



Available online at  
**ScienceDirect**  
[www.sciencedirect.com](http://www.sciencedirect.com)

Elsevier Masson France  
**EM|consulte**  
[www.em-consulte.com](http://www.em-consulte.com)



## History of Neurology

# Anglo-French neurological interactions in the 19th and early 20th centuries: Physicians, places and events

E. Broussolle <sup>a,\*</sup>, E.H. Reynolds <sup>b</sup>

<sup>a</sup> 123, rue Duguesclin, 69006 Lyon, France

<sup>b</sup> Department of Clinical Neurosciences, King's College, London, UK

### INFO ARTICLE

#### Article history:

Received 3 September 2020

Received in revised form

6 October 2020

Accepted 26 October 2020

Available online 25 February 2021

#### Keywords:

History of neurology

French neurology

British neurology

Salpêtrière

Queen Square

### ABSTRACT

The development of neurology as an independent discipline in the mid-19th century was considerably influenced by the almost simultaneous foundation of the Charcot School at the Salpêtrière Hospital in Paris and the National Hospital for the Paralysed and Epileptic and its School at Queen Square in London in the 1860's. We have reviewed the early interactions between Charcot's school and the leading neurologists at the National Hospital and also discussed their neurological antecedents and subsequent links up to the outbreak of World War 1 in 1914. Earlier interactions involved Trousseau and Duchenne in France and Graves, Todd, Laycock and Allbutt in Britain. The French Brown-Séquard was one of the first two physicians appointed to the National Hospital. Charcot was a frequent visitor to Britain culminating in his influential role in the 1881 International Medical Congress in London. He first suggested the terms "Parkinson's Disease" and "Jacksonian Epilepsy". He attracted numerous British visitors to Paris and his studies of hysteria were influenced by Laycock, Todd and Russell Reynolds. Hughlings Jackson drew upon the anatomical studies of Gratiolet in his interactions with Broca and Charcot which influenced French views on aphasia, epilepsy and cortical localisation. Ball, an Englishman, was the first Professor of mental and brain diseases in Paris in 1877. Bruce in Edinburgh and Kinnier Wilson in London both maintained frequent contacts with Paris, where the latter first presented his studies of hepatolenticular degeneration in 1912. The Entente Cordiale of 1904 led to further interactions with the leading role of the French and British physicians Raymond and Duckworth. Two outstanding British women, Elizabeth Garrett and Blanche Edwards, qualified in Medicine in Paris with neurological interests. Our review emphasises the constructive influence of the French and British Schools on each other and thus on the development of neurology. The French influence was primarily the establishment of the anatomo-clinical method and the use of photographic illustrations in publications. The British School influence was its Clinical Assessment Skills and scientific studies of newly recognised diseases and concepts and its early development of neurosurgery.

© 2021 Elsevier Masson SAS. All rights reserved.

\* Corresponding author.

E-mail address: [emmanuel.broussolle@sfr.fr](mailto:emmanuel.broussolle@sfr.fr) (E. Broussolle).

<https://doi.org/10.1016/j.neurol.2020.10.013>

0035-3787/© 2021 Elsevier Masson SAS. All rights reserved.

## 1. Introduction

Neurology evolved as an independent discipline in many countries in the middle of the 19th century, especially in France [1] and in Britain [2,3]. It is widely acknowledged that in France a neurological School was founded at the Salpêtrière Hospital in Paris by Jean-Martin Charcot (1825–1893) beginning in the 1860's [4,5] and that in Britain neurology began to flourish with the establishment of the National Hospital for the Relief and Cure of the Paralysed and Epileptic at Queen Square in London in 1860 [6].

In this review, we examine some seminal Anglo-French neurological interactions during the second half of the 19th century up until the beginning of World War One and their influence on the development of neurology. We also include some important precursors to the above two foundation stones.

## 2. Methods

We conducted a literature search on PubMed and Google Scholar and consulted books on the history of neurology. We also searched the contents of all issues of the most important journals in which French and British physicians published their work between the mid 19th and the early 20th centuries, including *Nouvelle Iconographie de la Salpêtrière*, *Revue Neurologique* and *Brain*.

## 3. Results

We here present a review of significant Anglo-French interactions by physicians with an interest in neurology and or neuropsychiatry prior to, during and following the foundation of the Schools of neurology in Paris and in London in the 1860s. In this paper we discuss individuals, places and events which relate to these interactions.

The most influential neurologists in Paris and London during the 19th and the early 20th centuries are mentioned in [Tables 1 and 2](#). Those most actively engaged in Anglo-French interactions are shown in [Figs. 1 and 2](#).

### 3.1. Anglo-French neurological interactions prior to the 1860's

Following the Napoleonic wars and the peace of 1815, there was a rapid increase in medical interchange and travel in Europe, especially in the direction of Paris [7]. Many leading British physicians travelled to Paris influenced by René Laënnec (1781–1826) and his discovery of the stethoscope and establishment of the anatomo-clinical method [8].

Among Anglo-French neurological interactions prior to the 1860's, those involving Trousseau and Duchenne in France and Todd, Laycock, Allbutt in England and Scotland and Graves in Ireland are most notable.

**Table 1 – Short list of the main French – mostly Parisian – contributors to neurology and neuropsychiatry from the mid 19th to the early 20th centuries<sup>a</sup>. From references [5,36,61].**

Name	Dates of birth and death	Teacher/mentor
Armand Trousseau	1801–1867	Pierre Bretonneau (Tours)
Guillaume Benjamin Amand Duchenne	1806–1875	Armand Trousseau and Jean-Martin Charcot
Paul Broca	1824–1880	Pierre-Nicolas Gerdy
Jean-Martin Charcot	1825–1893	Pierre François Olivier Rayer and Guillaume Benjamin Amand Duchenne
Alfred Vulpian	1826–1887	Pierre Flourens
Benjamin Ball	1833–1893	Jacques Moreau de Tours and Jean-Martin Charcot
Désiré-Magloire Bourneville	1840–1909	Jean-Martin Charcot
Alix Joffroy	1844–1908	Jean-Martin Charcot
Fulgence Raymond	1844–1910	Alfred Vulpian and Jean-Martin Charcot
Albert Pitres	1848–1928	Jean-Martin Charcot
Paul Richer	1849–1933	Jean-Martin Charcot
Jules Joseph Dejerine	1849–1917	Alfred Vulpian
Edouard Brissaud	1852–1909	Jean-Martin Charcot
Gilbert Ballet	1853–1916	Jean-Martin Charcot
Pierre Marie	1853–1940	Jean-Martin Charcot
George Edouard Brutus Gilles de la Tourette	1857–1904	Jean-Martin Charcot
Joseph Babiński	1857–1932	Alfred Vulpian and Jean-Martin Charcot
Augusta Dejerine-Klumpke	1859–1927	Alfred Vulpian
Achille Alexandre Souques	1860–1944	Jean-Martin Charcot
Henry Meige	1866–1940	Jean-Martin Charcot and Edouard Brissaud

<sup>a</sup> Most of these distinguished physicians became professors at Paris University. They spent some of their time in the Salpêtrière hospital before moving from one hospital to another, e.g. among others Saint Antoine, Lariboisière, Bicêtre or Sainte Anne hospitals. Two never worked at the Salpêtrière, i.e. Armand Trousseau and Paul Broca. Fulgence Raymond, Jules Dejerine and Pierre Marie later returned to the Salpêtrière as successors to Charcot's chair of neurology. Albert Pitres first worked in Paris before being appointed Professor at the Bordeaux Faculty of Medicine.

**Table 2 – Consultant physicians to the National Hospital appointed between 1860 and 1880.**

	Year of appointment	Year of retirement or death
C. Brown-Séguard (1817–1894)	1860	1863
J.S. Ramskill (1824–1897)	1860	1897
J. Hughlings Jackson (1835–1911)	1862	1906
C. B. Radcliffe (1822–1889)	1863	1889
J. Russell Reynolds (1828–1896)	1863	1869
P. Bazire (1835–1867)	1864	1867
E.H. Sieveking (1816–1904)	1864	1867
H. C. Bastian (1837–1915)	1867	1907
T. Buzzard (1831–1919)	1867	1906
C. Elam (1824–1889)	1870	1877
D. Maclure (?–1879)	1870	1879
William Gowers (1845–1915)	1872	1910
David Ferrier (1843–1928)	1880	1907

The first neurosurgeon, Victor Horsley (1857–1916), was appointed in 1886 until his death. From reference [6].

### 3.1.1. Armand Trousseau

Armand Trousseau (1801–1867), the outstanding physician in Paris in the 1850's at l'Hôtel-Dieu [5,9], attracted many British and other foreign physicians and students. His influence on general medicine notably infectious diseases and tracheotomy is well known but he also made important contributions to neurology [10,11]. Trousseau's two volume text "*Clinique Médicale de l'Hôtel-Dieu*" was first edited in 1861 then in 1865 [12]. Its third edition in 1868 was translated into English as "Lectures on Clinical Medicine" in 1872 [13]. The Lectures on neurology include Parkinson's disease, aphasia, chorea, tetany, tics, epilepsy and epileptiform neuralgia, and pro-

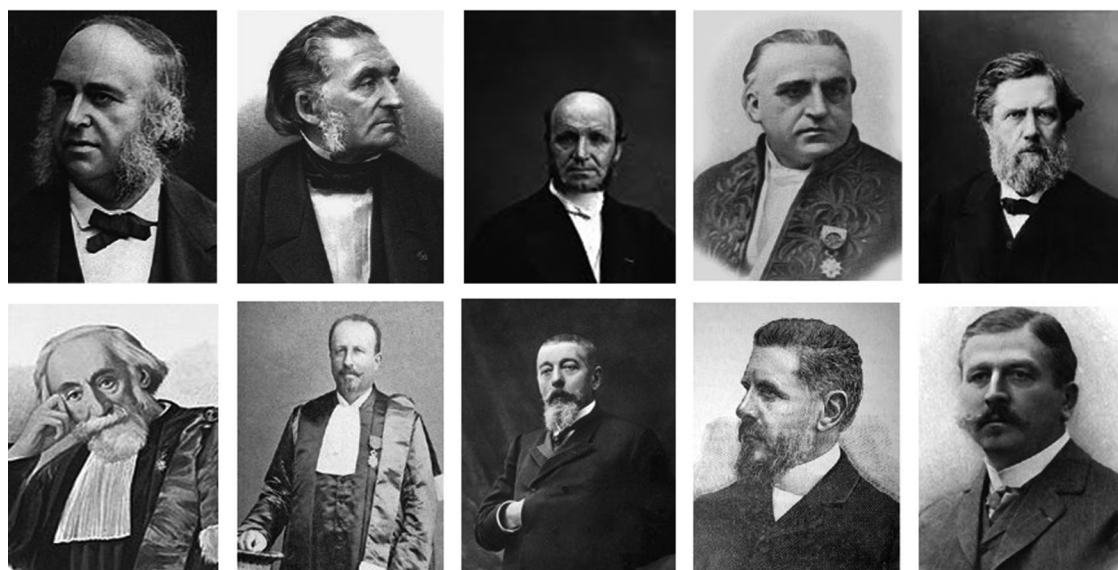
gressive muscular atrophy. It has been suggested that Trousseau's descriptions "must stand alongside those of Charcot, Oppenheim, Jackson and Gowers in the annals of neurology" [10].

### 3.1.2. Guillaume Benjamin Amand Duchenne de Boulogne

Trousseau was very supportive of Guillaume Benjamin Amand Duchenne de Boulogne (1806–1875). Like Charcot later at the Salpêtrière, he gave Duchenne the freedom to investigate his neurological patients at l'Hôtel-Dieu with his electrical machine as he made many original discoveries in the diagnosis and classification of neuromuscular diseases [14,15]. Indeed, Duchenne was the first French physician to devote his clinical practice wholly to neurology. Trousseau and Charcot acknowledged their debt to him. Charcot, 19 years his junior, described him as "his master in neurology" and in turn persuaded Duchenne of the diagnostic value of pathological investigations [5,16]. Allbutt of Leeds who spent a year with Trousseau and Duchenne in 1860–61 gives a wonderful account of Duchenne ("this great clinical investigator") in action in Paris and during a visit to London [16]. Duchenne also contributed to the British Medical Association meeting in Oxford in 1868 on the subject of locomotor ataxia [17].

### 3.1.3. Robert Bentley Todd

Robert Bentley Todd (1809–1860) trained in medicine in Dublin under Robert Graves, but established his reputation in London as a physiologist, pathologist, physician, administrator and teacher at King's College and at King's College Hospital which he founded in 1840. He was especially interested in the nervous system and influenced by Michael Faraday was the first to apply electromagnetic concepts to the brain and to conceive of electrical discharges in epilepsy [18–20]. His



**Fig. 1 – Picture of some important French pioneers in neurology and neuropsychiatry during the 19th and the early 20th centuries who contributed to the Anglo-French interactions (public domain). Upper row, from left to right: 1 – Paul Broca; 2 – Armand Trousseau; 3 – Guillaume Benjamin Amand Duchenne; 4 – Jean-Martin Charcot; 5 – Alfred Vulpian. Lower row, from left to right: 1 – Benjamin Ball; 2 – Fulgence Raymond; 3 – Jules Joseph Dejerine; 4 – Pierre Marie; 5 – Joseph Babiński.**



**Fig. 2** – Picture of some important British pioneers in neurology and neuropsychiatry during the 19th and the early 20th centuries who contributed to the Anglo-French interactions. Most pictures are of public domain. The portrait of Allbutt is reprinted by permission of the Master and Fellows of Gonville and Caius College, Cambridge. The portrait of Laycock is reprinted by permission of the Royal College of Physicians of Edinburgh. Upper row, from left to right: 1 – Robert Bentley Todd; 2 – James Crichton-Browne; 3 – Thomas Clifford Allbutt; 4 – Robert Graves; 5 – Thomas Laycock; 6 – Charles Edouard Brown-Séquard. Lower row, from left to right: 1 – John Russell Reynolds; 2 – John Hughlings Jackson; 3 – Alexander Bruce; 4 – David Ferrier; 5 – Victor Horsley; 6 – Samuel Alexander Kinnier Wilson.

lectures on paralysis including post-ictal paralysis [21] were very influential and as a pioneer microscopist in the 1840's he laid the foundations of the neurone doctrine [22]. He has been viewed as the UK's greatest neurologist prior to the foundation of the National Hospital in 1860, the year of his death. He travelled to European medical centres, including Paris, and his 4 volume *Cyclopedia of Anatomy and Physiology* included 7 French contributors [23].

#### 3.1.4. Thomas Laycock

Thomas Laycock (1812–1876), from Yorkshire, studied medicine at University College, London, but included a session at La Pitié Hospital in Paris under Pierre Louis (1787–1872) and colleagues [24,25]. He was much influenced by the French clinico-pathological method which he taught Hughlings Jackson, his student at the York Medical School in the early 1850's. He was the first to apply reflex theory to the brain [26]. Supported by Todd, among others, he was the first Englishman to be appointed in 1855 to the prestigious Chair of Medicine in Edinburgh. There he promoted the study of mental diseases, which he viewed as brain diseases, and taught a generation of distinguished neurologists and Asylum physicians [27]. One of the latter was James Crichton-Browne (1840–1938) who famously transformed the West Riding Lunatic Asylum in Wakefield, Yorkshire, into the leading neuropsychiatric Asylum in the UK for the study of insanity [28,29].

#### 3.1.5. Thomas Clifford Allbutt

Thomas Clifford Allbutt (1836–1925), another Yorkshireman, was Leeds most distinguished physician of the 19th century. Like Laycock in Edinburgh, he broke tradition by becoming the first provincial physician to be appointed in 1892 to the Chair

of Medicine in Cambridge [30]. Influenced by his year in Paris, he too promoted the study and teaching of mental and brain diseases, both at Leeds (together with Crichton-Browne at nearby Wakefield) and at Cambridge [16].

#### 3.1.6. Robert Graves

Todd's teacher in Dublin, Robert Graves (1796–1853), also travelled widely in Europe, including Paris, where he was friendly with Trousseau [31]. Trousseau visited Graves and his pupil William Stokes (1804–1877) in Dublin and also proposed that Exophthalmic Goitre should be called Graves Disease as it is so widely known today. Graves famous "Clinical Lectures on the Practice of Medicine" first published in 1843 was later translated into French together with a glowing introduction by Trousseau [31,32]. In his Clinical Lectures, Graves gives the first detailed account of acute or subacute peripheral neuropathy with variable recovery which he had observed with Auguste François Chomel (1788–1858) during a visit to Paris in 1828 [33]. Spillane [34] confirmed that this was an epidemic of polyneuritis. When Stokes edited "Studies in Physiology and Medicine" in 1863 in honour of Graves, 10 years after the latter's death, the book was dedicated to Trousseau [35].

It is interesting that Graves, Trousseau and Todd have been described as the greatest teachers of medicine in Europe in the 19th century. This may perhaps be because each published their widely acclaimed lectures, but by all accounts, each were also gifted oral teachers.

Finally, it is noteworthy that when Charles Darwin published his famous "The Expression of Emotions in Man and Animals" in 1872, he acknowledged his great debt to the assistance of both Crichton-Browne in Wakefield and Duchenne in Paris [16,36].

### 3.2. The Foundation of Schools of Neurology in Paris and London

The growth of Anglo-French neurological interactions in the second half of the 19th century was closely linked to the almost simultaneous foundation of a School of Neurology by Charcot at the Salpêtrière in Paris and by the establishment of the National Hospital for the Paralysed and Epileptic in London.

#### 3.2.1. The Salpêtrière and Charcot

Beginning in the mid-17th century, the Salpêtrière in Paris was devoted to the care of elderly or chronically ill women and became the largest charitable institution in Europe. The psychiatric section for the care of the chronically insane was already well known through the achievements of Philippe Pinel (1745–1826) and Jean Etienne Dominique Esquirol (1772–1840) [37], but it had an even larger section for the care of the chronically ill, the disabled and the destitute to which Charcot was appointed as resident (intern) in 1852, then head of a Department in 1862 [4,38,39]. Charcot understood the immense potential this offered for the study of neurological diseases to which he increasingly devoted his career. Over the next 30 years, he initiated a School of Neurology based on the clinico-pathological method, assisted and expanded by his many collaborators and pupils (Table 1). His studies, publications and teaching attracted colleagues and students from all over Europe, especially Britain, Russia, Poland and Romania [4,5,40,41].

In 1872, Charcot was elected Professor of Pathological Anatomy at the Faculty of Medicine of Paris University. In 1882, he was appointed to the chair created for him of Professor for the Study of Diseases of the Nervous System (in French: “*Chaire de Clinique des Maladies du Système Nerveux*”). His many clinico-pathological descriptions and classifications in neurology are well documented and illustrated by the number of diseases that bear his name. The first two volumes of his “*Lectures on Diseases of the Nervous System*” were translated into English by his pupil and friend, the Irish physician George Sigerson (1836–1925) in 1877 and 1881 [42]. Charcot’s interests and achievements included amyotrophic lateral sclerosis, locomotor ataxia, spinal cord localisation, multiple sclerosis, Parkinson’s disease, cerebral localisation, aphasia and hysteria [4,43–47].

Charcot spoke several languages and he had a scholarly knowledge of the neurological literature, especially English and German. It was he who suggested that paralysis agitans should be known as Parkinson’s Disease. Similarly, he recognised that the detailed descriptions of unilateral motor seizures by Jackson were worthy of the name Jacksonian Epilepsy [46].

#### 3.2.2. The National Hospital, Queen Square and Brown–Séquard

The National Hospital for the Relief and Cure of the Paralysed and Epileptic, as it was originally called, was founded in 1860 in Queen Square by the Chandler family, the Mayor of London and many supporters and philanthropists [6]. Of the first two physicians appointed that year one was the Frenchman, Charles Edouard Brown–Séquard (1817–1894), a pupil of Trousseau. Brown–Séquard was already distinguished for his work on the pathology and physiology of the nervous

system, including the discovery of vasomotor nerves and the spinal cord syndrome which is now known by his name. He was by this time a Fellow of the Royal Society and he had previously lectured in London, Edinburgh, Glasgow and Dublin. Brown–Séquard was a restless investigator whose career oscillated between prestigious academic positions in Paris, London and the USA, culminating finally as Professor of Experimental Medicine at the College de France in Paris in succession to Claude Bernard [48–50].

Brown–Séquard remained at Queen Square only for three and half years, perhaps for lack of experimental facilities. However, he gave it a very credible beginning. One of his achievements in retrospect was to encourage and support the appointment of John Hughlings Jackson (1835–1911) to the hospital in 1862 [51].

The hospital rapidly became a national centre for the study and treatment of neurological diseases. Among the first 13 part-time physicians appointed to the Staff in its first 20 years (1860–1880) were, in addition to Brown–Séquard, some of the most distinguished names in neurology, including John Hughlings Jackson, John Russell Reynolds (1828–1896), Edward Henry Sieveking (1816–1904), Henry Charlton Bastian (1837–1915), William Gowers (1845–1915) and David Ferrier (1843–1928) (Table 2) [6].

Queen Square, as it was often subsequently called, became a national teaching centre for the emerging discipline of neurology attracting physicians and students from all over the UK and Europe as well as the British Empire. While the Salpêtrière School was built largely on the achievements of the outstanding Charcot and based on the clinico-pathological method, the National School in London was founded on the clinical skills of a series of *prima donnas* each adding individual achievements but collectively developing an internationally recognised body of clinical knowledge and unique methods of clinical evaluation [6].

The National Hospital was much later than the Salpêtrière in developing neuropathology. The first neuropathologist to be appointed in the UK was in fact at the West Riding Lunatic Asylum in Wakefield in 1872 at the instigation of James Crichton–Browne. The first assistant pathologist at Queen Square was not appointed until 1889; the first full-time appointment, Joseph Godwin Greenfield (1884–1958) was not until 1914. In between two assistant pathologists, Gordon Holmes (1876–1965) and Samuel Alexander Kinnier Wilson (1878–1937) also later became distinguished physicians at the Hospital.

From the start, Brown–Séquard and his successors were expected to give regular lectures at Queen Square, but unlike the early University recognition of Charcot, it was not until 1880 that a Dean of Medicine was established at the National Hospital and not until 1895 that a Medical School was finally recognised by the Royal Colleges of Physicians and Surgeons. Academic links with the University of London were not established until after the second world war [6].

### 3.3. Charcot’s Teaching and Travels

The attraction of Charcot’s teaching programme, especially his Tuesday lessons, to numerous students from Europe and the Americas is well described in the biography of Charcot by

Goetz et al. [4]. It is epitomised in the famous portrait of Charcot demonstrating a patient with hystero-epilepsy to numerous colleagues and students during “*Une Leçon Clinique a la Salpêtrière*” by Brouillet in 1887 [4,52]. We describe below a few British visits to Paris together with Charcot’s numerous visits to London and Britain.

Allbutt’s year in Paris in 1860–61 has already been mentioned but he continued to visit Charcot on numerous subsequent occasions and eventually wrote Charcot’s obituary for *The Lancet* in 1893 [53].

Charcot first travelled to London in 1861 where he visited several London teaching hospitals and the Hunterian Museum of the Royal College of Surgeons [54]. Whether he visited the new National Hospital then is uncertain but as his colleague Brown-Séguard was already there, it seems plausible.

### 3.3.1. Russell Reynolds, Charcot and hysteria

Charcot and Brown-Séguard attended the annual meeting of the British Medical Association (BMA) in Leeds in July 1869. There Charcot heard the presentation by Russell Reynolds on “Paralysis and other disorders of motion and sensation, dependent on idea” [55] which, together with his reading of Laycock and Todd, was a seminal British influence on his subsequent studies of hysteria which began soon afterwards [4]. Russell Reynolds visited Charcot several times in the next two decades in Paris and he described in some detail several patients with hemianesthesia and hystero-epilepsy which he had witnessed in Charcot’s clinic [56].

A year later in August 1878, a group of several distinguished British and European physicians attended a demonstration of hystero-epilepsy by Charcot. Among the former were Grainger Stewart, William Turner, William Broadbent and Ernest Hart, the editor of the *British Medical Journal* [57].

### 3.3.2. Charcot and the British Medical Association (BMA)

Charcot continued to attend BMA meetings in the 1870’s and 1880’s. In 1877, he was one of the principal speakers at the annual BMA meeting in Manchester and he wrote to his wife in glowing terms about his reception [58]. At the same time, he presented a specimen of a neuropathic shoulder to the Royal College of Surgeons in London [54].

At the annual meeting in Bath in 1878, Charcot was elected an honorary member of the BMA with Louis Pasteur (1822–1895) [59].

In 1879, he was again a guest of the BMA at the annual meeting in Cork at the instigation of George Sigerson, his Irish pupil and friend as mentioned above.

It is reported that earlier in 1872, Charcot had visited Dublin and Ireland, initially with a delegation of French physicians [4,54]. Charcot was elected an Honorary Fellow of the King and Queen’s College of Physicians of Ireland in 1887 and of the Royal Society of Medicine in London in 1891.

In 1880, Pierre Marie (1853–1940) attended the BMA meeting in Cambridge on Charcot’s behalf and where some of Charcot’s views on hysteria came in for criticism [4].

Charcot’s final attendance as a guest speaker at a BMA meeting was in Brighton in 1886, where he spoke alongside Hughlings Jackson and Victor Horsley on the new neurosurgery. He also visited Horsley at Queen Square and saw him operate on a meningioma [58].

## 3.4. John Hughlings Jackson, Paul Broca, Louis Gratiolet and Aphasia

In the late 19th century, a great debate arose about the localisation of speech following a meeting of the British Association for the Advancement of Science in Norwich in 1868 at which both Paul Broca and Hughlings Jackson presented papers on the subject [60,61].

Paul Broca, Professor in the Medical Faculty of Paris, was a surgeon, anatomist and anthropologist, who founded the Paris Anthropological Society, an Anthropological Journal and School [62]. Based on his clinico-pathological study of several patients, he proposed in 1861 that the faculty of language resided in the posterior portion of the third left frontal convolution, subsequently known as Broca’s area responsible for Broca’s aphasia [61,63,64].

Hughlings Jackson, again a Yorkshireman, who was physician to the National and the London Hospitals has been described as the father of British Neurology [65]. He had a great capacity for detailed clinical observation combined with an intuitive and philosophical approach to the search for anatomical and physiological principles of nervous system function, an objective which he learned from Laycock in York [27]. He wrote extensively on many neurological disorders including for example epilepsy, paralysis and cortical localisation and disorders of movement and speech [66,67]. He had reservations about Broca’s precise localisation of speech, although he accepted, as did others, the common association of aphasia with right hemiparesis. He had a broader view of the faculty of language, separating it into intellectual and emotional, the former associated with the dominant left hemisphere, including but not confined to Broca’s area, and the latter with the right hemisphere [61].

Jackson drew upon the anatomical studies of Louis Pierre Gratiolet (1815–1865) who first separated the lobes of the brain into frontal, temporal, parietal, occipital and insular. Gratiolet was a colleague of Broca’s, director of anatomical studies and later Professor of Zoology in the Faculty of Science in Paris. His studies suggested that the left frontal lobe developed in advance of the right and the right posterior lobe in advance of the left. Jackson therefore suspected that the left frontal lobe was, in evolutionary terms, more educated and intellectual and the right posterior more emotionally advanced [64,68].

Although these diverging views of Broca and Jackson came to the fore in the 1868 meeting in Britain, it seems, as Lorch has carefully researched [61], that neither Broca nor Jackson attended each other’s lectures, which were on successive days and certainly there was no public debate between them.

As far as we know, Hughlings Jackson never travelled to Paris but he certainly met Charcot and his colleagues in London, especially at the 1881 London International Medical Congress. He was greatly admired by Charcot who kept a portrait of him in his office.

Finally, it is interesting to note that Gratiolet disagreed with Broca’s view that intelligence is related to the volume of the brain, but suspected that the number and complexity of the convolutions was more important [64].

### 3.5. Benjamin Ball, *English Professor of mental and brain diseases, Paris*

Benjamin Ball (1833–1893) is the least well known and yet one of the most intriguing of the neurologists or neuropsychiatrists in our story. Born in Naples of an English father and a Swiss mother, he spoke 7 languages. He studied medicine in Paris and was grounded in medicine as physician to the Laënnec Hospital and in the clinico-pathological method as a young assistant to Charcot. As both an Englishman and a French citizen, he rose to become with the support of Charcot and in opposition to candidates from the asylum system the first Professor of mental diseases and of the Encephalon in the Faculty of Medicine at Sainte-Anne'asylum in Paris (in French: "Professeur titulaire de la première chaire des maladies mentales et de l'encéphale à l'asile Sainte-Anne") from 1877 until his death in 1893 [69,70].

With Jules Bernard Luys (1828–1897), a colleague renowned in neuropsychiatry and anatomy, he founded the Journal, *L'Encéphale*, and he wrote and taught on an extensive range of neuropsychiatric and psychiatric topics, including his *Leçons sur les maladies mentales* [71]. At the 1881 International Medical Conference in London (vide infra), he presented a paper on psychiatric aspects of Parkinson's disease, including hallucinations, thus extending the spectrum of this disease. He subsequently published his cases together with some from his British colleagues [72]. He was a frequent visitor to meetings of the BMA in Britain and at one such meeting in Glasgow in 1888 he was awarded an Honorary Degree by Glasgow University.

### 3.6. Victor Horsley and the birth of British and French neurosurgery

Victor Horsley, surgeon, physiologist, social campaigner and politician is widely viewed as a founding father of neurosurgery [6,73–77]. As head of the scientific Brown Institute in London, he combined experimental physiology and neuroscience, especially cortical localisation, with his appointment as consultant surgeon to University College Hospital. In 1886 with a written testimonial from Charcot, he was the first neurosurgeon to be appointed to the National Hospital [6]. The testimonial confirms that Horsley had studied with Charcot in Paris in the autumn of 1885.

With the support of Jackson and Ferrier, Horsley presented the encouraging results of local cortical excision for focal epilepsy in 3 patients (later extended to 10) at the BMA meeting in 1886 in Brighton which was attended by Charcot, who commented: "British surgery was to be highly congratulated on the recent advances made in the surgery of the nervous system. Not only had English surgeons cut out tumours of the brain, but here was a case in which it was probable that epilepsy had been cured by operative measures" [78].

Although Horsley was not the first to remove a brain tumour, it is claimed he was the first to remove a spinal cord tumour in 1887 following his own experimental studies in animals [6,79]. Other first achievements included ligation of a carotid aneurysm, the transcranial approach to the pituitary gland, division of the trigeminal nerve root for trigeminal neuralgia, the curve skin flap and surface marking of the cerebral cortex.

Horsley travelled widely in Europe and was fluent in French. In 1909, he operated in Paris on the brain tumour of Edouard Brissaud (1852–1909), one of Charcot's pupils, as neurosurgery was not yet developed in France [80]. At that time, Joseph Babiński (1857–1932) asked to Thierry de Martel (1875–1940), a surgeon and friend, to operate with success on a brain tumour as the latter was assistant professor (in French: "chef de Clinique") of Pr. Paul Segond (1851–1912) at the Salpêtrière Hospital. Babiński then advised Thierry de Martel to specialise in neurosurgery and sent him in 1909–1910 to London to train under Horsley [81].

### 3.7. Fulgence Raymond and the *Entente Cordiale*

Fulgence Raymond (1844–1910) is perhaps best known as the successor of Charcot to the Chair of Diseases of the Nervous System at the Salpêtrière from 1894 to 1910. As a former pupil of Charcot, he continued the service and teaching traditions of his mentor, but his career was understandably overshadowed by the stature of his illustrious predecessor [4,82,83].

Raymond published and taught on a wide range of neurological and psychiatric subjects and his name is associated with a pontine syndrome [84,85]. He promoted and collaborated with Pierre Janet (1859–1947) on several psychoneuroses [86]. He was one of the 6 international patrons, including Hughlings Jackson, of the journal *Epilepsia* when it was founded in 1909.

Raymond was also interested in familial neurological diseases and he chose this subject when, as President of the French Section of the *Entente Cordiale Médicale*, he gave a lecture in 1908 to the Royal College of Physicians in London [87] and was presented with an Honorary Degree in Oxford the same year. He concluded his lecture by a warm "commemoration of many distinguished men who have worked in the field of English neurology". The *Entente Cordiale* was the famous diplomatic agreement between Britain and France in 1904 which fostered numerous cultural exchanges. In Medicine, the equivalent English President of the *Entente* was Sir Dyce Duckworth (1840–1928), physician to St. Bartholomew's Hospital, who lectured at the Faculty of Medicine in Paris earlier in 1908.

### 3.8. Alexander Bruce: Scottish participation

Alexander Bruce (1854–1911) was Scotland's first physician to practice primarily as a neurologist and in his case also as a neuropathologist.

As the best graduate in medicine in his year (1879) at Edinburgh University, he was awarded a scholarship to study in Vienna, Heidelberg, Frankfurt and Paris, where he was exposed to the French clinico-pathological method. He was also fortunate to work briefly as a clinical assistant at the excellent West Riding Lunatic Asylum in Wakefield, Yorkshire, where Bevan Lewis (1847–1929) further stimulated his interest in the microscopic anatomy of the nervous system [88].

In Edinburgh, he rose to become physician and pathologist to the Royal Infirmary, the Royal Hospital for Sick Children and Longmore Hospital for Incurables. His monographs on "Illustrations of mid and hind brain" [89] and "A topographical atlas of the spinal cord" [90] are now classics in neuroanatomy and neurology.

Bruce was fluent in French and German and maintained close links with Paris neurology and neuropathology, so much so that following the foundation of the *Société de neurologie de Paris* in 1899 [91], he was only the third British physician to be elected a Corresponding Member in 1900 after Jackson and Ferrier. Examples of his links with French neurology are his contribution to *Revue Neurologique* in 1896 on a special fascicule of the lateral zone of the spinal cord [92] and his presentations to the 13th International Medical Congress in Paris in 1900 and to a meeting of the *Société de neurologie de Paris* in 1905 [93] (vide *Infra*).

Bruce established in 1903 the journal “*Review of Neurology and Psychiatry*”, which he edited until his death in 1911 and which later became the precursor of the *Journal of Neurology and Psychopathology* founded by his assistant and son-in-law, Kinnier Wilson, whose French connections were also undoubtedly stimulated and encouraged by Alexander Bruce.

### 3.9. Kinnier Wilson’s French connections

Samuel Alexander Kinnier Wilson (1878–1937) is distinguished throughout the neurological world for the disease that bears his name [94–97] and for his scholarly and comprehensive two-volume Textbook [98]. He was fluent in French and as knowledgeable of the French medical literature as Charcot had been earlier of the English literature. From the beginning and throughout his career, he maintained close contact with French neurology [97,99,100].

Following medical graduation in Edinburgh, he first proceeded to Paris on a Carnegie Fellowship to study for a year (1903–1904) under Pierre Marie at the Bicêtre Hospital, resulting in several publications in *Revue Neurologique* in 1904 [97]. From Paris, he returned to his first junior appointment at the National Hospital in London, where he stayed for the rest of his career and became one of the outstanding neurologists of the first half of the 20th century, jointly at Queen Square and King’s College Hospital.

Kinnier Wilson obtained his MD at Edinburgh in 1911 with his famous thesis on hepatolenticular degeneration, which he first presented publicly in French to the *Société de neurologie de Paris* on January 25th 1912, where it was applauded by Pierre Marie, Jules Dejerine (1849–1917), Joseph Babiński and Henry Meige (1866–1940) among others [96,98,99]. Furthermore, this seminal work was published in abbreviated form in French in *Revue Neurologique* [94] one month before the full article on “Progressive lenticular degeneration, a familial nervous disease associated with liver cirrhosis” in *Brain* [95]. His studies of what is now called Wilson’s disease opened up the whole field of extrapyramidal disorders, a term that he introduced, in which he stressed the role of the basal ganglia in motility and of which he became the leading authority.

But Kinnier Wilson was fascinated by the whole field of neurology and psychiatry [101] and in 1920 he founded the *Journal of Neurology and Psychopathology*, now the *Journal of Neurology, Neurosurgery and Psychiatry*, of which he was editor until his death in 1937. Again like Charcot, he was interested in hysteria [102], including a review in *Brain* on “Some modern French conceptions of hysteria” [103] in which he disagreed with Babiński’s concept of “pithiatism” [102,103].

With his early French interactions, Kinnier Wilson was elected a Foreign Corresponding Member of the *Société de neurologie de Paris* in 1914. He was a frequent visitor to Paris maintaining friendly relations especially with Pierre Marie, Louis Edouard Octave Crouzon (1874–1938) and Georges Guillain (1876–1961) [97,99,100].

### 3.10. Elisabeth Garrett and Blanche Edwards

Interestingly, further links during the second half of the 19th century between British and French medicine and neurology involved two outstanding British women, Elizabeth Garrett (1836–1917) and Blanche Edwards (1858–1841).

Elizabeth Garrett was born in England and became the first woman to achieve the MD degree from the University of Paris [104]. The Faculty of Medicine tried to discourage her from studying medicine but she persevered and presented her medical thesis in 1870 with an exhaustive review on migraine. As quoted by a recent historical review, “she earned much applause from the public, which consisted of male students, and the overt appreciation of Paul Broca, head examiner, and Dr. Wurtz, the Dean of the Faculty of Medicine” [105]. She then returned to her native country and now the married Dr. Garrett Anderson became the first medically qualified woman in Britain. She is also famous for founding a Hospital for Women and the first Medical School for Women, now the Royal Free. She was moreover a social reformer, promoting the right of women to a professional occupation.

Blanche Edwards was born near Paris from a British father and a French mother [106]. She did her medical studies in Paris and was the first woman to pass the externship in 1882, the same year as another promising woman neurologist, the American Augusta Klumpke–Dejerine (1859–1927) [107]. Miss Edwards spent the 1884–1885 Academic year of externship at the Salpêtrière directly under Charcot’s supervision. She passed her MD thesis in 1889, entitled “on hemiplegia in certain neurological conditions: ataxia, multiple sclerosis, Parkinson’s disease and hysteria” [106]. She was congratulated by Charcot, president of the Jury. She published 11 articles in the field of neurology, notably on her use of suggestion to treat hysterical women at the Salpêtrière. Blanche Edwards is considered as the first woman neurologist with Augusta Klumpke–Dejerine. During her career, she also became distinguished in gynaecology and paediatrics in her private practice in Paris. She was moreover a woman’s rights activist. The right to compete for the position of extern in Paris Hospitals was obtained after a vigorous campaign led by her and her mother. Moreover, she was involved with Augusta Klumpke–Dejerine in the battle for the right to compete for the internship. Charcot had a personal pride in Blanche Edwards’s accomplishments, and supported the proposal for a full integration of women students into the medical field, although he claimed that certain medical duties remained difficult for a woman to fulfil [106].

### 3.11. International Congresses in London and Paris

Anglo-French neurological interactions were undoubtedly enriched by the expansion of international meetings as illustrated below.



3.11.1. *The 7th International Medical Congress, London, 1881*  
This was the largest and most glittering Medical Congress held so far with over 3000 delegates and 850 presentations [108–110]. It was opened in August 1881 by the Prince of Wales and his cousin, Crown Prince Frederick of Prussia, under the Presidency of Sir James Paget (1814–1899), surgeon to Queen Victoria and a friend of Charcot who had also written on hysteria [111].

The guests included nearly all the leading physicians, surgeons and scientists of that period. Among them were Virchow, Koch, Lister, Jenner, Pasteur, Treves, Klebs, Osler, von Langenbeck, Erb, Huxley, Owen, von Volkmann, Brown-Séquard, Hughlings Jackson, Ferrier, Gowers and not least, Charcot, for whom the Congress was a triumph and the apotheosis of his international career [4,34,110].

Charcot presented a demonstration and lecture of his studies since 1868 on “Arthropathic affections of locomotor ataxia” which was well received and acknowledged as a new disease, henceforth known as “Charcot’s Disease” or “Charcot’s Joints” [4,109,112,113]. At the Congress Banquet in Crystal Palace, a firework display included fire portraits of Paget, von Langenbeck and Charcot [4].

Another notable feature of the Congress was the debate and dispute between Friedrich Leopold Goltz (1834–1902) and David Ferrier on the subject of cortical localisation, which Goltz doubted. Ferrier presented a hemiparetic monkey in which the left motor cortex had been ablated 7 months earlier. At the sight of the limping monkey, Charcot is said to have exclaimed “C’est un malade !” (“It is a patient”) due to the resemblance of the baboon’s gait to the clinical signs seen in hemiplegia in humans [34]. Ferrier’s presentation stimulated and animated discussion on the use of vivisection. As quoted by Spillane, “at a dinner for foreign guests at the Star and Garter Hotel in Richmond, Charcot, responding for the guests, had some fun with the hypocrisy of the English – their fox-hunting and vivisection law” [114].

Hughlings Jackson also presented a paper on “Epileptiform convulsions from cerebral disease”. In the discussion which followed the international panel, which included Brown-Séquard, focal motor seizures with their specific march were referred to as “Jacksonian epilepsy”, as earlier proposed by Charcot [46].

3.11.2. *The 13th International Medical Congress, Paris, 1900*  
This Congress of more than 5000 delegates included for only the second time a Section of Neurology under the chairmanship of Fulgence Raymond held at the Sorbonne University. In addition to the presentations of the leading French and European neurological physicians at that time, British contributions included: David Ferrier on the diagnosis of organic and hysterical hemiplegia; Charles Sherrington (1857–1952) on the clinical relevance of tendon reflex examinations; and Alexander Bruce on non-tabetic lesions of the posterior columns of the spinal cord [115].

3.11.3. *Anglo-French neurological conference in Paris, 1905*

On May 11th 1905, a monthly meeting of the relatively new *Société de neurologie de Paris* at the Salpêtrière, founded in 1899, received for the first time a British delegation which included, among others, Charles E. Beevor (1854–1908), Alexander Bruce,

Byrom Bramwell (1847–1931), Frederick Mott (1853–1926), Kinnier Wilson and Thomas D. Savill (1857–1910). The latter was frequent author and foreign member of the editorial board of *Nouvelle iconographie de la Salpêtrière* since 1894. All were also guests at a special lunch at the Pavillon de l’Elysée [116]. At this meeting, Bruce presented a paper in French on “Distribution of the cells in the intermedio-lateral tract of the spinal cord” [93].

3.11.4. *The 17th International Medical Congress, London, 1913*

By now, the number of delegates had risen to over 5500 and included a Section on Neuropathology under the Presidency of David Ferrier with Frederick Eustace Batten (1865–1918) and Henry Head (1861–1940) as secretaries. The proceedings were extensively published in *Revue Neurologique* [117], edited by Alexandre Barré (1880–1967).

In addition to notable presentations from British and many other international leaders in pre-World War One neurology, Joseph Babiński, Auguste Tournay (1878–1969) and Max Rothmann (1868–1915) discussed cerebellar syndromes, for which Babiński received a standing ovation [117,118]. Jules Dejerine contributed to the session on motor aphasia, anarthria and apraxia. Both Horsley and his French pupil, Thierry de Martel participated in a session on neurosurgery where the Horsley–Clarke frame was demonstrated [117].

## 4. Discussion

After the early exchanges of Trousseau, Duchenne, Graves, Todd, Laycock and Allbutt among others, the discipline of neurology evolved rapidly in France and Britain from the early 1860’s with the almost simultaneous establishment of the Charcot School at the Salpêtrière and the National Hospital School in London. The early history of neurology was influenced to a large extent by these two complementary Schools. The Salpêtrière was a vast repository of unrecognised and unclassified neurological diseases, which facilitated the application of the French clinico-pathological method. The National Hospital was a new hospital attracting large numbers of both new and chronic patients which facilitated the study of the evolution and prognosis of common and rare diseases, especially paralysis and epilepsy. Although the Salpêtrière School was identified with and dominated by Charcot [41], the reputation of the National Hospital was built on the clinical skills of a series of early outstanding physicians, including Jackson, Russell Reynolds, Bastian, Gowers and Ferrier, who, with others later, established the Queen Square method of clinical evaluation [6]. The National Hospital was later in developing neuropathology and indeed was preceded by the West Riding Lunatic Asylum in Wakefield, due to the influence of Crichton-Browne, and also by Bruce in Edinburgh. On the other hand, London was ahead of Paris in developing neurosurgery due to the pioneering work of Horsley who accepted a French trainee and also operated in Paris.

From the start, as we have illustrated, there were numerous interactions between these two Schools, beginning with the appointment of Brown-Séquard as one of the first two physicians at the National Hospital in London. Coincidentally,

an Englishman, Ball, was the first Professor of mental and brain diseases in Paris. Charcot made numerous visits to England and Ireland. With his scholarly knowledge of the English literature, it was he who proposed the terms “Parkinson Disease” and “Jacksonian Epilepsy”. He, in his turn, was influenced by Laycock, Todd and Russell Reynolds in developing his famous studies of hysteria. His clinico-pathological discoveries and teaching attracted numerous British visitors to the Salpêtrière. Although we are not aware that Jackson ever visited Paris, he certainly met Charcot and his colleagues in London and influenced French thinking on several subjects including especially epilepsy, aphasia and cortical localisation.

The nearest example of a reciprocal scholarly British physician to Charcot was the later Kinnier Wilson with his fluency in French and German and his wide-ranging neurological interests. Following his early Fellowship with Pierre Marie in Paris, he continued his frequent contacts and visits in France throughout his career, even first giving a lecture in French in Paris on his famous studies on hepatolenticular degeneration (now Wilson’s Disease) before presentation or publication in England. His father-in-law, Bruce in Edinburgh, had earlier also established similar French links in neurology and neuropathology.

Anglo-French interactions in neurology were further developed as we have described by the International Medical Congresses in London in 1881 and 1913 and in Paris in 1900. By the time of the Paris 1900 and London 1913 Congresses, the progress of neurology and neuropathology as independent disciplines was reflected in special Congress Sections in which Anglo-French leadership and interaction was prominent.

Our review emphasises the constructive influence of the French and British Schools on each other and thus on the development of neurology. The French influence on the British School was primarily the establishment of the anatomoclinical method which was first promoted by Laënnec in general medicine in the early 19th century and later applied by Charcot at the Salpêtrière Hospital to the study of neurological disorders. Photographic illustrations were also highlighted by the French school, notably with the publication of important neurological articles in the journal *Nouvelle iconographie de la Salpêtrière*, then in *Revue Neurologique*. The British School influenced the French School with its rigorous clinical evaluation and scientific studies, especially in *Brain*, of newly recognised diseases and concepts by many outstanding physician-neurologists, but also by its early development of neurosurgery.

Finally, although the focus of this review is on Anglo-French interactions, especially the Salpêtrière and the National Hospital foundation stones, we are conscious of the considerable German and other European and Continental influences, including American, on the early development of neurology. The 19th and early 20th centuries were also marked by close French-US neurological links [50]. The 1913 London Congress was the last occasion for international medical dialogue and collaboration before it collapsed with the outbreak of World War One in 1914. However, Anglo-French neurological interactions continued in the military sphere during the Great War and were enhanced thereafter.

---

## Disclosure of interest

The authors declare that they have no competing interest.

---

## Fundings

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

---

## Acknowledgments

E.B thanks Dr. Olivier Walusinski for his helpful advice and Chantal Silarakis, library assistant of the Pierre Wertheimer neurological hospital, for literature search especially of old papers and books. E.H.R thanks Catherine Aggleton of Epsom Hospital library and Robert Greenwood of the Royal Society of Medicine library for much assistance with literature access.

---

## REFERENCES

- [1] Clarac F, Boller F. History of neurology in France. In: Finger S, Boller F, Tyler KL, editors. *Handbook of clinical neurology*, 95. Amsterdam: Elsevier; 2010. p. 629–56 [History of Neurology].
- [2] Clifford Rose F. An historical overview of British neurology. In: Finger S, Boller F, Tyler KL, editors. *Handbook of clinical neurology*, 95. Amsterdam: Elsevier; 2010. p. 613–28 [History of Neurology].
- [3] Clifford Rose F. *History of British neurology*. London: Imperial College Press; 2012, 315 pages.
- [4] Goetz C, Bonduelle M, Gelfand T. *Charcot, constructing neurology*. Oxford: Oxford University Press; 1995, 376 pages.
- [5] Broussolle E, Poirier J, Clarac F, Barbara JG. Figures and Institutions of the neurological sciences in Paris from 1800 to 1950. Part III: neurology. *Rev Neurol (Paris)* 2012;168:301–20.
- [6] Shorvon S, Compston A. *Queen Square: a history of the National Hospital and its Institute of Neurology*. Cambridge: Cambridge University Press; 2019.
- [7] Ackerknecht HE. *Medicine at the Paris Hospital 1794–1848*. Baltimore: The Johns Hopkins Press; 1967.
- [8] Sakula A. Laënnec’s influence on some British physicians in the 19th century. *J R Soc Med* 1981;74:759–67.
- [9] Bariéty M. Eloge d’Armand Trousseau (14 October 1801–23 June 1867). *Bull Acad Natl Med* 1967;151:627–35.
- [10] Pearce JM. Armand Trousseau – some of his contributions to neurology. *J Hist Neurosci* 2002;11(2):125–35.
- [11] Walusinski O. Armand Trousseau (1801–1867), a neurologist before neurology. *Rev Neurol (Paris)* 2020;176:531–42.
- [12] Trousseau A. *Clinique médicale de l’Hôtel-Dieu de Paris*. 2nd Edition, Paris: J.-B Baillière et fils; 1865, 851 pages.
- [13] Trousseau A. 3rd Edn, *Lectures on clinical medicine, delivered at the Hôtel-Dieu, Paris, 5, 3rd Edn* London: New Sydenham Society; 1872 [1868. Translated by Sir John Cormack].
- [14] Duchenne de Boulogne. *De l’électrisation localisée et de son application à la physiologie, à la pathologie et à la thérapeutique*. Paris: Baillière; 1855, 926 pages.

- [15] Duchenne de Boulogne GA. Physiologie des mouvements démontrée à l'aide de l'expérimentation électrique et de l'observation clinique et applicable à l'étude des paralysies et déformations. Paris: Baillière; 1867, 872 pages.
- [16] Reynolds EH, Broussolle E. Allbutt of Leeds and Duchenne de Boulogne: newly discovered insights on Duchenne by a British neuropsychiatrist. *Rev Neurol (Paris)* 2018;174:308–12.
- [17] Allbutt TC. Remarks on the phenomena of locomotor ataxy. *Brit Med J* 1869;1:157–9.
- [18] Reynolds EH, Todd, Hughlings Jackson, and the electrical basis of epilepsy. *Lancet* 2001;358:573–7.
- [19] Reynolds EH, Todd, Faraday, and the electrical basis of brain activity. *Lancet Neurol* 2004;3:557–63.
- [20] Reynolds EH. Jackson, Todd and the concept of “discharge” in epilepsy. *Epilepsia* 2007;48:2016–22.
- [21] Todd RB. Clinical lectures on paralysis, disease of the brain and other affections of the nervous system. London: J Churchill; 1854, 311 pages.
- [22] Binder DK, Rajneesh KF, Lee DJ, Reynolds EH. Robert Bentley Todd's contribution to cell theory and the neuron doctrine. *J Hist Neurosci* 2011;20:123–34.
- [23] Todd RB. Cyclopaedia of anatomy and physiology. London: Longmans, Brown, Green, Longmans, Roberts, 1835–1859.
- [24] James FE. Thomas Laycock, psychiatry and neurology. *Hist Psychiatry* 1998;9(36):491–502.
- [25] Pearce JMS. Historical note. Thomas Laycock (1812–1876). *J Neurol Neurosurg Psychiatry* 2002;73:303.
- [26] Laycock T. On the reflex function of the brain. *Br Foreign Med Rev* 1845;19:298–311.
- [27] Reynolds EH. John Hughlings Jackson and Thomas Laycock: brain and mind. *Brain* 2020;143(2):711–4.
- [28] Pearce JMS, Lees AJ. Yorkshire's influence on the foundation of British neurology. *J Neurol Neurosurg Psychiatry* 2013;84:6–9.
- [29] Rollin HR, Reynolds EH. Yorkshire's influence on the understanding and treatment of mental diseases in Victorian Britain: the golden triad of York, Wakefield, and Leeds. *J Hist Neurosci* 2018;27:72–84.
- [30] Rolleston HD. The right honourable Sir Thomas Clifford Allbutt: a memoir. London: Macmillan and Company limited; 1929, 314 pages.
- [31] Taylor S. Robert Graves; the golden years of Irish medicine. London: Royal Soc Med Press Limited; 1989 1–160.
- [32] Graves RJ. Leçons de clinique médicale. Précédées d'une introduction de M le Professeur Trousseau. Ouvrage traduit et annoté par le Docteur Jaccoud, 1 and 2. Paris: Adrien Delahaye; 1862. 738 pages.
- [33] Chomel A-F. De l'épidémie actuellement régnante à Paris. *J Hebd Med* 1828;1:331–8.
- [34] Spillane JD. The Doctrine of the nerves: chapters in the history of neurology. Oxford: Oxford University Press; 1981 467 pages.
- [35] Stokes W. Studies in physiology and medicine by the late Robert James Graves. The life and labours of Robert James Graves. London: John Churchill; 1863, 428 pages.
- [36] Darwin C. The expression of emotions in man and in animals. London–Murrey; 1872 [Reproduced by the Folio Society, London, 2008].
- [37] Poirier J, Clarac F, Barbara JG, Broussolle E. Figures and institutions of the neurological sciences in Paris from 1800–1950. Part IV. Psychiatry and psychology. *Rev Neurol (Paris)* 2012;168:389–402.
- [38] Nunn TW. La Salpêtrière, Paris (cases under the care of Professor Charcot). *Lancet* 1871;1:117–8.
- [39] Goetz C. Jean-Martin Charcot (1825–1893). *J Neurol* 2005;252:374–5.
- [40] Anon. Obituary Professor Charcot. *Brit Med J* 1893;2:495–6.
- [41] Gelfand T. Charcot médecin international. *Rev Neurol (Paris)* 1994;150:517–23.
- [42] Lyons JB. George Sigerson: Charcot's translator. *J Hist Neurosci* 1997;6:50–60.
- [43] Charcot JM. Clinical Lectures on the diseases of the spinal cord by Professor Charcot. Symptomatology of lateral amyotrophic sclerosis. *Lancet* 1874;2:73–4 [149–50].
- [44] Charcot JM. A lecture on rhythmical hysteric chorea. *Brit Med J* 1878;1:224–5 [251–53].
- [45] Charcot JM. An account of a demonstration on the phenomena of hysteria-epilepsy. *Brit Med J* 1878;2:545–8.
- [46] Charcot JM, Pitres A. Contribution à l'étude des localisations dans l'écorce des hémisphères du cerveau. Observations relatives aux paralysies et aux convulsions d'origine corticale. *Rev Mens Med Chir* 1877;1:1–18 [113–23,180–95,357–76,437–57].
- [47] Charcot JM, Richer P. On a muscular phenomenon observed in hysteria and analogous to the “paradoxical connection”. *Brain* 1885;8:289–94.
- [48] Goody W. Dr. C.E. Brown-Séquard, M.D., F.R.C.P., F.R.S. London: the casting of the Die. *J Hist Neurosci* 1996;5:7–13.
- [49] Aminoff MJ. The life and legacy of Brown-Séquard. *Brain* 2017;140:1525–32.
- [50] Boller F, Caputi N, Romano A, Kaminski H, Broussolle E. Transatlantic Crossings. Early neurological exchanges between USA and France. *Rev Neurol (Paris)* 2019;175(5):291–7.
- [51] Greenblatt S. The major influences on the early life and work of John Hughlings Jackson. *Bull Hist Medicine* 1965;39:346–76.
- [52] Signoret JL. Une leçon clinique à la Salpêtrière (1887) par André Brouillet. *Rev Neurol (Paris)* 1983;139:687–701.
- [53] Anonymous. Death of Professor Charcot. *Lancet* 1893;2:446.
- [54] Hierons R. Charcot and his visits to Britain. *Brit Med J* 1993;307:1589–91.
- [55] Russell Reynolds J. Certain forms of paralysis depending on idea. *Brit Med J* 1869;2:378–9 [483–5].
- [56] Russell Reynolds J. Hemi-anesthesia in the clinique of Professor Charcot. *Lancet* 1877;1:678–80 [787–8].
- [57] Gamgee A. An account of a demonstration on the phenomena of hystero-epilepsy and on the modification which they undergo under the influence of magnets and solenoids; given by Professor Charcot at The Salpêtrière. *Brit Med J* 1878;2:545–8.
- [58] Bonduelle M, Laplane D. The French connection. In: Clifford Rose F, editor. A short History of neurology: the British contribution 1660–1910. Oxford: Butterworth Heinemann; 1999. p. 226–36.
- [59] Anon. Annual Meeting of the British Medical Association. *Brit Med J* 1878;2:217–20.
- [60] Joynt RJ. Paul Pierre Broca: his contribution to the knowledge of aphasia. *Cortex* 1964;1:206–13.
- [61] Lorch MP. The merest Logomachy: the 1868 Norwich discussion of aphasia by Hughlings Jackson and Broca. *Brain* 2008;131:1658–70.
- [62] Clarac F, Barbara JG, Broussolle E, Poirier J. Figures and Institutions of the neurological sciences in Paris from 1800 to 1950. Introduction and Part I: neuroanatomy. *Rev Neurol (Paris)* 2012;168:2–14.
- [63] Broca P. Remarques sur le siège de la faculté du langage articulé, suivie d'une observation d'aphémie (perte de la parole). *Bull Soc Anat Paris* 1861;36:330–7.
- [64] Pearce JMS. Louis Pierre Gratiolet (1815–1865). The cerebral lobes and fissures. *Eur Neurol* 2006;56:262–4.
- [65] Critchley M, Critchley EA. John Hughlings Jackson: father of English neurology. New York, Oxford: Oxford University Press; 1998, 215 pages.

- [66] Taylor J, Holmes G, Walshe FRM, editors. Selected writings of John Hughlings Jackson. Vols. 1 and 2. London: Hodder & Stoughton, 1931–1932.
- [67] York GK, Steinberg DA. An introduction to the life and work of John Hughlings Jackson with a catalogue raisonné of his writings. Medical history Supplement, 26. London: Professional & Scientific Publications; 2006. 165 pages.
- [68] Trimble MR. The intentional brain. Baltimore: Johns Hopkins University Press; 2016: 120–1.
- [69] Anon. Obituary Benjamin Ball. *Brit Med J* 1893;1:613–4.
- [70] Bogousslavsky J, Moulin T. Birth of modern psychiatry and the death of alienism: the legacy of Jean-Martin Charcot. In: Bogousslavsky J (ed): following Charcot: a forgotten history of neurology and psychiatry. *Front Neurol Neurosci* 2011;29:1–8 [Basel: Karger].
- [71] Ball B. Leçons sur les maladies mentales. 2nd édition, Paris: Asselin et Houzeau; 1890, 1050 pages.
- [72] Ball B. De l'insanité dans la paralysie agitante. *Encephale* 1882;2:22–32.
- [73] Paget S. Sir Victor Horsley: a study of his life and work. London: Constable and Company; 1919, 358 pages.
- [74] MacNalty A. Sir Victor Horsley: his life and work. *Brit Med J* 1957;1:910–6.
- [75] Jefferson G. Sir Victor Horsley, 1857–1916. Centenary lecture. *Brit Med J* 1957;2:903–10.
- [76] Lyons JB. The citizen surgeon: a life of Sir Victor Horsley. London: Downey; 1966, 305 pages.
- [77] Tan T-C, McL P. Black, Sir Victor Horsley (1857–1916): pioneer of neurological surgery. *Neurosurgery* 2002;50:607–12.
- [78] Horsley V. Brain surgery. *Brit Med J* 1886;2:670.
- [79] Gowers WG, Horsley V. A case of tumour of the spinal cord. Removal, recovery. *Trans Royal Med Chirurg Soc* 1888;53:377–428.
- [80] Poirier J. Edouard Brissaud (1852–1909). *J Neurol* 2011;258:951–2.
- [81] Tournay A. Allocution à propos du décès de M. Thierry de Martel. *Rev Neurol (Paris)* 1939–1940;705–11.
- [82] Satran R. Fulgence Raymond, the successor of Charcot. *Bull NY Acad Med* 1974;50(8):931–42.
- [83] Walusinski O. Fulgence Raymond (1844–1910), regrettably forgotten successor of Jean-Martin Charcot. *Clin Transl Neurosci* 2019. <http://dx.doi.org/10.1177/2514183X19880387>.
- [84] Raymond F, Cestan R. Trois observations de paralysie des mouvements associés des globes oculaires. *Rev Neurol (Paris)* 1901;9:70–7.
- [85] Silverman IA, Liu GT, Volpe NJ, Galetta SL. The crossed paralyses. The original brain-stem syndromes of Millard–Gubler, Foville, Weber, and Raymond–Cestan. *Arch Neurol* 1995;52:635–8.
- [86] Janet P, Raymond F. Névroses et idées fixes. Paris: F Alcan; 1898, 559 pages.
- [87] Raymond F. The relationship of the so-called family diseases to a premature physiological senescence localised to certain systems and considered with special reference to the nervous system. *Lancet* 1908;1:1859–62.
- [88] Anon. Obituary Dr. Alexander Bruce. *Nature* 1911;86:524.
- [89] Bruce A. Illustration of mid and hind brain. London and Edinburgh: Young J Pentland; 1892[51 pages + 27 full pages color plates with descriptive annotations].
- [90] Bruce A. A topographical atlas of the spinal cord. London: Williams & Norgate; 1901.
- [91] Bonduelle M. Histoire de la Société française de neurologie: 1899–1974. *Rev Neurol (Paris)* 1999;155:785–801.
- [92] Bruce A. D'un faisceau spécial de la zone latérale de la moelle épinière. *Rev Neurol (Paris)* 1896;4:698–738.
- [93] Bruce A. À propos de la distribution des cellules de la Colonne Intermédio-Latérale dans la région dorsale de la moëlle. *Rev Neurol (Paris)* 1905;13:543.
- [94] Wilson SAK. Dégénération lenticulaire progressive. Maladie nerveuse familiale associée à la cirrhose du foie. *Rev Neurol (Paris)* 1912;23:229–34.
- [95] Wilson SAK. Progressive lenticular degeneration: a familial nervous disease associated with cirrhosis of the liver. *Brain* 1912;34:295–509.
- [96] Walshe JM. History of Wilson's disease 1912–2000. *Mov Disord* 2006;21:142–7.
- [97] Broussolle E, Trocello J-M, Woimant F, Lachaux A, Quinn N. Samuel Alexander Kinnier Wilson. Wilson's disease, Queen Square and neurology. *Rev Neurol (Paris)* 2013;169:927–35.
- [98] Wilson SAK. *Neurology*, 2 volumes. London: Edward Arnold; 1940.
- [99] Reynolds EH. Kinnier Wilson and Anglo-French Neurology in the early 20th Century. *World Neurology*; 2014: 1–2.
- [100] Reynolds EH. Kinnier Wilson's French connections. *Rev Neurol (Paris)* 2015;171:81–3.
- [101] Kennedy F. Samuel Alexander Dr. Kinnier Wilson, MD, D, Sc, FRCP. *Arch Neurol Psychiatry* 1937;38:388–9.
- [102] Reynolds EH. Kinnier Wilson on hysteria: a missing chapter? *J Neurol Neurosurg Psychiatry* 2012;83(4):464–5.
- [103] Wilson SAK. Some modern French conceptions of hysteria. *Brain* 1910;33:293–338.
- [104] Furbee L. Elisabeth Garrett Anderson. *JAMA* 1966;195:503.
- [105] Wilkinson M, Isler H. The pioneer woman's view of migraine: Elisabeth Garrett Anderson's thesis "Sur la migraine". *Cephalalgia* 1999;19:3–15.
- [106] Goetz CG. Charcot and the myth of misogyny. *Neurology* 1999;52:1678–86.
- [107] Berhoune NN, Thobois S, Gobert F, Campean L, Broussolle E. Augusta Dejerine-Klumpke (1859–1927): an extraordinary neurologist and an inspiration for all women in medical careers. *Pediatr Neurol* 2014;50(6):547–8.
- [108] Billings JS. International medical congress. *Brit Med J* 1881;2:262–8.
- [109] MacCormac W, Klockmann JW. Transaction of the International Medical Congress: seventh session held in London. August 2–9 1881, 4. London: Ballantyne, Hanson & Co; 1881.
- [110] Sakula A. Baroness Burdett–Coutts' garden party: the international Medical Congress, London, 1881. *Med Hist* 1982;26:183–90.
- [111] Paget J. Nervous mimicry of organic diseases. *Lancet* 1873;2:511–3 [547–9,619–21].
- [112] Charcot JM. Sur quelques arthropathies qui paraissent dépendre d'une lésion du cerveau ou de la moelle épinière. *Arch Physiol Norm Pathol* 1868;1:161–78.
- [113] Hawkes J. Charcot's disease. *Lancet* 1884;2:1166–7.
- [114] Spillane JD. A memorable decade in the history of neurology 1874–84-I. *Br Med J* 1974;2:701–6.
- [115] Anon. XIII<sup>e</sup> Congrès international de médecine, Paris, 2–9 août 1900. Section de neurologie, 2<sup>e</sup> Congrès international de neurologie. *Rev Neurol (Paris)* 1900;8:640–99 [704–17].
- [116] Société de neurologie de Paris. Séance du 11 mai 1905. *Rev Neurol (Paris)* 1905;13:541.
- [117] Société de neurologie de Paris. XVII<sup>e</sup> Congrès international de médecine de Londres (6–12 août 1913). *Rev Neurol (Paris)* 1913;2:305–90 [807–810].
- [118] Babinski J, Tournay A. Premier rapport; symptômes des maladies du cervelet. *Rev Neurol (Paris)* 1913;26:306–22.