

# Neuroliterature: David Ferrier (1843-1928)

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**Conflict of Interest Statement:**  
None declared.

**Provenance and Peer Review:** Submitted and reviewed internally.

**Date First Submitted:** 28/5/2023  
**Acceptance Date:** 9/6/2023

**To cite:** Larner AJ. "Neuroliterature: David Ferrier (1843-1928)." *Adv Clin Neurosci Rehabil* 2023;21(2):20-22 <https://doi.org/10.47795/AFY11968>

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## Introduction

However great their achievements in clinical neurology and investigative neuroscience, however loud their acclamation by their peers, few if any neurologists become sufficiently famous (or infamous) to impinge on the wider public consciousness, certainly not to the point of becoming subjects for comment in popular fiction.

The only example that initially springs to my mind is the "Penfield mood organ" described in Philip K. Dick's (1968) novel *Do androids dream of electric sheep?* (on which the 1982 film *Blade Runner*, a very different cultural artefact, was based), which is surely a reference to Wilder Penfield (1891-1976), whose work stimulating the cortex of awake epilepsy patients undergoing surgery allowed him to map the functions of various regions of the brain [1]. In contrast, I am aware of three literary works which either mention by name [2], or respond to the experimental work of [3], David Ferrier (1843-1928), perhaps Penfield's ultimate precursor in the field of brain stimulation studies.

## Background

David Ferrier (Figure 1) first came to prominence in the medical profession as a consequence of his experimental studies commenced in 1873 at the West Riding Pauper Lunatic Asylum in Wakefield, West Yorkshire [4,5]. Using faradic current to stimulate points on the cerebral cortex of various animals, he was able to evoke predictable motor

responses from certain locations, emphasising the complex goal-directed nature of the movements observed. Lesions of the same regions produced corresponding motor deficits. In his experimental studies, Ferrier was explicitly seeking to provide support for the clinical inferences on cortical localisation made by John Hughlings Jackson (1835-1911).

Ferrier's "initial publications caused an immediate sensation [6]" as did his experimental demonstrations at meetings of the British Medical Association and the British Association for the Advancement of Science in 1873. By the middle of the year, he had extended his work to monkeys, these findings later presented at the Royal Society in 1874 and 1875. His studies resulted in a monograph, *The functions of the brain*, published in 1876, and in that year he was elected a Fellow of the Royal Society.

Experimental studies such as those of Ferrier had been one of the factors prompting the development of a vocal anti-vivisection movement in the latter half of the 19th century [7]. Lobbying, particularly by the group known as the Victoria Street Society, in which Frances Power Cobbe (1822-1904) was a prominent member, lead to the passing of the Cruelty to Animals Act in 1876, requiring experimenters to hold a licence issued by the Home Office in order to perform their investigations. The founding of the Physiological Society in 1876, with Ferrier one of the initial members [8], was at least in part a response to this possible threat to the continued practice of experimental animal studies.

Despite Ferrier's findings, the issue of cortical localisation (motor centres) was still disputed by some, a matter which came to a head in a debate held at the International Medical Congress in London in August 1881. The German physiologist Friedrich Goltz (1834-1902) demonstrated dogs without motor weakness despite what he claimed was complete destruction of the cerebral cortices, whereas Ferrier demonstrated a monkey rendered hemiplegic by a focal experimental brain lesion. Ferrier had previously been critical of, if not frankly scathing about, Goltz's experimental method ("fatal objections") in his Gulstonian Lectures of March 1878 on *The localisation of cerebral disease* delivered at the Royal College of Physicians [9]. Subsequent independent neuroanatomical studies of the experimental animals of both researchers indicated that Goltz's lesions were not as extensive as he had imagined, and hence the argument for localisation presented by Ferrier proved the scientific victor [10,11]. However, it was

this public demonstration which formed the basis for Ferrier's subsequent prosecution, instigated by the anti-vivisectionists, under the Cruelty to Animals Act 1876, charged with not having an appropriate licence for performing such experiments.

The issue became a public and professional cause célèbre, the British Medical Association paying Ferrier's legal fees and its lawyers representing him in court. Commentary on the trial and its ramifications appeared not only in the medical and scientific journals but also in the national and international press. Ferrier was acquitted when it became known that his colleague at King's College London, Gerald Yeo, had performed the surgery for which he had the appropriate licence under the Act [12].

No doubt it was this legal entanglement which brought Ferrier sufficiently within the public gaze to prompt his appearance [2], and/or the thematic use of vivisection [3], in works of literature, some of which have subsequently been cast as "retrials" [3] of Ferrier. (Spoiler alert: In the following discussion of these three works, some plot details are made explicit.)

## Wilkie Collins: *Heart and Science: A story of the present time* (1883) [13]

Written shortly after Ferrier's prosecution (the subtitle is surely significant in this respect), this work has been generally acknowledged to be as much a protest against vivisection as a novel [2,3], although personally I find it has a pantomimic, sub-Wildean, comedic charm to it. It is known that Collins was a personal friend of Frances Power Cobbe, one of the chief anti-vivisection activists, and she is thanked in the first of the two prefaces to the novel.

Ferrier is specifically referenced in the second preface, addressed "To Readers in Particular":

*... a supposed discovery in connection with brain disease, which occupies a place of importance [in the novel], is not (as you may suspect) the fantastic product of the author's imagination. Finding his materials everywhere, he has even contrived to make use of Professor Ferrier – writing on the "Localisation of Cerebral Disease," and closing a confession of the present result of post-mortem examination of brains in these words: "We cannot even be sure, whether many of the changes discovered are the cause or the result of the Disease, or whether the two are the conjoint results of a common cause." Plenty of elbow room here for the spirit of discovery.*

“ One of the characters in the novel, Dr Nathan Benjulia, an Oxford graduate, conducts experiments on monkeys and dogs in his laboratory, which has no windows and a skylight with a white blind inside, to try to understand a brain disease (not specified). In her analysis of the novel, Laura Otis has likened Benjulia’s “tickling” of the spine of one of the female characters, ten-year old Zo (Zoe), in which he claims he touches the cervical plexus (Chapter XII), to Ferrier’s brain-mapping experiments, arguing that the correlation between a nervous stimulus and a specific movement in both instances suggests that Collins did read Ferrier’s work [3].



Figure 1: David Ferrier. Source: Wellcome Collection (<https://wellcomecollection.org/works/cqps5h8w>) Public Domain Mark (PDM) terms and conditions <https://creativecommons.org/publicdomain/mark/1.0>

The source of the quotation, not specified in Collins’s text, is from Ferrier’s Gulstonian Lectures of 1878 [14]. It appears again, in the text of the novel, near its climax, ascribed to a “celebrated physiologist” (Chapter LIX), a fair description of Ferrier by 1883.

One of the characters in the novel, Dr Nathan Benjulia, an Oxford graduate, conducts experiments on monkeys and dogs in his laboratory, which has no windows and a skylight with a white blind inside, to try to understand a brain disease (not specified). In her analysis of the novel, Laura Otis has likened Benjulia’s “tickling” of the spine of one of the female characters, ten-year old Zo (Zoe), in which he claims he touches the cervical plexus (Chapter XII), to Ferrier’s brain-mapping experiments, arguing that the correlation between a nervous stimulus and a specific movement in both instances suggests that Collins did read Ferrier’s work [3]. But, as we all know, correlation is not causation and personally I am doubtful that Collins was able to engage in any depth with Ferrier’s scientific publications rather than with the reports of them in the popular press or in anti-vivisectionist propaganda. However, Benjulia does later admit that when vivisectioning a sick monkey, obtained from the zoological gardens, he thought of the child when hearing the animal’s cries of suffering (Chapter XXXII).

Otis argues that the novel reiterates the central questions of Ferrier’s trial, particularly the question of who is to police the performance of experimental scientific work [3]. Jessica Straley has seen the novel as Collins’s reflection on the connection between scientific and literary practices, both potentially shocking and sensationalist [15]

**HG. Wells: *The island of Doctor Moreau* (1896) [16]**

Although Ferrier is not mentioned by name in Wells’s novella, it has been argued that this work invokes Ferrier’s research and that, like Collins, Wells enacts a “retrial” of Ferrier [3]. Certainly Wells had some scientific education, some of his teaching coming from Thomas Henry Huxley (1825-1895) in the mid-1880s at the School of Science in South Kensington (viii). It is possible that, somewhat earlier,

around 1872, Ferrier was one of the demonstrators in Huxley’s classes at South Kensington [17].

The title character of the novel is a vivisector, working in isolation on a volcanic island located somewhere in the Pacific Ocean. The locked enclosure where he performs his experiments is described as a “laboratory” (97,105). Moreau explains to the shipwreck survivor, Edward Prendick, the novel’s apparent narrator, that he is committed to the “study of the plasticity of living forms” (71). Taking a gorilla, he had operated to make his “first man”, finding that “it was chiefly the brain that needed moulding” (76). The resulting chimerical experimental forms, the “Beast-Folk,” inhabit the island.

Prendick’s disappearance is dated to 1887-8 (5-6), and whilst Moreau dates his work back 20 years (77) he and his associates have been on the island for only about ten or eleven years (11,19,75,106), when they were “howled out of the country [England]”. This chronology indicates that they left London around 1876, late enough to know of Ferrier’s initial publications but prior to his prosecution.

Having some scientific training himself, indeed with Huxley (29), Prendick is not unsympathetic to experimental science, yet he is revolted by the programme pursued on the island: “Had Moreau had any intelligible object I could have sympathized at least a little with him” (95).

**Bram Stoker: *Dracula* (1897) [18]**

Few novels can have achieved the cultural reach of Bram Stoker’s fin-de-siecle novel, so no recapitulation of the plot is necessary here. However, a perhaps less well-remembered allusion occurs in the following passage:

*Men sneered at vivisection, and yet look at its results today! Why not advance science in its most difficult and vital aspect – the knowledge of the brain? Had I even the secret of one such mind – did I hold the key to the fancy of even one lunatic – I might advance my own branch of science to a pitch compared with which Burdon-Sanderson’s [sic, with hyphen; incorrect] physiology or Ferrier’s brain-knowledge would be as nothing (80).*

The quotation purports to be from the diary of

Dr John Seward, a clinician who, aged twenty-nine, has a lunatic asylum “all under his own care” (63). This location may be significant in view of the fact that Ferrier’s original publications were, as mentioned, based on experimental researches performed at an asylum, the West Riding Pauper Lunatic Asylum, where laboratory space and experimental animals had been provided for him by Dr James Crichton-Browne, appointed asylum superintendent at the age of twenty-five [4,5]. Seward himself does not perform any animal experimentation in the novel, and his studies of the zoophagous patient, Renfield, seem unresolved.

The passage cited is also quoted (with ellipsis) as one of the chapter epigraphs in Terrie Romano’s book on John Burdon Sanderson (1828-1905) (sic, no hyphen; correct) [19], the nineteenth century physiologist and administrator who may have been one of Ferrier’s early supporters. It may be the case that he encouraged Ferrier to move to London in 1870 [20], and that Ferrier worked for or with him at the Brown Animal Sanatory Institution in London in the early 1870s. Certainly Burdon Sanderson communicated Ferrier’s papers on cerebral stimulation in monkeys to the Royal Society in 1874 and 1875 (as Ferrier was not then FRS) and the initial meeting of what was to become the Physiological Society was held in his house in London in 1876.

In the notes to both the Penguin Classics edition and the Oxford World’s Classics edition of *Dracula*, Burdon Sanderson’s inappropriate hyphen is repeated, but more worryingly Oxford World’s Classics misdates Ferrier’s birth as 1847, rather than 1843 [21], and even more astonishingly Penguin Classics interprets “Ferrier” as James Frederick Ferrier (1808-1864), a Scottish

metaphysician (444). From the context alone this attribution cannot be correct. Furthermore, even if there were any doubt, a later incident in the book surely confirms the reference to be to David Ferrier. The asylum patient Renfield is found collapsed in his cell with a right-sided paralysis (although he can still deliver an eloquent monologue, pertinent to the plot!):

*The real injury was a depressed fracture of the skull, extending right up through the motor area. ... "The whole motor area seems affected. The suffusion of the brain will increase quickly, so we must trephine at once or it may be too late."* (294)

The concept of a "motor area" in the brain relates directly to the clinical work of Hughlings Jackson and the experimental work of Ferrier. Stoker had written to his older brother, Thornley

Stoker (1845-1912), an anatomist and surgeon who from 1876 held the chair of anatomy at the Royal College of Surgeons in Ireland, for information on the effects of skull injury and his notes for Dracula include a detailed response with a sketch of a man's head indicating the various effects of damage to different parts of the skull (451).

It may be noted that another neurologist is also mentioned in Dracula: Jean-Martin Charcot (1825-93). Seward accepts that Charcot has proved hypnotism "pretty well" (204), and its repeated use later becomes an important plot element in the pursuit of Count Dracula. With respect to Charcot, Ferrier dedicated his 1878 book of the Gulstonian lectures to him, and probably encountered him at the 1881 International Medical Congress in London,

where the hemiplegic monkey demonstrated by Ferrier apparently provoked from Charcot the comment "C'est un malade!"

### Discussion

Ferrier's work, and more particularly its reception in lay as opposed to professional circles and discourses, influenced at least three writers in the later nineteenth century. Wilkie Collins was vigorously opposed to vivisection; Wells was tentatively in favour. Pedlar argues that Stoker is equivocal about science [2]. Then, as now, vivisection and "vivisectionists" remain emotive subjects, calling forth responses not only from within but also from outside their particular fields of scientific study.

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