# *Introduction: cerebral localization and the late-Victorian Gothic romance*

In Bram Stoker's *Dracula* (1897), madhouse superintendent Dr. John Seward lauds the work of two prominent physiologists who advanced the study of neuroscience by experimenting on live animals:

> 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 physiology or Ferrier's brain-knowledge would be as nothing.[1]

Critics have tended to overlook this passage, and perhaps understandably so – on the surface, neurological experiments seemingly have little to do with vampires, crucifixes, and the other supernatural mysteries at the heart of Stoker's novel. But in fact, a series of neurological experiments that began in the 1860s and 1870s – conducted by Sir David Ferrier, among others – had a profound impact on late-Victorian Gothic novels and romances such as *Dracula*. In turn, these novels often influenced the direction of future neurological research. This seemingly unlikely, symbiotic relationship between *fin-de-siècle* neurology and certain kinds of popular fiction extends to matters of form as well as content. In this study, I show how late-Victorian neurologists and authors of Gothic romances shared a fascination for boundaries and their transgression, especially the evanescent mind–body divide and the limits of human free will. These shared philosophical concerns help to explain the surprising number of brains, brain cells, and neurological references in late-Victorian Gothic novels and romances. At the same time, novelists did not simply accept a neurological perspective. Instead, through their snarled plotlines and depictions of tormented subjectivity, Gothic romances often criticized the objective, linear viewpoint of late-Victorian neurological science, not to mention its sometimes rigid biological determinism.

The late-Victorian and Edwardian periods witnessed watershed developments in neurological science, particularly the cerebral localization experiments of scientists such as David Ferrier and John Hughlings Jackson in England, Paul Broca in France, and Gustav Fritsch and Eduard Hitzig in Germany. These experiments began in earnest in 1861, when Broca linked the third frontal convolution of the left brain hemisphere to linguistic ability. Broca had found that speech difficulties such as aphasia frequently occurred after damage to this particular portion of the brain.[2] Following Broca's lead, other scientists attempted to establish that discrete sections of the brain regulate specific mental and physical functions. In the late 1860s, for instance, Jackson traced certain defects of memory to lesions of the posterior part of the right hemisphere, hypothesizing that the right hemisphere was involved in spatial perception.[3]

Jackson and Broca had relied primarily on autopsies and clinical case studies to arrive at their discoveries. By contrast, during the 1870s, scientists performed experimental surgeries on a variety of laboratory animals in an effort to localize cerebral functions more precisely. For example, Prussian scientists Fritsch and Hitzig operated on numerous dogs (sometimes without anesthesia) in order to determine that muscular movements were controlled by the motor cortex of the brain.[4] In the process, they also proved that the substance of the brain was electrically excitable, a possibility denied by previous scientists.[5] Building on these experiments, Scottish physician Ferrier exposed and electrically stimulated the brains of cats, dogs, rabbits, and monkeys. By exciting various regions of these animal brains and observing the results, then extrapolating these results to corresponding areas of the human cerebral cortex, Ferrier produced elegant cortical maps detailing which areas of the brain controlled specific functions.

The medical benefits of these discoveries became apparent almost immediately. For instance, Ferrier's detailed cortical maps saved lives by helping surgeons locate brain tumors and hemorrhages without first opening up the skull.[6] Cerebral localization experiments incited controversy, however, because they challenged the possibility of free will or an extra-corporeal soul. Indeed, ever since René Descartes contended that the soul resides in the pineal gland of the brain, attempts to correlate specific regions of the brain with particular functions have raised theological hackles. Late-Victorian debates surrounding cerebral localization resonated far beyond the professional scientific community, infiltrating the popular press and popular literature.

*Popular Fiction and Brain Science in the Late Nineteenth Century* explores the seemingly paradoxical fact that British popular novelists – those associated with commercially successful genres such as the romance, the Gothic novel, and the "shilling shocker" – were often exceptionally well informed about neurological theories and their philosophical ramifications, more so than many respected practitioners of realism. This book examines the works of scientifically savvy popular novelists including Robert Louis Stevenson, Bram Stoker, H. G. Wells, Grant Allen, and Marie Corelli, some of the most financially successful and culturally influential authors of their time. Their fictions collectively demonstrate how popular developments like the late-Victorian romance revival and the simultaneous revival of the Gothic expressed the deep-seated fears spawned by cerebral localization. Furthermore, these novels shaped scientific thought and influenced public opinion toward neurological innovations.

The question this volume addresses is why certain novelists proved more responsive to (though hardly uncritical of) neurological theories than others. Specifically, why did Gothic romances like Robert Louis Stevenson's *Strange Case of Dr. Jekyll and Mr. Hyde* (1886), Bram Stoker's *Dracula* (1897), and H. G. Wells's *The War of the Worlds* (1898) probe the implications of cerebral localization experiments more often and more deeply than "serious" literary genres like the realist novel? In the course of addressing this query, I hope to problematize the frequently acknowledged identification between Victorian literary realism and scientific discourse. George Levine, for instance, asserts that "the epistemology that lay behind realism was empiricist, with its tendency to value immediate experience."[7] He further suggests that realism was "a method consonant with empirical science in that it was exploratory rather than definitive," implying that the realist novel itself could serve as a scientific experiment of sorts.[8] Lawrence Rothfield, meanwhile, has argued that realist authors and nineteenth-century scientists shared a common commitment to mimetic representation. In Rothfield's words, novels like George Eliot's *Middlemarch* (1871–2) approach medical objectivity with their "eschewing of supernatural explanation," "appeal to scientific standards of truth," and "reliance on empirical detail."[9]

The omniscient third-person narration present in many realist novels likewise resembles the objective, scientific detachment of Victorian medical writing. The realist narrator can even be likened to a physician who takes account of characters' "symptomatic" behaviors as part of a detailed character study.[10] Émile Zola, for example, memorably compared the

methods of the "experimental" novelist to those of French physiologist Claude Bernard: "This dream of the physiologist and the experimental doctor is also that of the novelist, who employs the experimental method in his study of man as a simple individual and as a social animal."[11] The realist or naturalist author, Zola implied, must "dissect piece by piece" the characters described in his fiction in order to show how heredity and environment determine their actions.[12]

Recent scholarship focusing specifically on the intersections between Victorian physiological psychology and literature has likewise tended to focus on high realist fiction at the expense of genres with less academic prestige, including Gothic novels and romances. For instance, Rick Rylance's impressive *Victorian Psychology and British Culture, 1850–1880* (2000) provides valuable insight into the associationist theories of Alexander Bain, Herbert Spencer, and George Henry Lewes. But when Rylance relates these theories to Victorian literature, he focuses almost exclusively on the work of George Eliot, due to his "respect for her way of dramatizing multiple perspectives."[13]

Similarly, Nicholas Dames's recent study, *The Physiology of the Novel: Reading, Neural Science, and the Form of Victorian Fiction* (2007), performs a valuable service by drawing attention to a previously overlooked strand in Victorian novel criticism. Dames relates how authors like G. H. Lewes, E. S. Dallas, and Alexander Bain examined readers' physiological responses to a novel's pacing, temporal rhythms, and affective qualities. These brain-based reader response theories privileged metaphors of "sound rather than sight" and musical analogies, frequently "borrowing the terms ('movement,' 'theme') of symphonic composition."[14] Dames's work reveals that the recent trend of cognitive literary criticism is not without precedent, and might correctly be viewed as a continuation of an earlier strand of Victorian novel theory. Although the theories Dames describes could reasonably be applied to any novelistic genre, his examples (like Rylance's) are drawn primarily from the canon of high realist fiction, including Eliot's *Daniel Deronda* (1876) and William Makepeace Thackeray's *Vanity Fair* (1847–8).[15]

These recent studies have contributed much to our understanding of Victorian novels by illuminating how medical writing and realist fiction utilize complementary modes of representation. By choosing to focus on realism, however, critics have left the affinities between Victorian physiological psychology and other popular novelistic genres relatively underexplored. In this study, I argue that late-Victorian Gothic novels and romances possessed unique advantages in grappling with certain scientific

subjects, specifically, the study of brain structure and function. In so doing, I build upon the work of several recent critics who discuss the role of science in nineteenth-century popular fiction. For instance, Julia Reid has argued that discourses on evolution and degeneration influenced the development of late-Victorian romances, especially those of Robert Louis Stevenson, while Kelly Hurley and Robert Mighall have explored convergences between the Gothic and *fin-de-siècle* discourses on evolution, anthropology, and sexology.[16] Dames and Jenny Bourne Taylor, meanwhile, have discussed readers' physiological responses to mid-Victorian sensation novels, a genre closely related to the Gothic in that both share convoluted plots and a general atmosphere of mystery.[17] However, no one has yet inquired why the late-Victorian Gothic novel and the romance might be ideal mediums for exploring specifically neurological quandaries, particularly the controversies surrounding cerebral localization.

To cite only two examples of this overlap between the neurological and the Gothic, I will turn briefly to the writings of Robert Louis Stevenson and Bram Stoker, the subjects of Chapters 1 and 2, respectively. Both authors received scientific training and later penned famous Gothic romances that hinged upon specific developments in cerebral localization. Stevenson, who briefly studied engineering before deciding upon a literary career, loosely based *Strange Case of Dr. Jekyll and Mr. Hyde* on two famous French case studies of dual personality whose "double lives" were widely discussed in French and British periodicals. In the late nineteenth century, cases of dual personality were often attributed to bilateral brain hemisphere asymmetry. Victorian physiologists like Henry Holland, Arthur Wigan, and Charles Édouard Brown-Séquard argued that if one brain hemisphere were larger than the other, madness and criminality could result. Moral depravity and intellectual regression stemmed from an oversized right brain hemisphere, which supposedly housed primitive instincts and emotions (in stark contrast to the highly evolved left brain). While Jekyll demonstrates rational, civilized, left-brain tendencies, his double, Hyde, exhibits atavistic traits and base passions characteristic of right-brain dominance. In physiological terms, then, Dr. Jekyll is guilty of allowing his right-brain tendencies to overwhelm his more highly evolved left-brain functions.

Bram Stoker, meanwhile, came from a family of successful physicians and obtained a master's degree in science from Trinity College, Dublin.[18] His famous Gothic romance, *Dracula*, contains references to prominent Victorian physiologists such as Ferrier and Burdon-Sanderson, not to mention Jean-Martin Charcot and William Carpenter. Moreover, Stoker's

manuscript notes for *Dracula* demonstrate that he sought medical advice on head injuries from his brother, distinguished physician Sir William Thornley Stoker, then president of the Royal College of Surgeons in Ireland. This advice was used to lend clinical accuracy to the death scene of the insect-eating madman, Renfield.

It should come as no surprise, therefore, that *Dracula* tackles some of the thorniest issues raised by cerebral localization debates. Stoker's famous vampire and his minions exhibit semi-conscious, trance-like behaviors that owe much to late-Victorian interest in cerebral automatism and unconscious cerebration. According to localizationists, semi-conscious reflex behaviors such as Lucy's sleepwalking, Dracula's daytime hibernation, and Mina's clairvoyant trances could be traced back to the brain stem. The horror of Stoker's *Dracula* proceeds not just from the Count's repellent vampirism, but also from the looming threat that human beings might be soulless machines governed solely by physiological impulses.

Educated readers of Stoker and Stevenson often saw past the monstrous and supernatural aspects of their tales and grasped the science upon which they were based. These literary works even influenced late-Victorian scientific discourse. For instance, Stevenson's fictional "case" colored scientific work on multiple personality disorder written during the 1880s and 1890s by psychical researcher Frederic Myers and Scottish psychiatrist Lewis Bruce.[19] These examples demonstrate that physicians, scientists, and experts in what we would now call pseudosciences were acutely responsive to literary authors.[20] Rather than a one-way exchange of information between science and literature, Victorian intellectual culture permitted a dialogic or circular conversation in which scientific researchers and literary authors were mutually responsive to one another.

## NEUROLOGY AND THE GOTHIC

Both the Gothic novel and the romance are highly contested genres about which much has been written in the last several decades. As Ian Duncan explains, critics over the last fifty years have applied the label "romance" to many different things, including (but not limited to): "a courtly or chivalric fiction of the late Middle Ages, a fanciful or erotic sentimental enhancement of a situation or event, any unlikely story, highly conventionalized mass-market novels read by women, a narrative with a quest in it, four of the last plays of Shakespeare."[21] The word "Gothic," meanwhile, was used in the eighteenth century to denote Teutonic origins, and also to suggest the medieval or barbaric. Since then, the term has been applied

to an architectural style, an aesthetic, a mode, and a poetics, as well as to a literary genre.

In this volume, I will refer to both the romance and the Gothic novel as distinct literary genres, while acknowledging their frequent overlap. When used in a literary context, the label "Gothic" usually applies to a type of popular fiction that flourished between the 1760s and 1820s, beginning with Horace Walpole's *The Castle of Otranto* (1764) and culminating in the suspenseful narratives of Ann Radcliffe. These novels were typically set in gloomy castles or remote convents with labyrinthine passageways, sliding panels, and hidden dungeons; their thematic elements generally included a pervasive atmosphere of darkness and gloom, a complex and attractive villain, supernatural events, and an emphasis on the ancestral past. In terms of form, these novels often featured convoluted or fragmentary narrative structures, which served to augment the reader's pleasurable suspense.[22] While some critics apply the term "Gothic" only to novels written in late-eighteenth- and early-nineteenth-century Britain, others have expanded its application to the horror fiction of other nations and time periods, including "American Gothic" fiction by Edgar Allan Poe and Nathaniel Hawthorne, along with late-Victorian works such as *Dracula* and *Jekyll and Hyde*. These late-Victorian Gothic fictions share many thematic and formal traits with their Romantic-era forebears, but tend to place greater emphasis on monsters (vampires, mummies, etc.) and on contemporary scientific discourses, particularly those relating to evolution and degeneration.

The romance, meanwhile, is a literary genre concerned with the long ago and far away, and with artifice and idealism rather than mimesis. Critics have frequently suggested that the romance has a special relationship with the ancestral past, as befits the genre's distant origins in twelfth-century tales of chivalry and courtly love.[23] In the eighteenth century, the term "romance" was appropriated by writers of Gothic fiction like Walpole and Radcliffe, who wished to signal the distance between their fictions and the commonplace, everyday world of their readers. Yet the romance remained a less prestigious and distinctly feminized genre during the eighteenth century, partly due to its association with Radcliffe. In the early nineteenth century, Walter Scott helped to remasculinize and legitimize the romance with tales of adventure such as *Waverley* (1814) and *Ivanhoe* (1819).[24] By the time of the romance revival of the 1880s and 1890s, writers like Stevenson, H. Rider Haggard, and Andrew Lang conceived of the romance as a distinctly masculine form whose artistry rivaled that of the realist novel.[25]

The above histories suggest how, well before the late-Victorian period, the boundaries of the Gothic and the romance had already begun to blur. Even high realist novels have moments of Gothic mystery: take, for instance, the "dream-like strangeness" of Dorothea's honeymoon in *Middlemarch*, or the catastrophic, highly implausible flood that concludes Eliot's *The Mill on the Floss* (1860).[26] Moreover, hybrid fictions like those of Walpole and Radcliffe introduced new issues of terminology. Some critics call such works "Gothic romances," while others suggest that this phrase is redundant, since the Gothic is arguably a subset of the romance.[27] Still others use the terms "Gothic" and "romance" almost interchangeably, ignoring the important differences between the two genres (such as the idealistic, utopian tendencies of the romance). In this study, I often apply the label "Gothic romance" to works that seem to fit both generic categories. For instance, *Jekyll and Hyde* or *The Island of Doctor Moreau* (1896) might be referred to as Gothic romances, but not Corelli's *A Romance of Two Worlds* (1886), which is notably free from Gothic elements.

These generic boundary lines become even more difficult to assess in late-Victorian and Edwardian fiction, despite – or perhaps because of – the resurgent popularity of Gothic novels and romances during this time. Sensational tales of adventure and horror proliferated between 1880 and 1914, due to shifting artistic tastes and sweeping social changes. Scholars of Victorian fiction continue to debate the usefulness of the label "Gothic" as applied to this body of literature. Nicholas Daly points out, for instance, that Victorians themselves did not use this term. Instead, they referred to works like *Dracula* and *Jekyll and Hyde* simply as "romances." Nevertheless, Daly concedes that a novel like *Dracula* shares numerous formal and thematic elements with Radcliffe's *The Mysteries of Udolpho* (1794).[28] At the other extreme, several critics have vastly expanded the range of late-Victorian fiction to which we might apply the "Gothic" label.[29]

In *Popular Fiction and Brain Science in the Late Nineteenth Century*, I will explore how certain formal and thematic conventions of the Gothic and romance genres mesh surprisingly well with a certain non-evolutionary strand of Victorian scientific thinking. When previous scholars have explored resonances between late-Victorian science, the romance, and the Gothic, they have tended to focus on those branches of science most closely associated with evolution, such as degeneration theory, criminology, anthropology, sexology, evolutionary psychology, and so forth. Cases in point include Hurley's *The Gothic Body: Sexuality, Materialism, and Degeneration at the* Fin de Siècle (1996), Mighall's *A Geography of*

*Victorian Gothic Fiction: Mapping History's Nightmares* (1999), and Julia Reid's *Robert Louis Stevenson, Science, and the* Fin de Siècle (2006).

By focusing specifically on neurology in relation to Gothic novels and romances, *Popular Fiction and Brain Science in the Late Nineteenth Century* positions itself somewhere between the social science or "soft science" milieu of these earlier studies and the more prestigious "hard sciences," like physics and astronomy, whose practitioners communicated primarily via mathematics rather than vernacular languages. According to Alice Jenkins, the nineteenth century was the period in which "hard" versus "soft" sciences came to be defined against one another, with hard sciences like physics offering a promise of mathematical rigor to which other sciences aspired.[30] Neurology took part in this larger development in scientific discourse, even if it did not (and still does not) fall neatly on either side of the hard versus soft divide. During the second half of the nineteenth century, neurologists increasingly incorporated mathematics, charts, graphs, and specialized jargon in their articles and books, making them less accessible to laypeople. This was especially true after 1891, when Santiago Ramón y Cajal's neuron doctrine took hold in Europe. Thereafter, localizationists increasingly debated what occurred in the brain at the cellular level, investigating matters of anatomy, cell biology, and microscopic electrical and chemical reactions.

At the same time, Victorian neurologists were well aware that their work reflected on broader issues that were not so easy to quantify, particularly those relating to biological determinism. Implicitly or explicitly, neurological research posed the following questions: what is the role of the will or soul in human action? Where does strictly physiological activity leave off, and a higher power take over? When does a human being resemble a machine more than a self-determining organism? These questions put pressure upon the boundaries between human and divine, human and animal, human and machine. Boundaries (and their transgression) likewise hold a central place in Gothic fiction from Walpole onward, as numerous critics have elucidated. Eugenia DeLamotte argues that eighteenth-century Gothic romances generated terror by violating "the boundaries of the self," often by means of "transgression[s] against the body, the last barrier protecting self from other."[31] Similarly, Stephen Bruhm demonstrates how Romantic-era Gothic fiction emphasized the limits of the body's endurance, as well as the boundary between self and other that is invoked when we witness or read about another person's pain.[32] The late-Victorian Gothic romances examined here test a different, very specific set of limits, the most important of which may be

the boundary between voluntary and reflex action. When this boundary becomes unclear – as when Jekyll changes spontaneously into Hyde, or when Dracula's victims feel instinctive attraction to the loathsome vampire – the novel's characters experience affective responses ranging from fear and anger to a sense of betrayal or abandonment by God.

Many Victorians experienced these same emotions upon first encountering cerebral localization research. In fact, if a scientific discourse can be said to have a mood or tone, late-Victorian neurology could justly be characterized as a Gothic science. This statement might seem to jar with the widespread perception that science is unemotional or impartial. Mighall observes, for instance, that "horror fiction has a generic obligation to evoke fear or suggest mystery," whereas "science … attempts to contain fear and offer a rational explanation for all phenomena."[33] This remark seems applicable to some Gothic romances, like *Dracula*, where an authorial pose of scientific objectivity allows the reader to approach horrifying supernatural subjects with relative calm.

But Mighall's commentary overlooks the disturbing, Gothic undertone of some late-Victorian science. For instance, *fin-de-siècle* degeneration theories, which derived indirectly from Darwinian evolutionary thought, heralded an imminent biological apocalypse that would culminate in the extinction of mankind.[34] Victorian sexologists, meanwhile, defined normal sexual functioning against the backdrop of numerous perversions, including Richard von Krafft-Ebing's concept of the *Lustmord* or "Lust Murder" (in which killing replaces the sexual act).[35] As these examples suggest, Gothic novels drew some of their horrifying elements directly from contemporary science. Such fictions served both to aggravate and alleviate anxieties generated by nineteenth-century biology, evolutionary theory, sexology, and criminal anthropology, as Hurley has explained.[36] The combined impact of these scientific discourses destabilized prevailing ideas about what it meant to be human.

One might easily add neurology – specifically, cerebral localization theories – to the list of *fin-de-siècle* scientific discourses that undermined a sense of a stable human identity. By suggesting that certain parts of the brain controlled specific emotions and behaviors, localizationists contradicted the popular belief in a unified soul or mind governing human action, thus narrowing possibilities for human agency. Even within the scientific community, controversy brewed regarding this seemingly mechanistic view of the mind. In 1846, French physiologist Jean Pierre Marie Flourens argued that pinpointing the cerebral origin of movements and thoughts apparently "undermin[ed] the unity of the soul, human