionary-like Morton’s medical bibliography by Jeremy Norman (1991) catalogues significant writings and articles throughout the history of medicine, many neurological. Those still sympathetic to the nostalgia of eponyms will find a selection in Neurological eponyms by Koehler, Bruyn and Pearce (2000).

History of British neurology provides the reader with a broad (perhaps too broad) account, mainly centred on individual neurologists, their beginnings, careers and publications. Some sections, such as those on Bell, Jackson, Head, Kinnier Wilson and Critchley (whom he greatly admired) are refreshingly spiced with anecdotes to reveal glimpses of their personal lives and idiosyncrasies. They tell of the personalities behind the names. Others are more drab factual accounts. Some are no more than a padded outline, such as a single page on Lord Brain, and a solitary paragraph on the remarkable Thomas Young (1773–1829), ‘The last man who knew everything’ (Robinson, 2006). Robert Boyle (1627–91), Sir Christopher Wren (1632–1723), Robert Hooke (1635–1703) and many of the ‘natural philosophers’ recorded here made huge scientific contributions, but in the main they were remote from neurology and one wonders whether they should have been included.

Although the British contribution is impressive, how did this relate to progress of comparable importance across Europe? Important links did exist between the neurologist physicians [for instance, both Jackson and Sir John Russell Reynolds (1828–96) with Charcot], and both awareness and ignorance of continental studies merit explanation not found here. In France, advances were made under Charcot, Pierre Marie (1853–1940), Guillaume Duchenne (1806–75), Joseph Babinski (1857–1932), Georges Gilles de la Tourette (1857–1904) and their distinguished colleagues, many of whom presented at The Société de Neurologie.
de Paris. In Germany, neurology was closely bound to psychiatry (Karenberg, 2009). The Society of German Neurologists was founded in 1907, the culmination of advances made inter alia by Wilhelm Erb (1840–1921), Wernicke, Robert Remak (1815–65) and Romberg. British neurologists were familiar with their work and with Oppenheim, Arnold Pick (1851–1924), Cecile (1875–1962) and Oskar (1870–1959) Vogt, Alois Alzheimer (1864–1915), Otfrid Förster (1873–1941), Kurt Goldstein (1878–1965) and the German Carl Friederich Otto Westphal (1833–90). What, we are left to wonder, was their influence on neurology in Britain and vice versa? They may have lacked the analytical refinement of contemporary English clinicians, but they continued the tradition of describing new syndromes and correlating them with sophisticated neuropathology and speculating about pathogenesis.

We are reminded that in Britain, neurology was more intricately linked to general medicine, and remains so. It was one of the first specialties to develop in the mid 19th century. In 1886 the Neurological Society of London was founded, with Jackson as its first president. Kinnier Wilson was the first ‘physician in charge of a neurological department’ (at the Westminster hospital), appointed in the second decade of the 20th century. Most of the physicians at Queen Square were general physicians with a special interest in neurology; indeed most were appointed as general physicians in their various teaching hospitals. The separation of neurology from psychiatry then widened in Britain, in contrast to Germany and the USA where these disciplines were often fused. The underlying British themes were clinical precision and observation, and clinico-pathological correlation. These corresponded to the approach of Charcot’s school and were inseparably linked to cerebral localization initiated by Fritsch and Hitzig in Germany and crucially by Ferrier’s original Wakefield experiments.

Although Rose mentions these advances, his text concentrates more on the individual exponents than on the evolving theme of scientific progress and knowledge aimed at showing how the brain worked, and what was the diagnostic significance of the clinical signs observed. We search in vain for a story of the vision possessed by most great experimenters.

The coverage is patchy. Migraine, one of Rose’s favourite topics about which he organized several conferences, inexplicably receives sparse mention and no specific account of the development of aetiological concepts and treatments. Indeed Edward Liveing (1832–1919), whose 1873 monograph On megrim, sick headache, and some allied disorders was the most important on the subject for more than 60 years is not mentioned. The work of Robert Bentley Todd (1809–60), one of the most original if disputatious physicians of the mid 19th century, is not adequately described. Jackson acknowledged the Todd and Robertson theory that post-epileptic paralysis was due to ‘post-paroxysmal exhaustion of the cortical centres’, but this and original quotations from his writings are not in evidence. There is brief mention of, but no extract from Kinnier Wilson’s classic 1912 paper in Brain: ‘Progressive lenticular degeneration: a familial nervous disease associated with cirirosis of the liver’. Many of the citations are illuminated only by a brief quotation, too often from a secondary source; this forfeits the expression and thoughts behind original descriptions. Gowers’s account of pseudohypertrophic paralysis, Robert Graves’s (1895–1985) account of transient ischaemic attacks, Walshe’s strident critique of Wilder Penfield’s (1891–1976) homunculus are but a few examples where we miss the original words. If this book repeats much of the author’s previous writings, this may be forgiven since he leaves us with a useful collection of essentially biographical notes on a wide range of neuroscientists who sculpted modern neurology. Rose and Bynum’s Historical aspects of the neurosciences (1982) was a more satisfactory and authoritative work.

Biographical collations subsume inextricably interrelated ingredients: the life of the man or woman described, and the results they have achieved (Pearce, 2007). Certain anecdotes of personal eccentricities and notoriety enliven Rose’s account and help us to understand their subjects’ successes and failures and to put them in the context of their individual achievements. He leaves us a competent historical précis that should encourage neuroscientists and aspiring neurologists to seek earlier works and ideas. For more penetrating, comprehensive texts illuminating the routes from each discovery along the pathways of medical practice, the reader will have to consult other publications. A cultivation of the past bears its own fruits. Rose’s biographies afford the chance to see which ideas and discoveries developed, flourished and sometimes were also destroyed by advancing experiments and consequent knowledge.

JMS Pearce

References

Carswell R. Illustrations of the elementary forms of disease. PI 1V fig1. London: Longman; 1838.


Robinson A. The last man who knew everything: Thomas Young, the anonymous polymath who proved Newton wrong, explained how we see, cured the sick and deciphered the Rosetta Stone among other feats of genius. New York: Pi Press; 2006.


Waller AV. Experiments on the section of the glossopharyngeal and hypoglossal nerves of the frog, and observations of the alterations produced thereby in the structure of their primitive fibres. Philos Trans R Soc 1850; 140: 423–9.