Victorian Network

Volume 2, Number 1
Summer 2010

Victorian Literature and Science

Volume 2, Number 1
Summer 2010

www.victoriannetwork.org

Victorian Network is funded by the Arts and Humanities Research Council and supported by King's College London.

TABLE OF CONTENTS

INTRODUCTION: VICTORIAN LITERATURE AND SCIENCE

Ian Henderson
(King's College London)

On 5 April 2010 the *New York Times* sponsored a debate in its online pages: 'Can "Neuro Lit Crit" Save the Humanities?'.[1] The question rose from an earlier article in the same paper on the 'Next Big Thing in English' (31 March 2010), outlining work by (among others) Professor Linda Zunshine (University of Kentucky) which merges eighteenth-century literary studies and evolutionary psychology, referencing Professor Elaine Scarry's seminars on 'Cognitive Psychology and the Arts' at Harvard, and highlighting a project at Yale led by Emeritus Professor Michael Holquist which uses MRI scans to explore the mental functioning involved in reading complex texts. Behind these projects, it was claimed, there was recognition that

> science not only offers unexpected insights into individual texts, but that it may help to answer fundamental questions about literature's very existence: Why do we read fiction? Why do we care so passionately about nonexistent characters? What underlying mental processes are activated when we read?[2]

Science, apparently, could also 'prove' the advantages for cognitive development of reading literature (part of its 'saving' function; it makes literary study 'relevant' to mental health) and there followed the startling suggestion that literary history might make manifest psychological evolution in humans.

Naturally the framing of the article and subsequent question for debate prompted critical responses, but also a stimulating defence from Professor Holquist, asserting literary-scientific research looks 'beyond our balkanized academic departments':

> This is an exhilarating way of conceiving our subject. It connects us to our past in philology, and leads to a future enabled by recent breakthroughs in digitization and brain science. While we make the

1'Room for Debate: Can "Neuro Lit Crit" Save the Humanities?', *New York Times* blog, 5 April 2010,http://roomfordebate.blogs.nytimes.com/2010/04/05/can-neuro-lit-crit-save-the-humanities/?pagemode=print&scp=4&sq=literature%20and%20science&st=cse, accessed 28 April 2010.
2 Patricia Cohen, 'Next Big Thing in English: Knowing They Know That You Know', *New York Times*, 31 March 2010, http://www.nytimes.com/2010/04/01/books/01lit.html, accessed 28 April 2010.

> traditional assumption that language is thought, in light of exciting new discoveries, we are now able to see more clearly the seminal importance of the activities of reading and writing for thought in general. Complexity in literacy provides cognitive value added. Understanding the truth of this better is not just another 'next big thing'. Unlike some of the more inaccessible theories that have swept through the Humanities, this focus on trying better to grasp what it is that we do when we read works having advanced levels of intricacy is the kind of study that reaches out to a wider community. It is an intellectual goal that has real life implications for the future of our society as a whole.

There are three points in this statement I would like to explore by way of introducing this collection of essays on 'Victorian Literature and Science': the apparent connection between past and present approaches to literature enabled by contemporary literary-science; the contrast between literary-science and literary theory in terms of accessibility; and the assertion of literary-scientific criticism's relevance to a 'wider community' ('real life implications for the future of our society as a whole').

Indeed, it seems to me research in Victorian literature and science counteracts somewhat reactionary assertions about contemporary literary science in three important ways. Firstly, it reminds us that we have been here before: the Victorians also posed 'fundamental questions about literature's very existence' using scientific methods. Nicholas Dames, for example, in *The Physiology of the Novel: reading, neural science, and the form of Victorian fiction* (2007), discusses the impact of the Victorian physiology of the senses on the work of a 'coterie' of Victorian literary critics who interested themselves in the specificities of how reading affected the body, and how literary art might make use of scientific knowledge better to manipulate or even to discipline corporeal response as it unfolds in response to the stimulations of text.[3] 'Neuro lit crit', then, is not so much new as a revival that warrants attention to its Victorian precedent.

Secondly, moreover, here is a precedent which did not shy away from contemporary theories, even where they opposed its principles. This contrasts the paradigm operating in the statement above which suggests present-day literary-scientific research enables a recovery of previously defunct philological and formalist

3 Nicholas Dames, *The Physiology of the Novel: Reading, Neural Science, and the Form of Victorian Fiction* (Oxford: Oxford University Press, 2007). The 'coterie' include 'G. H. Lewes, Alexander Bain, E. S. Dallas, Geraldine Jewsbury, and Vernon Lee'. Dames, *Physiology*, p.2. Dames describes these as 'physiological novel theorists' whose critical tradition rose in the 1850s and 1860s but yielded by the mid to late 1890s to post-Jamesian formalism. Dames, *Physiology*, pp.39-40. Dames also explores the application of these 'theories' in the work of his focus authors (William Thackeray, George Eliot, George Meredith and George Gissing), literary 'examples of self-conscious *response* to physiological novel theory's areas of concern'. Dames, *Physiology*, p.13 (original emphasis).

approaches to literary studies by recognizing them as precursors, precursors that unfortunately failed for want of true interdisciplinarity and the latest brain scanning equipment. The implication is, what is more, that this failure (i) allowed literary theory to usurp 'scientific' approaches to literature, leading to a dark age of inaccessibility, and (ii) that by engaging with the more technologically advanced science of today, we can take up again where the precursors left off. In other words 'neuro lit crit' spans—and enables us to overlook—the theory wars.

This Renaissance paradigm is belied by the innovative, not reactionary, stance of literary science's Victorian precedent. The Victorians' was not a bridge between a supposedly 'progressive' scientific present and a defunct religio-humanist past but one that understood the entanglement *per se* of contemporary scientific and religio-literary 'theories' to express modernity. For nineteenth-century 'scientists' were, for the most part, raised in faith, and were deeply aware of church doctrine, not least because of contemporary (highly 'relevant') controversies about dissenting and Tractarian beliefs and practices. They were cognisant of discursive 'theories' from both science and religion. Indeed literary *and* scientific writers *and* readers shared, before the nineteenth century, the same principles with which both also struggled during it. The sharing can be illuminated by Holquist's useful observation that 'Reading and writing is [sic] to humanists what nature is to physicists'.[4] Prior to the materialist challenge to Christian belief, reading the human word grew out of interpretation of God's, and aspired to—if it necessarily failed to accomplish—the communion offered by divining The Word. Correspondingly, the study of nature was the elucidation of God's works. To take only one example (expediently because I know it), Bernardin de Saint-Pierre's *Études de la nature* (1784-88)—acclaimed if outdated even on release—had asserted closely observed moments of 'harmony' in nature (where opposites were resolved, such as in gentle breezes) were moments when the perfection of Eden re-emerged, and whereby those with sensibility might find themselves in communion with God. A similar principle, more rationally described, later underpinned nineteenth-century natural theology (as discussed by Kate Holterhoff in this collection). Phenomena in the book, and in the book of nature, therefore pointed readers backwards to Creation, forwards to the Kingdom of God, and, in the present, always already upwards. When the function of indicating the divine in reading nature and the book was removed, a crisis ensued for both Victorian literature and science.

And yet literary theory represents literary studies' own continued grappling with the implications of materialism: how does literature 'work' without a God? What is the point of such work? If it is an arbitrary social construct, how precisely are its hierarchies upheld? Why have they endured? To remove such questions, and the work of those that attempted to answer them, from the story of literature's and science's re-

4 'Can "Neuro Lit Crit" Save the Humanities?'

convergence, is to disregard what literary scholarship has discovered in the time of its apparent separation, to make this new body of knowledge irrelevant to the 'next big thing'—science—which, it seems, alone can make literary studies relevant by demonstrating the reading of literature's 'real life implications for the future of our society as a whole'. Society as a whole, then, seems to have replaced God as that which the study of literature must answer to; and science alone can lend it 'impact' there. Yet it is precisely by overlooking twentieth-century literary theory that we both forego those insights into the paradoxes of making meaning that illuminate the social and historic contingency of scientific writing, and give up those aspects of literary studies that chime with the counterintuitive concepts underpinning contemporary physics: by overlooking theory we give up the key (and undoubtedly difficult, 'inaccessible') principles that the disciplines continued to share while divorced. No wonder, in this view, literary studies looks like a lame duck rather than a conversant on equal footing with science. The Victorians never saw it that way.

In fact, last year's bicentenary of the birth of Charles Darwin (and sesquicentenary of the publication of *On the Origin of Species by Means of Natural Selection*) reminded us that science's struggle with Creationism is still with us. One does not even have to be embroiled in religious argument for 'Victorian' debates to seem relevant: a sense that nature represents 'vestiges of creation' underpins some branches of environmentalism. But the difference between twenty-first- and nineteenth-century controversies about Darwin's theory is that neither the complexity of the scientific case for evolution nor of various Christian approaches to the origins of species are as well known. Victorian literary studies can articulate that distinction and go some way to explaining the persistence of anti-evolutionary thinking. Thirdly, then, research in Victorian literature and science reminds us of what precisely is at issue in the entanglement of disciplines, and thereby enables us confidently (like the Victorians) to assert—rather than distractedly to try 'proving'—the absolute relevance of the (in truth, never-ending) dialogue between literary studies (including theory) and science.

The literary critical engagement with Victorian scientific writing has become familiar practice in Victorian studies at least since Gillian Beer's seminal work *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction* (1983). Its relevance to my own research came much later. I must admit to being surprised to have found myself in 2007 ensconced in London's Wellcome Library reading Hermann von Helmoltz's *Handbook of Physiological Optics* (1856, 1860, 1866), an endpoint for a research trajectory that had taken me from Australian colonial literary culture, through British representations of the Australasian colonies to Victorian visual science and the late nineteenth-century science of reading. As well as Victorian literary studies' engagement with Victorian psychology (pioneered by the work of Jenny Bourne Taylor), the already well populated field of studies in Victorian visuality also proved increasingly relevant to

my work. From that personal odyssey it is tempting to acknowledge a general trend. Self-centred though that may be, again it would be a mistake, nonetheless, to figure the scientific turn in Victorian studies as a turning away from theory. If anything it is literary theory that has enabled such an engagement with a broader range of contexts.

What pleases me about the present collection is that outstanding postgraduate research now begins with self-evident familiarity with Victorian scientific principles and their relevance to literary history, as well as grounding in what theory has taught us over the last half century. The work in this collection assumes that melding of primary research in Victorian science and the theoretically informed perspectives of twenty-first century literary studies. What excites me is that such a foundation sets the scene for an admittedly more challenging engagement with the work of Victorian science's descendants: today's biologists, neuroscientists, geneticists and others. Our challenge in Victorian Studies, then, is to take our cognisance of literary theory and relatively new interest in historic science as we train ourselves to speak the technical language of contemporary science, to help make our research relevant to scientists who are quite a worthy enough component of that 'whole society' to warrant the attention.

*

Darwin is a natural focal point for any present-day literary engagement with Victorian science. But in the mêlée of his 200th anniversary, one of his key works, *The Descent of Man*, has been neglected, not least for the moral discomfort it brings modern readers: if postcolonialism provides insight here it also demands we confront the fact that Darwin the future's hero was also a man of his time. Kate Holterhoff in this collection goes some way towards righting the balance, with an insightful discussion of the meaning of 'beauty' in Darwin's 1871 work, while highlighting the difficult intersection of Darwin's use of the term and cultural assumptions about gender and race underpinning his work. Meanwhile, bringing museology to bear upon the work of Darwin and Ralph Waldo Emerson, Lauren F. Klein reveals some of the principles of inquiry shared by these otherwise divergent writers. If Darwin's sheer literariness makes him as attractive a scientist to literary scholars of the nineteenth century as Freud is to critics of later periods, Lewis Carroll must be the nineteenth century's most beloved writer of literature for scientists of many domains. The temptation for mathematicians, logicians, physicists and other scientists to play in *Wonderland* and *Through the Looking Glass*, rendered almost irresistible by Martin Gardner's *The Annotated Alice* (1960), is renewed by Joanna Shawn Brigid O'Leary's enticing revelations about Carroll's awareness of, and toying with, the discoveries of Victorian chemistry. These illuminate, at the same time as they are conditioned by, the variegated commentary on reflection she explores in Carroll's Looking-glass world. From chemistry to geology, E. E. Snyder outlines the impact for Tennyson of that field which first challenged Creationism in an article which also elucidates different

interpretations within geological discourse of how present formations came to be as they are. Kanarakis Yannis confirms the pervasiveness of science's influence in the nineteenth century by articulating Walter Pater's debts to its rhetoric: even the aesthete would figure himself a scientist.

It has been an honour to be tangentially involved with the editing of this collection. Allow me to end by thanking the hard-working editorial team—Katharina Boehm, Sarah Crofton, Rosalyn Gregory, Tammy Ho Lai-Ming, Ceri Hunter, Matt Kerr and William Tattersdill—for their handling of that delicate and time-consuming process. Broad though 'Victorian Literature and Science' as a theme appears, it is a title that belies both the true range and the multivocal nature of the work represented here.

THE 'EMERSON MUSEUM' AND THE DARWIN EXHIBIT: OBSERVATION, CLASSIFICATION AND DISPLAY IN THE EARLY WORKS OF RALPH WALDO EMERSON AND CHARLES DARWIN

Lauren F. Klein
(The Graduate Center, City University of New York)

Abstract

This article builds on the work of Lee Rust Brown, whose *Emerson Museum* (Harvard UP, 1997) established the museum as a model through which Ralph Waldo Emerson's writings could be approached and explained. Taking into account both nineteenth-century curatorial practices and present-day museum theory, I expand Brown's model to include the specific curatorial practices of observation, classification, and display. I show how Emerson and his British contemporary, Charles Darwin, drew upon these practices in their thoughts and in their writings. I demonstrate how both men employed the techniques of observation and classification as their primary means of analysis, and how, in recording their results, they followed similar paths of display—private thought to printed notebook, printed notebook to published page.

While most critics place Emerson and Darwin on opposite sides of a humanistic/scientific divide, I contend that the Emersonian and Darwinian conceptions of the natural world converge in their mutual understanding of that world as fluid and evolving, not static and fixed, and in their attention to the fundamental relationships between organisms and their environments. While Emerson and Darwin, undeniably, reached different conclusions, my article shows how their shared methodological approach, deeply influenced by contemporaneous ideas about museum display, results, in both cases, in a narrative that links natural order and language. I argue that the works of Emerson and Darwin can each be understood in terms of a process of translation between nature and language, one in which hidden relations are revealed over time.

I also bring to light Darwin's ambivalence about the museum as a method of conveying information and ideas to the public. By contrasting Darwin's concerns about the limitations of museum display with Emerson's wholehearted embrace of the curatorial practices of the time, I show how Darwin arrives at his decision to describe the process of evolution by natural selection in the form of a book. I conclude that only with the underlying concept of the museum in his mind, and with an awareness of its limits, was Darwin able to embrace language as the tool that would allow him to fill in the gaps between his own observation and classification of the natural world and the resultant display of his evolutionary theory.

In November 2005, a major exhibit on Charles Darwin (1809-1882) opened at the American Museum of Natural History in New York City. Prior to the opening, Michael Novacek, the curator of the museum's Division of Palaeontology, guided reporters through the exhibition. In front of a case displaying Darwin's magnifying glass, Novacek paused to explain 'It's a very simple instrument. We want people to

get the sense that he defined biology, and yet he used very simple tools'.[1] The next month, my own visit to the museum confirmed this perception. At the exhibit's entrance, next to a cage of live Galapagos Finches, a placard proclaimed Darwin the foremost 'observer of nature'. As the hall merged into a room of fossils and skeletons, I noticed in the bottom right corner of each enclosure the words 'Looking Closely' in large red type, and prominently positioned, a small, handheld magnifying glass.[2]

Certainly Charles Darwin looked closely at the elements of life. In 1831, at the age of 22, Darwin embarked on a round-the-world voyage aboard the *HMS Beagle*. Employed as the ship's naturalist, Darwin spent over five years observing life in remote parts of the world, collecting a vast array of specimens, and recording his ideas and impressions in a series of notebooks and journals. These writings, edited and rearranged, were published first in 1839, and again in 1845, as the volume now titled *Voyage of the Beagle*.[3]

In 1833, while Darwin was in the midst of his journey, Ralph Waldo Emerson (1802-1882) set sail for Europe, suffering a crisis of religious faith and, in addition, seeking consolation for the death of his first wife. On 13 July of that year, Darwin in Montevideo prepared crates of specimens to be sent back aboard a mail ship, where he hoped they would reside in the 'largest & most central collection' of England.[4] Simultaneously, Emerson in Paris paid his celebrated visit to the famed natural history museum at the *Jardin des Plantes*. While Darwin dried plant clippings, preserved animal samples and cleaned and labelled fossils and rocks, Emerson explored the French museum's botanical and geological collections. He examined its zoological cabinets (arranged by Georges Cuvier), and studied its shell displays (laid out by Jean-Baptiste Lamarck). On that day in July, both men were processing specimens—Darwin in his makeshift laboratory, and Emerson in his mind. The next day, Emerson remarked in his journal 'I am moved by strange sympathies; I say continually 'I will be a naturalist''.[5]

Unlike Darwin, Emerson never became a naturalist. Instead, he embarked upon

1 Ben McGrath, 'Darwin in Manhattan,' *The New Yorker*, 21 November 2005, <http://www.newyorker.com/printables/talk/051121ta_talk_ mcgrath> [accessed 13 January 2010] (para. 7).

2 Between 2005 and 2008, the Darwin exhibit travelled to Boston, Chicago, and Ontario, before becoming incorporated into the Darwin Centre of the Natural History Museum in London, which opened its doors on 15 September, 2009. More information about the Darwin exhibit can be found on the American Museum of Natural History website: < http://www.amnh.org/exhibitions/darwin/>. More information about the Darwin Centre can be found on the Natural History Museum website: < http://www.nhm.ac.uk/about-us/darwin-centre/index.html>.

3 The *Voyage of the Beagle* was first published in 1839 as the third volume of the *Narrative of the Surveying Voyages of His Majesty's Ships Adventure and Beagle, between the years 1826 and 1836, describing their examination of the Southern Shores of South America, and the Beagle's Circumnavigation of the Globe*. Captains Philip King and Hugh Fitzroy penned the first two volumes. In 1845, the *Voyage of the Beagle* was published separately, as the *Journal of Researches into the Natural History and Geology of the countries visited during the voyage of H.M.S. Beagle round the world under the command of Capt. FitzRoy*. This second edition, now known as the *Voyage of the Beagle*, is the version cited in this paper.

4 Quoted. in Janet Browne, *Charles Darwin: Voyaging* (New York: Knopf, 1995), p. 208.

5 Ralph Waldo Emerson, *The Journals of Ralph Waldo Emerson, 1820-1872*, eds. Edward Waldo Emerson and Waldo Emerson Forbes (New York: Houghton Mifflin, 1910), III, p. 163. Referred to hereafter as *J*.

a career as a lecturer and essayist, delivering 'The Uses of Natural History' in late 1833, composing *Nature* in 1836, and publishing his first series of essays in 1841.[6] Through his public appearances and additional written works, Emerson applied his experience at the *Jardin des Plantes* to produce, in his words, a 'natural history of the intellect.'[7] Emerson's visit to the museum in Paris has been recognized by Lee Rust Brown, in *The Emerson Museum*, as a significant influence on his later intellectual direction. Brown's conception of the museum as an 'assignment of huge varieties of natural particulars, brought from all parts of the earth, to the unifying structures of a few ideational systems', provides a construct for the analysis of Emerson's strategies of writing.[8] To Brown's construct, I will add that the processes of classification that underlie the order of the museum, and the techniques of observation that are assumed of its visitors, suggest a more precise model of interpretation for Emerson's oeuvre. What is more, these classificatory processes and observational techniques are central to Darwin's work as well.

The nineteenth century, the century of Emerson and of Darwin, has been widely recognized as 'The Museum Age'. In his eponymous book, Germain Bazin identifies the French Revolution as the catalyzing moment in the formation of the modern museum. With an immediate need to educate a new, and newly powerful, middle class, the government tasked a group of science professors with converting the former royal botanical gardens into a museum of natural history for public use. John Pickstone notes that the British Museum 'played a similar role in London, along with the botanical gardens at Kew, initially developed as a royal estate'. By the mid-nineteenth century, as Pickstone explains, these museums 'were seen as collecting places for imperial treasures and as inventories of imperial possessions and resources'. Pickstone's emphasis is on how public officials perceived natural history museums as expressions of national identity and imperial might, and Richard Fortey confirms: 'The great proliferation of museums in the nineteenth century was a product of the marriage of the exhibition as a way of awakening intelligent interest in the visitor with the growth of collections that was associated with empire and middle-class affluence'. But in his account, Fortey also underscores the social function of museum-going for the visitors, themselves: 'Attendance at museums was as much associated with moral improvement as with explanation of the human or natural world,' he explains.[9] As the overwhelming public response to the Great Exhibition of 1851 would soon confirm, the British people were eager to educate themselves by

6 Emerson continued to lecture and publish essays until his death in 1882, the same year as Darwin's. For a more detailed timeline, see 'The Complete Works of Ralph Waldo Emerson' online at: <http://rwe.org/pages/time-line.htm>.
7 The title of Emerson's 1870 lecture series.
8 Lee Rust Brown, *The Emerson Museum: Practical Romanticism and the Pursuit of the Whole* (Cambridge: Harvard University Press, 1997), p. 60.
9 Germain Bazin, *The Museum Age*, trans. Jane Van Nuis Cahill (New York: Universe Books, 1967), p. 20. John V. Pickstone, *Ways of Knowing: A New History of Science, Technology, and Medicine* (Chicago: University of Chicago Press, 2000), p. 74. Richard Fortey, *Dry Storeroom No. 1: The Secret Life of the Natural History Museum* (New York: Knopf, 2008), p. 42.

observing the objects of empire on display.

Emerson seems not to have considered the opportunities for social improvement, or the expressions of imperial power, when he attended the natural history museum at the *Jardin des Plantes*. Instead, the 'strange sympathies' that affected him upon viewing Cuvier's cabinets and Lamarck's shells indicate the start of his own 'romance' with natural history. This romantic attraction to the natural world, as Lynn Merrill has shown, imbued the ethos of the Victorian Age. But what Lynn Barber depicts as a 'national obsession' of the nineteenth-century took root nearly a hundred years previously. Upon the first publication of Linnaeus's *Systema Naturae*, in 1735, as Harriet Ritvo explains, systems for classifying plants and animals were immediately hailed 'as both a symbol and an agent of a larger intellectual triumph, one that could ultimately reverse the traditional relationship between humans and the natural world'.[10] While the specifics of Linnaeus's classification system would soon be challenged by Cuvier and others, the idea that classification could lead to mastery and control over a particular area of knowledge, and hence position man at the pinnacle of the great chain of being, was embraced by natural historians, government officials and private citizens alike.

Simultaneously, on the other side of the Atlantic, Americans were just beginning to be affected by what David Reynolds terms 'the science bug'. For the most part, United States citizens continued to insist on an order that placed God above both human beings and the natural world. As Reynolds points out, the noted Yale scientist Benjamin Silliman was able to declare, as late as 1818, in the first issue of the *American Journal of Science*, that 'The whole circle of physical science… everywhere demonstrates both supreme intelligence, and harmony and beneficence of design in THE CREATOR'.[11] Not only does Silliman's invocation of the 'whole circle' of science run counter to the metaphor of the chain of being that dominated British scientific discourse at the time, but it demonstrates there was little credence in America given to an interpretation of natural history which gave humans preeminence. According to Silliman, and to most Americans in the early years of the nineteenth century, nature was undeniably ordered by God—even if scientists had learned to name and classify His creations.

It would thus be easy to place Emerson and Darwin on opposite sides of a scientific divide. Emerson certainly believed that the order of nature was arranged by God. Darwin, of course, came to view nature as a reflection of the process of evolution by natural selection. Emerson, moreover, perceived nature as a metaphor for the mind. Darwin, for his part, understood nature as a mechanism in which man played only a minor part. But the Emersonian and Darwinian conceptions of the natural world converge both in their mutual understanding of the natural world as one

10 Lynn Merrill, *The Romance of Victorian Natural History* (New York: Oxford University Press, 1989), p. 1. Lynn Barber, *The Heyday of Natural History, 1820-1870* (New York: Doubleday, 1984), p. 9. Harriet Ritvo, *The Platypus and the Mermaid, and Other Figments of the Classifying Imagination* (Cambridge: Harvard University Press, 1997), p. 18.
11 David S. Reynolds, *Waking Giant: America in the Age of Jackson* (New York: Harper Collins, 2008), p. 220.

that is not static, but is fluid and evolving, and also in their attention to the fundamental relationships between organisms and their environments.[12]

In addition, Emerson and Darwin share a number of scientific influences. Joan Richardson notes that both men studied the theories of Cuvier and Lamarck, as well as earlier works by Augustin de Candolle, Alexander von Humboldt and Charles Lyell, among others.[13] With this knowledge—and poetic inclination—it is possible to view Emerson and Darwin themselves as figures for Darwin's famed finches. Although they have comparable intellectual origins, the men were separated by geography and culture. They evolved independently and eventually derived separate conclusions. Nevertheless, Emerson and Darwin continued to rely on similar methods of analysis: techniques of observation and classification. Furthermore, in recording the results of these analyses, Emerson and Darwin again follow similar paths: private thought to printed notebook, printed notebook to published page.

The construct of the museum courses through each of these processes—in Emerson as a guiding principle, and in Darwin, as I will demonstrate, as a goal of research. But the museum fulfils its most elucidatory capacity for readers, that is to say, for visitors to the works of each great thinker. The museum reinforces techniques of observation by encouraging careful and nuanced examination, and clarifies order through the classification of the objects on display. Visible elements are arranged so as to expose invisible relationships, thus conveying knowledge from private to public, from expert to amateur. The museum both performs and produces narrative—in particular, a narrative that links natural order and language. In a sense, the projects of Emerson and Darwin can each be understood in terms of a process of translation between nature and language, one in which hidden relations are revealed over time. In his project, Darwin described instances of evolution. Emerson, by contrast, adumbrated his project in terms of eyeballs, circles, and rotations. But both scholars draw upon the museum's theoretical underpinnings and its practices of display. In reading Emerson's early lectures and essays as they contrast with Darwin's *Voyage of the Beagle*, the construct of the museum emerges as the idea that illuminates each author's particular strategies and goals.

The museum instructs its visitors in the technique of observation—the primary method employed by both Emerson and Darwin. In her work on Georges Cuvier, Dorinda Outram explains how his galleries, the same that Emerson viewed at the *Jardin des Plantes*, were 'full of objects to be looked not *at*, but *into*'. Outram demonstrates how Cuvier's style of presentation encouraged an observational mode attuned to issues of depth and relation. In *The Birth of the Museum*, Tony Bennett, following Pierre Bourdieu, describes how curators continue to arrange installations so

12 Joseph Carroll's *Evolution and Literary Theory* (Columbia: University of Missouri Press, 1995) provides a thorough account of Darwin's attention to the relation between organism and environment, and its impact on the emergence of modern literary theory.

13 Joan Richardson, *A Natural History of Pragmatism: The Fact of Feeling from Jonathan Edwards to Gertrude Stein* (New York: Cambridge University Press, 2007), p. 88.

that visitors 'can both *see* [the objects] on display and *see through* them to perceive the hidden order of art which subtends their arrangement'.[14] Bennett traces the emergence of a model for museum curation that emphasises looking 'into' and seeing 'through.' Both Emerson and Darwin, in their private journals and published works, put this museum model of observation on display.

Emerson, in his lectures and essays, describes a method of observation that is learned, immersive, and ultimately, metaphoric. In 'The Uses of Natural History', Emerson's first lecture delivered several months after his visit to the *Jardin des Plantes*, he employs his experience at the museum to demonstrate how the 'instructed eye' learns to perceive the 'history of the thing' in a single glance.[15] Emerson suggests that the scholarly study of natural history adds the impetus to spontaneously uncover the historical essence of individual artefacts. In *Nature* Emerson loosens the academic strictures on observation and instead proposes a new kind of transcendental sight. He explains 'The axis of vision is not coincident with the axis of things and so they appear not transparent but opaque'.[16] Emerson no longer believes that clarity can be achieved through the study of natural history alone. In order to penetrate the opacity of things, man must first observe himself. Man, he writes, 'cannot be a naturalist until he satisfies all the demands of the spirit' (*PE*, p. 48). When he succeeds in decoding his mind, man will then be able to decipher the 'solution in hieroglyphic' to the order of natural things (*PE*, p. 8).

Emerson's process of cerebral exploration as experiential and immersive is similar to the process of 'informed' observation that he demonstrates at the museum (*EL*, p. 17). In *Nature*, Emerson famously describes a moment of transcendent sight: 'Standing on the bare ground, —my head bathed by the blithe air and uplifted into infinite space, —all mean egotism vanishes. I become a transparent eyeball; I am nothing; I see all; the currents of the Universal Being circulate through me; I am part or particle of God' (*PE*, p. 11). In this passage, Emerson's normal visual processing is replaced by an instance of universal sight. He not only acquires the ability to perceive the transparency of things; his eyes themselves become transparent. He becomes immersed in and integrated with nature, 'part or particle of God'. For Emerson this experiential observation offers divine clarity. Modelled after his revelatory visit to the *Jardin des Plantes*, he 'come[s] to look at the world with new eyes' (*PE*, p. 49).

Like Emerson's description of his transcendent experience in *Nature*, Darwin's chronicle of his transformative encounters with nature in the *Voyage of the Beagle* also illustrates well-honed techniques of observation. But while Emerson explicitly

14 Dorinda Outram, *Georges Cuvier: Vocation, Science and Authority in Post-Revolutionary France* (Dover: Manchester University Press, 1984), pp. 175-6. Tony Bennett, *The Birth of the Museum: History, Theory, Politics* (New York: Routledge, 1997), p. 35.

15 Ralph Waldo Emerson, The Early Lectures of Ralph Waldo Emerson, eds. Stephen Whicher and Robert Spiller (Cambridge, Mass.: Belknap-Harvard University Press, 1966), p. 17. Referred to hereafter as EL.

16 Ralph Waldo Emerson, *The Portable Emerson*, eds. Carl Bode and Malcolm Cowley (New York: Viking, 1981), p. 48. Referred to hereafter as *PE*.

conveys his techniques to his audience—for Emerson, after all, the method is the message—Darwin's methods must be gleaned from the vast catalogue of his account. Rather than broadly describing his techniques, Darwin demonstrates them with visual acuity and literary precision. Take, for example, his entry on the rocks of St. Paul:

> The rocks of St. Paul appear from a distance of a brilliantly white colour. This is partly owing to the dung of a vast multitude of seafowl, and partly to a coating of a hard glossy substance with a pearly lustre, which is intimately united to the surface of the rocks. This, when examined with a lens, is found to consist of numerous exceedingly thin layers, its total thickness being about the tenth of an inch. It contains much animal matter, and its origin, no doubt, is due to the action of the rain or spray on the birds' dung.[17]

In this passage, Darwin models the techniques of 'looking closely' and 'seeing through'. He first notes the rocks' appearance 'from a distance'. Then he observes the rocks from close up, noting the composition of the sediment on their surface. With a 'lens', he examines the sediment in detail, recording its consistency and measuring its 'thickness'. Finally, he theorizes about its 'origin'. Because he has performed so thorough an investigation, he has 'no doubt' as to the nature of the substance. At all times, however, Darwin's observing eye is invisible: he uses the passive voice to describe what are presumably active procedures: 'is united', 'when examined', and 'is found'. As the museum offers implicit instruction through the arrangement of its installations and displays, Darwin convinces his readers through example, not explication. His are instructions for a penetrating technique of total observation.

For both Emerson and Darwin, observation is only the first step in the investigation of natural phenomena. The second, equally significant stage, is classification. Classification conveys order, as in the museum exhibit in which visible objects are arranged so as to convey invisible forms and relations. According to Tony Bennett, all museum exhibits 'are involved in organizing an exchange between the fields of the visible and the invisible which they establish'. Bennett's conception of classification is free and open; it encourages the 'exchange' and production of ideas. As recent scholarship on Victorian curatorial practices has shown, however, the order that is conveyed through the systems of classification employed by nineteenth-century museums is more socially fraught. 'In the case of England', Jonah Siegel explains 'the period leading up to the first Reform Bill of 1832 marks the forceful beginning of a national debate about the place of people in the museum, and the role of the museum in shaping the people'. Siegel suggests that the natural history

17 Charles Darwin, *From So Simple A Beginning: The Four Great Books of Charles Darwin,* ed. E.O. Wilson (New York: Norton, 2006), p. 37. Referred to hereafter as *SB*.

museum in fact 'shares characteristics not only with such emergent social structures as the newly reformed schools and universities but also with more popular venues, such as the pleasure ground, the park, even the public house—indeed, with the modern city itself'.[18] Just as designs for parks and cities took into account how the masses might be ordered and arranged, so too did the natural history museum. Its classifications conveyed the scientific order of biological specimens and the social order of British society.

Always attendant to issues of ideology embedded in social structures, Michel Foucault, in *The Order of Things*, explores the function of the museum in terms of resistance and exposure. Interestingly, Foucault illustrates his ideas about the empowering aspects of classification with the example of Cuvier's cabinets: 'One day, towards the end of the eighteenth century, Cuvier was able to topple the glass jars of the Museum, smash them open and dissect all the forms of animal visibility that the Classical age had preserved in them'. Foucault describes Cuvier's installation at the *Jardin des Plantes* as a 'mutation in the natural dimension of Western culture', an unexpected development that is later revealed to have held a competitive advantage over others. In keeping with the Darwinian scheme of survival of the fittest, Cuvier's exhibit does not effect immediate change. Rather, in Foucault's words, it 'provides the basis for the exterior possibility of a classification' that 'arises from the depths of life, from those elements most hidden from view'.[19] Here, Foucault suggests that encouraging visitors to arrive at their own criteria for classification, as the 'invisible' cues of Cuvier's cabinets enabled Emerson to do, may help to 'topple' the dominant ideologies of the time, and to reveal alternate manifestations of forms of culture that may have been suppressed or 'hidden from view'.

When Emerson visited the *Jardin des Plantes* he grasped the ways in which the museum's system of classification revealed hidden elements and relationships, even if he was not attuned to the issues of empire subtended by the objects' arrangement. Upon returning home, he remarked in his journal 'How much finer things are in composition than alone. 'Tis wise in man to make cabinets' (*J*, III, p. 161). In 'The Emerson Museum', the essay that preceded his book of the same name, Brown examines this journal entry for clues to understanding the origins of Emerson's transcendental thought: 'Series, form, organization, relation—these are the key terms of the visual experience Emerson explores. They pertain to the intellectual practices, actual and possible, of 'man the observer''.[20] Indeed, in the introduction to *Nature*, Emerson defines his project, an explication of the natural world, as a process of 'enumerating the values of nature and casting up their sum' (*PE*, p. 8). In 'The American Scholar' Emerson more explicitly propounds the museum model of

18 Bennett, p. 35. Jonah Siegel, *The Emergence of the Modern Museum: An Anthology of Nineteenth-Century Sources* (New York: Oxford University Press, 2008), p. 4.
19 Michel Foucault, *The Order of Things: An Archaeology of Human Sciences* (New York: Vintage, 1994), pp. 137-8, p. 138, p. 268.
20 Lee Rust Brown, 'The Emerson Museum,' *Representations*, Vol. 40 (Autumn 1992), pp. 57-80, (p. 58).

classification as a way to understand the invisible relation between nature and intellect:

> To the young mind every thing is individual, stands by itself. By and by, it finds how to join two things and see in them one nature; then three, then three thousand; and so, tyrannized over by its own unifying instinct, it goes on tying things together, diminishing anomalies, discovering roots running under ground whereby contrary and remote things cohere and flower out from one stem. It presently learns that since the dawn of history there has been a constant accumulation and classifying of facts (*PE*, pp. 53-4).

In this account, Emerson outlines a developmental process that explains how individuals progress from perception of discrete objects to the unification of experience through a system of classification. He presents this process, repeated over time, in the figurative language of tree 'roots' and flowers 'stems', connoting both a historical and a generative relation among natural things. Anticipating Darwin's model of the 'Tree of Life', Emerson asserts that nature not only supplies the items to be classified, but also functions as a model for the system of classification that best organises its diverse specimens (*SB*, p. 533).

Emerson employs the museum model of classification both as a critical practice and as a compositional technique. Having amassed a diverse collection of writings in his notebooks and journals, Emerson, according to Brown, 'wished for a compositional method that would bring out relations already inherent in the textual material; the pathways hidden within the miscellaneous writing would make up the outline of a new, more necessary disposition'.[21] More precisely, after his visit to the museum, Emerson began to perceive his thoughts as specimens.

In a letter to Thomas Carlyle Emerson described his first collection of essays in terms that partially belie its careful, museum-like, arrangement:

> In a fortnight or three weeks my little raft [the 1841 *Essays*] will be afloat. Expect nothing more of my powers of construction,—no ship-building, no clipper, smack, nor skiff even, only boards and logs tied together… I dot [sic] evermore in my endless journal, a line on every

21 Brown, 'Museum', p. 59.

> knowable in nature; but the arrangement [of the *Essays*] loiters long, and I get a brick-kiln instead of a house.[22]

By likening his publication to a 'little raft' instead of a 'clipper' and 'brick-kiln instead of a house' Emerson suggests that his essays may supply basic building materials, but are limited nonetheless in their practical applications. This relationship is suggestive of the interactive exchange that occurs when visitors view objects in a museum. In Emerson's words, 'A classification is nothing but a cabinet. The whole remains to be done thereafter' (*J*, III, p. 284). The cabinet may furnish a model of classification, but it is the viewer who must apply his interpretative powers in order to extract meaning from its contents. If the cabinet here is the life raft, man must arrive at the museum ready to row.

For Darwin to arrive at his theory of evolution by natural selection, he required a vessel much more seaworthy than 'boards and logs tied together'—and in point of fact, the *Beagle* was a *Cherokee*-class ten-gun brig. But in terms of conceptual durability Darwin recognised that he would require an interpretive framework that would bend with the social forces of the time, while sailing forward into the future. George Levine suggests that Darwin's ideas about evolution acquired cultural currency 'not only because they developed out of and reinforced the givens of his moment and the ideological commitments of many who first read him, but because they managed to bring something to the argument that allows them to survive their particular history and feed other, even contradictory, uses. Levine suggests that Darwin's ideas themselves were adaptable. Undeniably, Darwin crafted his theory as a supplement to existing ideas rather than as a revision. He incorporated geographical ideas from Humboldt, geological concepts from Lyell, and, as Levine has shown in his other works, narrative strategies from an array of Victorian novels. At the same time, he established his revolutionary claim that God had not placed each creature individually on the earth.[23]

But Darwin's writing suggests that he recognized the museum process of classification—the same that provided Emerson with his interpretative framework—as an additional ideological 'given' onto which he might graft his ideas about the evolution of the natural world. In the *Voyage of the Beagle*, Darwin presents abundant examples that illustrate his understanding of how classification can reveal hidden influences among species and across time. In Bahia Blanca, Darwin unearthed the fossilised bones of a Toxodon, 'perhaps one of the strangest animals ever discovered':

22 Quoted in Lawrence Rosenwald, *Emerson and the Art of the Diary* (New York: Oxford University Press, 1988), p. 72.

23 George Levine, *Darwin Loves You: Natural Selection and the Re-Enchantment of the World* (Princeton: Princeton University Press, 2006), p. 16. Also see Levine's other works, *Darwin and the Novelists: Patterns of Science in Victorian Fiction* (Chicago: University of Chicago Press, 1988) and *Dying to Know: Scientific Epistemology and Narrative in Victorian England* (Chicago: University of Chicago Press, 2002).

> In size it equalled an elephant or megatherium, but the structure of its teeth… proves indisputably that it was intimately related to the Gnawers, the order which, at the present day, includes most of the smallest quadrupeds: in many details it is allied to the Pachydermata: judging from the position of its eyes, ears, and nostrils, it was probably aquatic, like the Dugong and Manatee, to which it is also allied. How wonderfully are the different Orders, at the present time so well separated, blended together in different points of the structure of the Toxodon! (*SB*, p. 94)

This investigation of the Toxodon involves several types and layers of classification. Darwin assigns the Toxodon a size equal to the elephant and other large beasts. Based on an assessment of its facial features, he locates the Toxodon within the aquatic order. Decoding the internal 'structure of its teeth,' Darwin determines the Toxodon's likeness to other animals ('the smallest quadrupeds'). Using visual indicators and contextual cues, Darwin divides its 'blended' attributes into the 'well separated' categories of his 'present day'. Using this method, Darwin 'indisputably prove[s]' the Toxodon's relation to other species and determines its 'probable' place in time.

On the Galapagos Archipelago, Darwin develops a new focus on the formulation of his theory of evolution by natural selection. After observing the islands' indigenous finches, he concludes that 'seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that from an original paucity of birds in this archipelago, one species had been taken and modified for different ends' (*SB*, pp. 330-1). Again, Darwin evaluates his observations in terms of 'structure' and 'related groups'. This, according to Gillian Beer, is Darwin's primary focus: 'What Darwin emphasizes is relationship—the ordinary chain of generation—the sense of progeny and diversification, of a world in which profusely various forms co-exist, unseen and yet dependent on each other and related to each other by blood or need'.[24] These relationships, which Darwin reveals through his process of classification, will eventually yield 'that great fact—that mystery of mysteries—the first appearance of new beings on this earth' (*SB*, p. 329).

Darwin, like Emerson, required a method of writing that would convey the specificity and range of the relationships he discerned on his round-the-world voyage. In fact, significant critical attention has been paid by Beer, Levine and others to the ways in which Darwin employs literary techniques to emphasize the relation between specific instances and ideal forms. But fewer scholars have explored how Darwin accounts for the limitations of written expression in conveying the wonder if the natural world. Joan Richardson touches on the similarities and differences between

24 Gillian Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction* (Boston: Ark, 1985), p. 45.

Emerson and Darwin in terms of the challenge of composition:

> Both Emerson and Darwin addressed themselves to solve the same problem concerning the possibilities of adequate description in language but projected different thought experiments to demonstrate their results. Though both learned key lessons about the organization and presentation of ideas and envisioning from the same core of texts, their purposes were different. Most significantly, Darwin had to integrate the actual facts evidenced by his explorations in the fossil record into his account. Emerson, poised just earlier enough in time and without the first-hand experience in the field of bones and rocks, could present his evidence figuratively.[25]

Richardson describes the divergence between Darwin and Emerson in terms of the more literal, factual explanation of the former and the more figurative, literary exegesis of the latter. For example, while Emerson in *Nature* detects 'analogy' between the 'human hand' and the 'flipper of the fossil saurus,' Darwin's accounts of discoveries like the Toxodon skeleton are scientific and precise (*PE*, p. 30). It is my premise, however, that Emerson's and Darwin's ideas converge in their shared conception of nature as a repository of facts that must be examined, categorized, and, ultimately, transcribed into text.

As in the museum, in which, according to Gaynor Kavanagh, objects are perceived as representing larger ideas and therefore are selected for the 'evidence value' they necessarily contain, Emerson and Darwin consider the choice of particular specimens as imbued with deeper meanings that must be contemplated and extracted.[26] In *Nature*, Emerson intones 'Nature never became a toy to a wise spirit. The flowers, the animals, the mountains, reflected the wisdom of his best hour, as much as they had delighted the simplicity of his childhood' (*PE*, p. 9). For Emerson, nature proffers endless evidence to the 'wise spirit', evidence that requires constant study. In 'The American Scholar' Emerson again characterizes nature as a collection of facts that must be interrogated in order to unravel their full meaning: 'The ambitious soul sits down before each refractory fact; one after another reduces all strange constitutions, all new powers, to their class and their law, and goes on forever to animate the last fibre of organization, the outskirts of nature, by insight' (*PE*, p. 54). The facts of nature, for Emerson, are 'refractory'—enigmatic and unyielding—but also, in the sense of the refraction of light, capable of mind-altering, illuminating, flashes of 'insight'.

Darwin too perceives nature as a series of 'truly wonderful' facts (*SB*, p. 345).

25 Richardson, pp. 168-9.
26 Gaynor Kavanagh, *Dream Spaces: Memory and the Museum* (Leicester: Leicester University Press, 2000), p. 99.

But where Emerson derives infinite knowledge from a single bird or rock, Darwin finds enlightenment in exacting linkages of disparate objects and observations. On the last leg of his voyage, Darwin assesses the trip's utility in terms of the thought processes that it invokes: 'In conclusion, nothing can be more improving to a young naturalist, than a journey in distant countries. The excitement from the novelty of objects, and the chance of success, stimulate him to increased activity. Moreover, as a number of isolated facts soon become uninteresting, the habit of comparison leads to generalization' (*SB*, p. 431). For Darwin this process of linking 'isolated facts' to produce generalizations is the most illuminating application of the study of nature, and it is the most revolutionary 'habit' that his writing discloses. One might argue that Darwin's greatest discovery is not actually the theory of evolution, which, after all, was prefigured in the works of Lamarck, Lyell, and others. Rather, one could consider Darwin's seminal contribution to be the way in which he employs language to create a narrative in which 'direct evidence' is integrated into a compelling account of the changing natural world.[27]

Language equips Darwin, like Emerson, with the tools to convert his particular interpretations of nature into narratives for public display. Both men employ language in order to guide readers through their respective journeys—Darwin's around the world, and Emerson's through the mind. Both men rely, figuratively, on another book—the Book of Nature—as their own guide for 'reading' the natural world.

The method of deploying language as an 'investigative model' is nowhere more apparent than in their respective treatments of geology. In 'The Poet' (1844) Emerson describes the language of his day as 'fossil poetry'. He elaborates: 'As the limestone of the continent consists of infinite masses of the shells of animalcules, so language is made up of images or tropes, which now, in their secondary use, have long ceased to remind us of their poetic origin' (*PE*, pp. 252-3). Here Emerson employs the figure of fossilized shells in order to illustrate the process of literary excavation that he believes is required of the modern poet.

There is no indication that Emerson read Darwin's *Voyage of the Beagle* (although Darwin read *Nature* in 1841).[28] Had Emerson read Darwin's description of the shoreline of Patagonia, however, he would have discovered a worthy companion to his archaeology of verse:

> Here along hundreds of miles of coast we have one great deposit, including many tertiary shells, all apparently extinct... These beds are

27 This quotation is taken from Darwin's account of the formation of barrier reefs. He pre-empts claims of hand-waving by prefacing his theory with the following: '"It may be asked, whether I can offer any direct evidence of the subsidence of barrier-reefs or atolls; but it must be borne in mind how difficult it must ever be to detect a movement, the tendency of which is to hide under the water of the part affected"' (*SB*, p. 407). 'Nevertheless', he continues, and proceeds to outline his theory over several pages by means of the aforementioned process of generalization from isolated facts.
28 Beer p. 65. Much later, on 7 June, 1873, in a letter to George Cupples Darwin remarked that he did not think he and Emerson would have much in common. The letter can be located in the library of the American Philosophical Society.

> covered by others of a peculiar soft white stone, including much gypsum, and resembling chalk, but really of a pumiceous nature… These white beds are everywhere capped with a mass of gravel, forming probably one of the largest beds of shingle in the world… When we consider that all these pebbles, countless as the grains of sand in the desert, have been derived from the slow falling masses of rock on the old coast-lines and banks of rivers; and that these fragments have been dashed into smaller pieces, and that each of them has since been slowly rolled, rounded, and far transported, the mind is stupefied in thinking over the long, absolutely necessary, lapse of years. Yet all this gravel has been transported, and probably rounded, subsequently to the deposition of the white shells, and long subsequently to the underlying beds with the tertiary shells… What a history of geological changes does the simply-constructed coast of Patagonia reveal! (*SB*, pp. 163-5)

In his analysis, Darwin probes deeply into the geological composition of the Patagonian coast, and reaches far back in evolutionary time. The result is a 'history' of geological transformation that is narrated like poetry, with similes ('countless as the grains of sand'), metaphors (fragments 'dashed' along the rocks), and evocative phrases ('the long, absolutely necessary, lapse of years'). If Emerson's design was to reattach language to nature, Darwin's aim was perhaps the reverse—to fasten nature to language as if the two had never been apart.

The desire to bind nature to language, to establish a method of 'reading' the natural world, relates to the construct of the museum as well as it does to the works of Emerson and Darwin. Citing Emerson's journal entry about the *Jardin des Plantes*, in which he 'insists on its resemblance to devices (grammar, alphabet, dictionary) that classify elements of speech and prescribe rules for writing', Brown argues that Emerson acknowledges that the museum 'reorganizes nature more effectively than an ordinary book, but that the difference between the garden and the book is a matter of degree rather than structure or intention'. This represents a departure from Foucault's ideas about nineteenth-century natural history museums as classificatory structures that function only so far as to create a precondition for writing. As Foucault states 'By limiting and filtering the visible, structure enables it to be transcribed into language.'[29] Nevertheless, conceiving the relation between the museum and the book as a 'matter of degree' may further elucidate Emerson's and Darwin's shared reliance on the techniques of observation and classification and may illuminate, in Emerson's case, the fascination with, and in Darwin's the ambivalence about, the museum as a model of display.

29 Brown, 'Museum,' p. 69. Foucault, p. 135.

Emerson's fascination with the museum has been much discussed and explicated. Darwin's ambivalence about the museum, however, has not yet received significant critical attention. Throughout the *Voyage of the Beagle*, Darwin, in fact, expresses frustration at the inadequacy of contemporary museum display:

> Who from seeing choice plants in a hothouse, can magnify some into the dimensions of forest trees, and crowd others into an entangled jungle? Who when examining in the cabinet of the entomologist the gay exotic butterflies, and singular cicadas, will associate these lifeless objects, the ceaseless harsh music of the latter, and the lazy flight of the former,—the sure accompaniments of the still, glowing noonday of the tropics? (*SB*, pp. 423-4)

For Darwin, 'seeing' and 'examining' are no match for the immersive experience of travel abroad. For no-one but the 'learned naturalist' are these hothouses and cabinets adequate representations of the beauty and complexity of nature (*SB*, p. 423). At one point, Darwin remarks at how a bird fluttering by appears as if 'a vilely stuffed specimen has escaped from some museum, and has come to life again!'[30] For Darwin, the sight of this creature, and its association with the museum, triggers feelings of 'vileness' and displeasure. Nevertheless, Darwin took the time to visit the Botanic Garden in Rio (a 'short but most pleasant excursion' (*SB*, p. 55)) and he occasionally he refers to the Zoological Gardens in London in a positive light.

Given this ambivalence, it is particularly interesting that Darwin employs a figure for the museum—the hothouse—to articulate his feelings of frustration concerning his written account of the *Beagle*'s voyage:

> When quietly walking along the shady pathways, and admiring each successive view, I wished to find language to express my ideas. Epithet after epithet was found too weak to convey to those who have not visited the intertropical regions, the sensation of delight which the mind experiences. I have said that the plants in a hothouse fail to communicate a just idea of the vegetation, yet I must recur to it. The land is one great wild, untidy, luxuriant hothouse, made by Nature for herself, but taken possession of by man, who has studded it with gay houses and formal gardens. (*SB*, p. 424)

In this passage, Darwin compares the diminished impression conveyed by the written

30 Quoted in John Tallmadge, 'From Chronicle to Quest: The Shaping of Darwin's 'Voyage of the Beagle," *Victorian Studies*, Vol. 23 (Spring 1980), p. 341.

record of his travels to the decreased impact of the greenhouse display in contrast to the actual experience of nature. Although he feels his language is 'too weak to convey' the fecundity of the tropics, as the hothouse similarly 'fail[s] to communicate' the luxuriance of the botanical world, he returns to the figurative power of language, in the metaphor of the hothouse, to encase the 'wild, untidy' abundance of nature in the pages of his book.

What is the significance of Darwin's reluctant acceptance of the limitations of expressive language in terms of the experience of the profusion of nature within the hothouse? Quite possibly, with the underlying concept of the museum in his mind, Darwin was able to begin to identify language as a tool that could fill in the gaps between observation, classification and display. It is this realization, after all, that later enabled him to record his theory of evolution by natural selection in the *Origin of Species*. Referring to that book, Beer states, 'Darwin displays, categorizes, and argues, but does not expect to contain the workings of the world in his mind, or ever fully understand them'.[31] Conceivably, Darwin's experience of writing the *Voyage of the Beagle* provided him with the first indication that the 'workings of the world' could not entirely be contained in his mind, but could only be represented, in his thought and on the page, through the collection and display of specimens.

It is an interesting footnote to the history of the development of museums that Darwin's theory of evolution, more than any other event, changed the way in which museum displays were, and continue to be, organized and executed. In *Pasts Beyond Memory*, Bennett explains how, after Darwin, 'evolutionary principles of classification and exhibition' began to subtend the arrangements of most major natural history museums. These types of displays are characterised by an emphasis on epochal time and an attention to narratives of progress, in order to account for the fact that evolution '[can] not be seen directly'. Museum-goers, therefore, function as characters in, not narrators of, the story of evolution. According to Bennett, the museum itself has evolved into a 'machinery for producing progressive subjects'.[32] At present, the museum supplies a narrative apparatus for representing the history of the natural world through the processes of observation, classification and display.

At the new Darwin Centre at the Natural History Museum in London, displays of butterflies, fossils, and skeletons—some oversized and backlit, some equipped with miniature magnifying glasses—lead into a seven-storey cocoon-shaped structure. I watch as visitors follow along a spiralling path, clustering in front of a case of beetles before becoming distracted by the life-size replica of an ostrich around the bend. How fitting, I think to myself, that the exhibit is designed to be navigated in the path of an expanding circle. I recall Emerson: 'The eye is the first circle; the horizon which it forms is the second; and throughout nature this primary figure is

31 Beer, p. 46.
32 Tony Bennett, *Pasts Beyond Memory: Evolution, Museums, Colonialism* (New York: Routledge, 2004), p. 2, p. 162. Bennett, *Birth*, p. 47.

repeated without end' (*PE*, p. 228). A small child standing by, perhaps intuiting the endless repetition, or more likely, because he is not tall enough to be able to 'look closely' into the display cases, asks to play with his mother's mobile phone. I continue on, contemplating circles.

Emerson shared Darwin's belief that 'looking closely' would reveal invisible correspondences between things. Both Emerson and Darwin relied upon similar techniques of observation, and of classification, in order to make these correspondences known. Emerson observed and classified nature with the aim of understanding himself and interpreting his role in the book of nature. Darwin observed and classified nature in order to understand its unrecorded history, interpreting objects as evidence for his theory of evolution by natural selection. Both drew upon the museum as a model and as a method, Emerson through his thoughts, and Darwin through his actions. While they diverge in their conceptions of the natural world and the position of man within it, Emerson and Darwin are joined in their embrace of the ability of language to transport and to transcend. Emerson's lectures and essays, and Darwin's *Voyage of the Beagle*, exemplify techniques for 'reading' nature. Through the museum model of display, and through the animating power of language, Emerson and Darwin inscribe these techniques in the history of time.

Bibliography

Barber, Lynn, *The Heyday of Natural History, 1820-1870* (New York: Doubleday, 1984)

Bazin, Germain, *The Museum Age*, trans. Jane Van Nuis Cahill (New York: Universe Books, 1967)

Beer, Gillian, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction* (Boston: Ark, 1985)

Bennett, Tony, *The Birth of the Museum: History, Theory, Politics* (New York: Routledge, 1997)

———, *Pasts Beyond Memory: Evolution, Museums, Colonialism* (New York: Routledge, 2004)

Brown, Lee Rust, *The Emerson Museum: Practical Romanticism and the Pursuit of the Whole* (Cambridge: Harvard University Press, 1997)

———, 'The Emerson Museum,' *Representations*, Vol. 40 (Autumn 1992), pp. 57-80

Browne, Janet, *Charles Darwin: Voyaging* (New York: Knopf, 1995)

Carroll, Joseph, *Evolution and Literary Theory* (Columbia: University of Missouri Press, 1995)

Darwin, Charles, *From So Simple a Beginning: The Four Great Books of Charles Darwin*, ed. Edward O. Wilson (New York: Norton, 2006)

Emerson, Ralph Waldo, *The Early Lectures of Ralph Waldo Emerson*, eds. Stephen Whicher and Robert Spiller (Cambridge: Belknap-Harvard University Press, 1966)

———, *Journals of Ralph Waldo Emerson 1820-1872*, eds. Edward Waldo Emerson and Waldo Emerson Forbes (New York: Houghton Mifflin, 1910)

———, *The Portable Emerson*, eds. Carl Bode and Malcolm Cowley (New York: Viking, 1981)

Fortey, Richard, *Dry Storeroom No. 1: The Secret Life of the Natural History Museum* (New York: Knopf, 2008)

Foucault, Michel, *The Order of Things: An Archaeology of Human Sciences* (New York: Vintage, 1994)

Kavanagh, Gaynor, *Dream Spaces: Memory and the Museum* (Leicester: Leicester University Press, 2000)

Levine, George, *Darwin and the Novelists: Patterns of Science in Victorian Fiction* (Chicago: University of Chicago Press, 1988)

———, *Darwin Loves You: Natural Selection and the Re-Enchantment of the World* (Princeton: Princeton University Press, 2006)

———, *Dying to Know: Scientific Epistemology and Narrative in Victorian England* (Chicago: University of Chicago Press, 2002)

Macdonald, Sharon and Gordon Frye, eds., *Theorizing Museums: Representing Identity and Diversity in a Changing World* (Cambridge: Blackwell, 1996)

Merrill, Lynn, *The Romance of Victorian Natural History* (Oxford: Oxford

University Press, 1989)

McGrath, Ben, 'Darwin in Manhattan,' *The New Yorker*, 21 November 2005, CondeNet, <http://www.newyorker.com/ printables/talk/ 051121ta_talk_ mcgrath> [accessed 13 January 2010]

Outram, Dorinda, *Georges Cuvier: Vocation, Science and Authority in Post-Revolutionary France* (Dover: Manchester University Press, 1984)

Pickstone, John V, *Ways of Knowing: A New History of Science, Technology, and Medicine* (Chicago: University of Chicago Press, 2000)

Reynolds, David S., *Waking Giant: America in the Age of Jackson* (New York: Harper Collins, 2008)

Richardson, Joan, *A Natural History of Pragmatism: The Fact of Feeling from Jonathan Edwards to Gertrude Stein* (New York: Cambridge University Press, 2007)

Ritvo, Harriet, *The Platypus and the Mermaid, and Other Figments of the Classifying Imagination* (Cambridge: Harvard University Press, 1997)

Rosenwald, Lawrence, *Emerson and the Art of the Diary* (New York: Oxford University Press, 1988)

Siegel, Jonah, *The Emergence of the Modern Museum: An Anthology of Nineteenth-Century Sources* (New York: Oxford University Press, 2008)

Stearn, William T., *The Natural History Museum at South Kensington: A History of the Museum, 1753-1970* (London: Heinman, 1981)

Stewart, Susan. 'Death and life, in that order, in the Works of Charles Willson Peale,' *Visual Display: Culture Beyond Appearances*, ed. Lynne Cooke and Peter Wollen (New York: New Press, 1995), pp. 31-53

Tallmadge, John, 'From Chronicle to Quest: The Shaping of Darwin's 'Voyage of the Beagle,' *Victorian Studies*, Vol. 23 (Spring 1980), pp. 324-45

Walls, Laura Dassow. 'The Anatomy of Truth: Emerson's Poetic Science.'

Configurations Vol. 5.3 (1997), pp. 425-461

———, *Emerson's Life in Science: The Culture of Truth* (Ithaca: Cornell University Press, 2003)

Walsh, Kevin, *Representations of the Past: Museums and Heritage in the Post-Modern World* (New York: Routledge, 1992)

TENNYSON'S PROGRESSIVE GEOLOGY

E. E. Snyder
(University of Sheffield)

Abstract

In Tennyson's poem *In Memoriam*, geology provides one potential means to make sense of the experience of grief, by supposing a divine meaning inherent in the physical world that can be discovered through human knowledge. However, Lyell's non-progressive hypothesis challenges this interpretation. Extinction supports natural theological arguments that find seeking traces of God's divine plan within the world problematic, particularly when used for individual comfort in the face of loss. Where grief is concerned the theory of progressive development also requires dramatic alteration. Whilst there is the promise of transcendence, this requires the death of the known and beloved human, and the potential loss of the individual soul in a general self. The sacred dust of the body becomes merely mechanical, employed in creating continents by the action of laws with no divine guidance, and geology proves incapable of speaking to spiritual purpose.

Tennyson's poem separates spirit from the world, positing that, while God directs geological change, it is impossible for humanity to understand his plan through the study of geology. It reaches this conclusion through a reconsecration of the world, seeing the beloved soul as extant in geological time and possessing the ability to take physical action by virtue of its spiritual power. This change is animated by Hallam's transformed but individual spirit and progressive development once again becomes a mechanism for understanding change within the world. Tennyson affirms the primacy of the spiritual, through continued use of geological language to show God's presence in the world. Resolution of the role of human knowledge and its ability to understand God's plan through study of Nature is deferred, the province of the "crowning race".

By the close of the nineteenth century, Tennyson had earned a reputation as a poet who understood science, a reputation which largely rested on *In Memoriam*. Grief in the poem consists of a search for explanation, for reason and rationale. Geology holds out the promise of reason, in the guise of a meaningful world, as an expression of God's design – but this design proves elusive and the earth vacant of spirit and meaning. Throughout the poem, Tennyson reascribes meaning into the world and into the threat of geology.

Tennyson was aware of the theoretical positions both of the Diluvialist and the Uniformitarian schools of geology: Whewell had been his tutor at Cambridge, yet the critical tendency has been to read his poems as informed by the theories of Lyell.1

1 Alfred Tennyson, "To Richard Monckton Milnes. [c. 1 November 1836.]" *The Letters of Alfred Lord Tennyson*, ed. by Cecil Y. Lang and Edgar F. Shannon, 3 vols (Oxford: Clarendon Press, 1982), I, p. 145. Tennyson may well have read of Lyell's ideas before this; Dennis Dean writes, "We know that Tennyson read the *Quarterly Review* in 1827 and based several of his poems upon it. Probably in response to Lyell's remarks on Scrope, then, he wrote a choral celebration of nature's mutability." Dennis R. Dean, *Tennyson and Geology*, (Lincoln: The Tennyson Society, 1985), p. 4.

Lyell's theory, which Whewell named Uniformitarianism, posited that the level of geological change observable in the world could explain the physical composition of the earth. He argued that no extreme cataclysm had devastated the entire globe, but that natural forces operated at their current levels of intensity over an extremely long period of time. In his work *The Great Chain of History*, Nicolaas Rupke provides some perspective on the debate between the Uniformitarians and the Diluvialists, pointing out that the Diluvialists do not represent a fundamentalist position, and that "Catastrophism" is a belatedly labelled theory in response to "Uniformitarianism".2 Through the early and mid-1830s, the Diluvialists searched for evidence of the Biblical flood, but by the late 1830s, this position was largely defunct, its adherents associated with a range of theories centering on progressive development.3 (Due to these problems with the Diluvial name, I will therefore continue to refer to these theories as "Catastrophist", as has been common critical practice). While Tennyson read Lyell, and demonstrated a joking familiarity with his concept of climate change, the language of progressivism, of increasingly-perfect creations interrupted by cataclysm, is a language that was clearly available to Tennyson.4

Both Lyellian Uniformitarianism and Catastrophism embraced large-scale change, though they varied in terms of time period and intensity. They also disagreed on the concept of progressivism: Lyell was vehement in his arguments against the theory of progressive development of species, while this concept was central to the Catastrophist understanding of fossil history.5 Lyell argued in *Principles of Geology* for a cyclical world, in which a beginning cannot be traced, nor an end foreseen. Species, according to Lyell, were immutable and introduced into the world (through mechanisms upon which he did not speculate) to live for a time and eventually become extinct: "Each species may have had its origin in a single pair… and species may have been created in succession at such times and in such places as to enable them to multiply and endure for an appointed period, and occupy an appointed space on the globe".6 Buckland, one of the Catastrophists, argued that the alteration of the earth to suit successive species, including man, attested to a divine plan of creation.7 G. Glen Wickens notes that, "The distinction between the two sides of science remains a useful one if we keep in mind that the conscious aim of the religious scientist was to harmonize mechanism and teleology, while the underlying assumption of the pure observer was that this effort was beyond the scope of science

2 Nicolaas A. Rupke, *The Great Chain of History*, (Oxford: Clarendon Press, 1983), p. 193.
3 Rupke, p. 81-82.
4"Truly we are getting deep into the great Geological winter and inasmuch as a round belly is better than a white head it were to be wished that we might wear down at the pole and grow up at the equator, that is, I would that our waste were greater at the pole and that we had an eye to it at the equator—(See Lyell Pr. Geol.)" Alfred Tennyson, "To Richard Monckton Milnes. [C. 1 November 1836.]" *The Letters of Alfred Lord Tennyson*, I, p. 145.
5 Rupke, p. 149.
6 Charles Lyell, *Principles of Geology*, 3 vols, (London: J. Murray, 1830-1833; repr. London: The University of Chicago Press, 1991), II (1832), p. 124.
7 Rupke. p. 159.

proper".8 Lyell was not a "pure observer," but he was against the idea of directed change, while it was the driving idea behind Catastrophism. It is this impulse to "harmonize mechanism and teleology" informs Tennyson's work. In this regard, *In Memoriam* is not a Lyellian poem.

Progressive development in *In Memoriam* is initially characterized as threatening, requiring a devastating change and potentially obliterating the individual soul. Lyellian geology proves no more comforting, insisting on mass extinctions and non-directionalism, there is no meaning to be found in death. Tennyson eventually recovers a sense of spiritual direction through the figure of Hallam, who causes change through his spiritual powers. In envisioning the beloved spirit as once again animating the world, Tennyson can speak of change as evidence of a divinely directed plan. He returns to the idea of progressive development, although he no longer looks to geology to provide knowledge of God, instead using it as support for an already-determined spiritual explanation.

The first stanzas of the Prologue set forth a model by which to read the eventual reconciliation of faith and geology that is reached over the course of *In Memoriam*:

> Strong Son of God, immortal Love
> Whom we, that have not seen thy face,
> By faith, and faith alone, embrace,
> Believing where we cannot prove;
>
> …
>
> Our little systems have their day;
> They have their day and cease to be:
> They are but broken lights of thee,
> And thou, O Lord, art more than they.
>
> We have but faith: we cannot know;
> For knowledge is of things we see;
> And yet we trust it comes from thee,
> A beam in darkness: let it grow.9 (Prologue. 1-4; 17-24)

The poem opens with God the Maker, the benevolent deity who loves His creation. This is no watchmaker God, creating the world only to leave it to run on its own: He

8 G. Glen Wickens, "The Two Sides of Early Victorian Science and the Unity of The Princess", *Victorian Studies: A Journal of the Humanities, Arts and Sciences*, 23, (1980), 369-88 (p. 376).
9 Alfred Tennyson, *The Poems of Tennyson*, ed. by Christopher Ricks (London: Longman Group Limited, 1969), pp. 861-63.

directly controls both life and death, and Christ has experienced both. Man and man's knowledge are portrayed as limited, restricted to the first-hand incomplete knowledge of "little systems" that are only partial reflections of God. This knowledge then requires faith to fill its inadequacies. Gerhard Joseph writes

> Knowledge as inductive reasoning and scientific demonstration—the 'knowledge... of things we see'—was an obsessive menace for Tennyson primarily during the 1830s, when he wrestled with the new astronomy and tried to reconcile with a traditional biblical faith such shocks as Lyell's *Principles of Geology*.10

Joseph articulates the poem's shift from knowledge to trust; asserting that some questions cannot be answered from empirical study. Indeed, knowledge impedes the comfort sought; as Patricia O'Neill writes, "Throughout [*In Memoriam*], Tennyson rehearses the arguments for and against the idea of an afterlife and the existence of an immortal soul; however, his desire for such assurances is thwarted by his understanding of natural history".11 It was a commonplace in defences of geological study that knowledge of God's works led to greater understanding of and appreciation for their Creator. However, *In Memoriam* does not find that evidence of a divine plan necessarily leads to greater faith.12

In poem XXI, others overhear the poet's elegy, and respond to it:

> A third is wroth: 'Is this an hour
> For private sorrow's barren song,
> When more and more the people throng
> The chairs and thrones of civil power?
>
> 'A time to sicken and to swoon,
> When Science reaches forth her arms
> To feel from world to world, and charms
> Her secret from the latest moon?'13 (XXI. 13-20)

10 Gerhard Joseph, "Tennyson's Concepts of Knowledge, Wisdom, and Pallas Athene", *Modern Philology*, 69.4 (1972), 314-22 (p. 319).
11 Patricia O'Neill, "Victorian Lucretius: Tennyson and the Problem of Scientific Romanticism", in *Writing and Victorianism*, ed. by J.B. Bullen (London: Longman, 1997), pp. 104-19 (p. 107).
12 See for instance G. Poulett Scrope's review of *Principles of Geology*, Vol. 1, which states that geology can "Elevate the mind to the contemplation of the infinite source of all being, by the knowledge of the grandest and most imposing of His works." [G. Poulett Scrope], "Principles of Geology, being an attempt to explain the former Changes of the Earth's Surface, by a reference to Causes now in operation", *Quarterly Review*, 43.86 (October 1830), 411-469 (pp. 411-412).
13 Tennyson, p. 883.

The listener chides the poet for giving time to private sorrow, in the face of ongoing public problems and triumphs. Science is shown as a conquering force. The two threats to sorrow's song, in this poem, are the threat of populist revolution and the conquest of astronomy's secrets by human learning. The speaker implies that public affairs demand the attention the poet wishes to give to private grief, but the conjunction of scientific knowledge with political unrest creates uncertainty about the very progress the speaker wishes to praise. Science, even when spoken of approvingly remains an unsettled and unsettling concept; while its mastery is framed as increasing, it may threaten established systems of order in a manner akin to mob rule. Additionally, although Science exists in the public sphere Tennyson makes continued use of it within the personal sphere as a schematic with which to attempt to make sense of private sorrow. While Tennyson sets up an opposition between science and grief in this verse, he in fact mingles them by using the "public" language of science as metaphor and aid to understanding intensely personal experience.

The public science decribed in this section is astronomy. Susan Gliserman draws a firm distinction between Tennyson's uses of astronomy and geology:

> To organize the nurturing cosmos of In Memoriam, Tennyson frequently draws on his reading in astronomy; to organize the landscapes of a hostile and aggressive environment, he draws on his reading in geology… The latter threatens to impose an identity on him; the former enables him to find himself in a world which seems to be an enlargement of his capacity for love and a realization of his wish for beneficent order.14

Although this essay focuses on geological metaphor, it is worth noting the division between the treatment of geological landscapes and astronomical ones. The two sciences were frequently compared during the early part of the nineteenth century, and Lyell often referred to the progress of astronomy as similar to that of geology, likening empty space in the universe to the expanse of geological time.15 For *In Memoriam*, the many distant worlds of astronomy are a positive figure of possibility; the shifting, cataclysmic landscape of this world, however, brings loss with it.

Just after the Prologue, hints of the conflict between faith and human experience appear:

14 Susan Gliserman, "Early Victorian Science Writers and Tennyson's In Memoriam: A Study in Cultural Exchange", *Victorian Studies* 18 (1975), 277-308, 437-59 (p. 442).

15 "The inadequacy of our conceptions of the earth's antiquity [have] cramped the freedom of our speculations in this science [geology], very much in the same way as a belief in the existence of a vaulted firmament once retarded the progress of astronomy." Charles Lyell, *Principles of Geology*, 3 vols, (London: J. Murray, 1830-1833; repr. London: The University of Chicago Press, 1991), III (1833), p. 97.

I held it truth, with him who sings
To one clear harp in divers tones,
That men may rise on stepping-stones
Of their dead selves to higher things.16 (I. 1-4)

This formulation resembles the Epilogue: there is a movement toward a better type of humanity, but in this case, that movement requires death. The transformation of a man into something higher is both threat and consolation simultaneously. Geological language here offers comfort of dubious nature, for embracing progress as a goal requires alteration of form, leaving the dead selves behind; the worry, then, is that the new, higher form will be unrecognisable. The mixed consolation and concern offered by progressive development recurs in poem XXX:

Our voices took a higher range;
Once more we sang: 'They do not die
Nor lose their mortal sympathy,
Nor change to us, although they change…'17 (XXX. 21-24.)

The diction of this poem speaks of the alteration the human soul has undergone: the voices have a "higher range," mirroring the hoped-for higher range of the dead. At the same time the song addresses the fear that the dead are no longer as their loved ones would remember them, either because they have become omniscient, watching over the living with no pity for their spiritual weakness, or they have merged into one general soul.

Tennyson confronts this fear again in poem XLVII, writing:

That each, who seems a separate whole,
Should move his rounds, and fusing all
The skirts of self again, should fall
Remerging in the general Soul,

Is faith as vague as all unsweet:
Eternal form shall still divide
The eternal soul from all beside;

16 Tennyson, p. 864.
17 Tennyson, p. 890.

> And I shall know him when we meet…18 (XLVII. 1-8.)

The fear once again is of change: change from living to dead, a sharp division between matter and spirit, one form from another. Progression to something "higher" implies advancement, desirability, but this idea of transcendence cannot remove the regret for that which was transcended – the individual beloved soul. The poem itself shifts from general statement, mentioning "each" unspecified individual and the "general Soul", to the highly personal "and I shall know him when we meet". The poet faces immutable alteration, but holds out hope that the transformation is not entire, and that something of the individual remains. Progressive development of this sort therefore does not offer an uncomplicated or immediate relief from sorrow.

Tennyson searches for evidence of a divine plan in the world, but instances of change in nature prove ambiguous or threatening. Geological theories of observable change provide evidence contradicting hopes of a spiritual transformation capable of retaining elements of the human self within it. Lyellian geology gives a model of reading the world in which all things continually transform, but these alterations are not directed by God's hands. Isobel Armstrong explains the connections between geological change and the experience of death:

> The geological model makes it possible to reconstruct continuities out of rupture itself, as the massive diachronic subsidence and shift of deposits from one era to another creates an 'economy' (Lyell's word) which destroys in one place and repairs with the residues of a former age in another. The poem… lyricises the constant flux of displacement which is both undermining and reassuring.19

Lyell's theories threaten to any use of geological metaphor for spiritual purposes: the Uniformitarian world is non-directional, full of constant death and small cataclysms. It offers no hope of respite, and nothing safe from eventual alteration.

Lyell's economy of change comes across as explicitly threatening in poem XXXV:

> Yet if some voice that man could trust
> Should murmur from the narrow house,
> 'The cheeks drop in; the body bows;

18 Tennyson, p. 904.
19 Isobel Armstrong, "Tennyson in the 1850s: From Geology to Pathology—In Memoriam (1850) to Maud (1855)", in *Tennyson: Seven Essays*, ed. by Philip Collins (New York: St. Martin's, 1992), pp. 102-140 (p. 104).

> Man dies: nor is there hope in dust:'
>
> Might I not say? 'Yet even here,
> But for one hour, O Love, I strive
> To keep so sweet a thing alive:'
> But I should turn mine ears and hear
>
> The moanings of the homeless sea,
> The sound of streams that swift or slow
> Draw down AEonian hills, and sow
> The dust of continents to be…20 (XXXV. 1-12.)

The poem presupposes spirit in the existence of a voice speaking from beyond the grave, but that spirit dashes the hopes of the listener. The second stanza attempts to create meaning within this world, without reference to any overarching principle, but the Lyellian imagery of the third stanza contradicts it, using more examples drawn from observable phenomena: he eventual fate of dust, the fate of the attempt to keep love alive. Lyell writes in Volume 2 of the *Principles of Geology*, turning from destruction to creation, "We have hitherto considered the destroying agency of running water, as exhibited in the disintegration of rocks and transportation of matter from higher to lower levels. It remains for us to examine the reproductive effects of the same cause".21 Though the dust can be used in building future continents, nothing remains of the original hills. The dust is subsumed in its new creation, entirely transformed through mechanical action lacking a directing spirit. Michael Tomko writes

> The "wandering" through "grief" and "sin" of the tormented sections of *In Memoriam* are a journey through undivided desire to the propositions of bifurcation asserted in the opening section of the prologue…. Lyell's geology, far from introducing a crisis that needs to be overcome, provides a salutary demystification of dust that allows Tennyson to forego his "little systems" in order to experience mystically the spiritual qua spiritual and the physical qua physical. Lyell's geology is only critical in so far as it is conciliatory, offering a means to overcome traditional Christian cosmology with dynamic

20 Tennyson, p. 893.
21 Charles Lyell, *Principles of Geology*, 3 vols, (London: J. Murray, 1830-1833; repr. London: The University of Chicago Press, 1991), I (1830), p. 220.

spiritualism.22

I read Lyell's geology in *In Memoriam* as providing both crisis and demystification; I also disagree that the split between spirit and body is as well-divided as Tomko proposes. Tennyson arrives at a reading of the world imbued with Spirit—but in doing so he continues to look to the geological world. He does not expect geology to explain God, but he does refer to progressive spiritual development as evidenced by geological change. The bifurcation that Tomko proposes between spirit and bodycan only be achieved by use of the very terms that it seeks to exclude.

In poem LV, the possibility that the actions of Nature are not part of an overarching divine plan proves terrifying:

> The wish, that of the living whole
> No life may fail beyond the grave,
> Derives it not from what we have
> The likest God within the soul?
>
> Are God and Nature then at strife,
> That Nature lends such evil dreams?
> So careful of the type she seems,
> So careless of the single life;
>
> That I, considering everywhere
> Her secret meaning in her deeds,
> And finding that of fifty seeds
> She often brings but one to bear,
>
> I falter where I firmly trod,
> And falling with my weight of cares
> Upon the great world's altar-stairs
> That slope through darkness up to God,
>
> I stretch lame hands of faith, and grope,
> And gather dust and chaff, and call
> To what I feel is Lord of all,
> And faintly trust the larger hope.23 (LV. 1-20.)

22 Michael Tomko, "Varieties of Geological Experience: Religion, Body, and Spirit in Tennyson's *In Memoriam* and Lyell's *Principles of Geology*", *Victorian Poetry*, 42.2 (2004), pp. 113-33 (p. 124).
23 Tennyson, p. 910.

The first stanza seeks a logical basis for spirit. The idea of God should act, by this reasoning, as evidence of God: the existence of a soul capable of conceiving God is proof of its creation by deity. However, that basis for faith is at odds with an empirical understanding of the creation. Nature is no longer the hands by which love moulds the world; Nature manages the daily business of dying. God's power is not manifested in the deadly struggle that characterises the creation. As Aidan Day writes, "Lyell's thesis influenced the way that Tennyson sees, in sections LV and LVI, a divorce of interest between God and the organic world. Lyell's perspective did not posit any special connection between the animate world, including humanity, and some divine spiritual reality."24 Tennyson turns to gathering dust—with lame hands (unlike the confident reach of Science in poem XXI), he assembles the dust of the world, of Lyell's continents to be, formed from the sacred dust from which the spirit has departed. He turns to that faint word, trust, presaging faith.

Poem LVI dashes the faint hope of the last section, providing evidence of Nature's lack of care:

'So careful of the type?' but no.
From scarpèd cliff and quarried stone
She cries, 'A thousand types are gone:
I care for nothing, all shall go.

'Thou makest thine appeal to me:
I bring to life, I bring to death:
The spirit does but mean the breath:
I know no more.' And he, shall he,

Man, her last work, who seemed so fair,
Such splendid purpose in his eyes,
Who rolled the psalm to wintry skies,
Who built him fanes of fruitless prayer,

Who trusted God was love indeed
And love Creation's final law—
Though Nature, red in tooth and claw
With ravine, shrieked against his creed—

Who loved, who suffered countless ills,
Who battled for the True, the Just,
Be blown about the desert dust,

24 Aidan Day, *Tennyson's Scepticism* (Basingstoke: Palgrave Macmillan, 2005), p. 118.

Or sealed within the iron hills?25 (LVI. 1-20.)

In this section, Tennyson reduces the mechanical process of breathing. Nature threatens extinction, an end to the species and to the individual soul, existing in the space between the personal "he, shall he" and the general "Man" of the next line. The individual is transformed into the species. Nature cries from the cliff and quarried stone—the evidence of fossilisation literally speaks of its own extinction. The faith in God of the Prologue is changed to the ravages of Nature: "Thou madest Life… Thou madest Death" echoes the "I bring to life, I bring to death" of the uncaring mechanism, rendered meaningless through lack of faith or evidence of a soul. Nature that operated by God's love has been replaced by a worldly force; the voice of extinct fossils tells of a world in which change brings no transcendence (dust in this poem is neither sacred, nor mechanically constructive). The process of creating meaning out of evidence has resulted only in further despair. From this point, the poem no longer attempts to build a theological argument from the evidence of the natural world.

Hallam precipitated the search for consolation in the world, for evidence of God, and here provides the path to consolation. The poetry moves toward an identification of Hallam with the world, re-infusing it with spirit. First, the poem reframes the problems of geological time:

So many worlds, so much to do,
    So little done, such things to be,
    How know I what had need of thee,
For thou wert strong as thou wert true?

The fame is quenched that I foresaw,
    The head hath missed an earthly wreath:
    I curse not nature, no, nor death;
For nothing is that errs from law.

We pass; the path that each man trod
    Is dim, or will be dim, with weeds:
    What fame is left for human deeds
In endless age? It rests with God.

O hollow wraith of dying fame,
    Fade wholly, while the soul exults,
    And self-infolds the large results

25 Tennyson, pp. 911-12.

Of force that would have forged a name.26 (LXXIII. 1-16.)

In LXXIII, Tennyson re-ascribes the operations of nature to the laws of God—but offers no explanations of the workings of that law. Any investigation of the operation of natural laws would be scientific, privileging human knowledge in its ability to understand the universe. The poem begins to move firmly from knowledge of laws that operate, to faith that there are laws and that their operation will make sense on a grander scale. The figure of Hallam is part of this transformation, as his personal energies "self-infold". Hallam becomes translated more and more to the spiritual plane in the second half of the poem, but his spirit is also seen as infusing the physical world he lived in, and his powers begin to affect it.

In LXXIII, the lengthy span of geological time stretches, to become a tragedy on the scale of a human life. Tennyson again considers this great span of time a few poems later:

What hope is here for modern rhyme
To him, who turns a musing eye
On songs, and deeds, and lives, that lie
Foreshortened in the tract of time?27 (LXXVII. 1-4.)

There is no hope in the language of the poem, if not for something larger than geological time. Geological language must be brought under the sway of a force more powerful than itself. Where geology, with its clear instances of mass death, posed a threat to individual meaning, it will be re-inscribed in the sacred, brought in to describe, though not explain the worth and operation of powers larger than itself. It is recreated as metaphor for Hallam, and for God.

The change from worldly doubt to faith in the benevolent governance of nature is not easy, nor is it carried out all in one step.

So word by word, and line by line,
The dead man touched me from the past,
And all at once it seemed at last
The living soul was flashed on mine,

And mine in this was wound, and whirled
About empyreal heights of thought,

26 Tennyson, p. 924.
27Tennyson, p. 926.

And came on that which is, and caught
The deep pulsations of the world,

Aeonian music measuring out
The steps of Time—the shocks of Chance—
The blows of Death. At length my trance
Was cancelled, stricken through with doubt.28 (XCV. 33-44.)

This poem is transitional, beginning a slow change (Armstrong notes that "Lyell's model of 'gradual change in the living creation' is negotiated in the movement of *In Memoriam* itself").29 The transformation begins in the wild riot of despair in geology, of despair in finding any external foundation for divine meaning. The poem moves toward a faithful resolution by means of visionary moments where the cataclysms of the world are "measured" by music, or move to the measures *of* music (a song like the swallow-flights of lyric, but not foreshortened by geological time) this movement is accomplished despite (and through) continual slippage into doubt. The trance is brought on by Hallam's letters, and the imputation of the presence of the dead man as a living soul in the world. It is still a "trance," however, not something integrated with daily experience, and it is "cancelled" — not entirely negated by doubt.

In poem CXII, Tennyson's contemplation of Hallam's life and soul leads to the beginnings of a reconsecrated model of the world:

For what wert thou? some novel power
Sprang up for ever at a touch,
And hope could never hope too much,
In watching thee from hour to hour,

Large elements in order brought,
And tracts of calm from tempest made,
And world-wide fluctuation swayed
In vassal tides that followed thought.30 (CXII. 9-16.)

In this poem the spirit of the dead man and thought are tied to the physical action of the elements. His power extends, bringing order to the experience of "world-wide fluctuations"; "vassal tides" follow "thought," and "tracts of calm" created out of

28 Tennyson, pp. 946-947.
29 Armstrong, p. 102.
30 Tennyson, pp. 964-65.

catastrophe expand through the world. There is a directing force, the beloved soul, and that force acts to calm the experience of cataclysm. Tennyson uses the language of geology without looking to the science of it in this passage—he offers no empirical justification for the calm it claims.

From calm to cataclysm, Hallam's spirit spreads its influence:

> A life in civic action warm,
> A soul on highest mission sent,
> A potent voice of Parliament,
> A pillar steadfast in the storm,
>
> Should licensed boldness gather force,
> Becoming, when the time has birth,
> A lever to uplift the earth
> And roll it in another course,
>
> With thousand shocks that come and go,
> With agonies, with energies,
> With overthrowings, and with cries,
> And undulations to and fro. 31(CXIII. 9-20.)

The actions that Hallam would have taken had he lived are compared to the cataclysms that cause the devastation over which Tennyson had previously despaired. The "self-infolded" spiritual power of the beloved soul take on the language of geological change to describe the alterations that Hallam would have wrought (in this world) had he lived. This movement, imagining Hallam as capable of "uplifting" the earth in a way that causes cataclysmic agonies instead of calm places faith in a God-directed world, despite the geological evidence of extinction. In the next poem, Tennyson continues this movement describing the role of human knowledge: subservient to the rule of the soul. Knowledge can never be sufficient to explain the actions of a spirit-infused world.

By poem CXVIII, geological time is fully comprehended within the rule of sacred time.

> Contemplate all this work of Time,
> The giant labouring in his youth;
> Nor dream of human love and truth,

31 Tennyson, p. 965.

As dying Nature's earth and lime;

But trust that those we call the dead
Are breathers of an ampler day
For ever nobler ends. They say,
The solid earth whereon we tread

In tracts of fluent heat began,
And grew to seeming-random forms,
The seeming prey of cyclic storms,
Till at the last arose the man;

Within himself, from more to more;
Or, crowned with attributes of woe
Like glories, move his course, and show
That life is not as idle ore,

But iron dug from central gloom,
And heated hot with burning fears,
And dipt in baths of hissing tears,
And battered with the shocks of doom

To shape and use. Arise and fly
The reeling Faun, the sensual feast;
Move upward, working out the beast,
And let the ape and tiger die.32 (CXVIII. 1-28.)

This poem marks a firm return to the directed, progressive development of species, and of the earth itself. The phrase "seeming-random" implies that there is nothing truly random about the forms of the world's development; the "seeming prey" in the next line reinforces that human knowledge cannot comprehend the directionalism of geological change, but that direction exists. Though the phrase "cyclic storms" could imply aspects of Lyellian geology, the iron ore metaphor, and its connection to the nebular hypothesis, which specified a world begun "in tracts of fluent heat," suggests a Catastrophist geological system at work. The iron ore metaphor, firstly, implies that all human suffering, "tears" and "shocks," are purposeful. Secondly, the metaphor recalls a progressivist geological theory which held that the world had cooled from a great heat and moved through several stages of life, before it became perfectly

32 Tennyson, p. 968-70.

habitable for humans.33 Both human life and the earth have been shaped by an active force: transformed through suffering for "nobler ends." This poem also clearly states the idea that humanity is still a work in progress, moving up the chain of being into a spiritual realm, removed from the threat of being like animals in physicality, or, presumably, extinction. Dennis Dean writes,

> With poem CXV, however, the great Lyellian winter of geological doubt is over. Precisely what happened to alleviate Tennyson's geological anxieties is unclear, but such optimism had become very popular. Thus, in a brief commentary upon Richard Owen's famous paper announcing a new order of prehistoric life called dinosaurs, *Literary Gazette* eloquently characterized the history of past life as a progressive series of successively more perfect creations culminating in Man (who 'even yet may be but the link upwards to a higher gradation in the scale of being'). Babbage too, no later than November 1842, reassured Tennyson and others that geological change was purposeful and benevolent.34

The idea of progressivism is, as we have seen, not a new one for English geology, nor for Tennyson. However, it does return in great strength in the latter parts of *In Memoriam*, banishing the fears associated with the lack of directionality for change (of landmasses and species) in *Principles of Geology*.

In section CXX, Tennyson sums up the poem's new relation of scientific knowledge to spiritual understanding:

> I trust I have not wasted breath:
> I think we are not wholly brain,
> Magnetic mockeries; not in vain,
> Like Paul with beasts, I fought with Death;
>
> Not only cunning casts in clay:
> Let Science prove we are, and then
> What matters Science unto men,
> At least to me? I would not stay.
>
> Let him, the wiser man who springs

33 Stephen Jay Gould, "The Tooth and Claw Centennial", in *Dinosaur in a Haystack* (New York: Crown, 1995), pp. 63-75 (pp. 71-72).
34 Dean, pp. 11-12.

> Hereafter, up from childhood shape
> His action like the greater ape,
> But I was *born* to other things.35 (CXX. 1-12.)

Beasts and death are conjoined in the first stanza: the animal part of the world is the part that dies with no hope of resurrection. Tennyson's vision of man's role moves away from the sensuous, and the prospect of eternal death embodied in the dead fossils, characterised as "cunning casts in clay" that record extinctions. The breath of this poem is not wasted, like the spirit-breath of Nature in LVI; instead, it denies that reading nature provides true knowledge of the spirit. God is not evident in the mechanism of geology, and scientific theorising, though not intentionally inimical to faith, can give no consolation and no direct route to God. (Some confusion of terms remains: the spiritual conviction of an eternal soul is expressed in terms of human knowledge: "I think we are not wholly brain"). Buckland, one of the Catastrophists, sees fossils as nearly scriptural, where Lyell uncomfortably reads man as a separate creation and a moral epoch in the world. Meanwhile, Tennyson refutes notions the physical could act as a guide to the spiritual.36 Aidan Day writes that

> What is important is that, after having been gravely disconcerted by the insights of rational science upon reading Lyell's *Principles*, Tennyson does not react in any crass way against scientific perspective in his conclusion to *In Memoriam*. Tennyson may write, in section CXX, 'What matters Science unto men?" (CXX.7), but the conclusion of *In Memoriam* shows that it continues to matter a great deal to him.37

More than not reacting against scientific perspective, I argue that Tennyson returns to geology as support for spiritual interpretations, reading the spiritual back into the physical world as evidence of divine direction without looking to it to explain the spiritual. Tennyson's attempts in the latter part of *In Memoriam* to read the changing world by his spiritual philosophy mix geological and religious elements.

This mingling of the geological and the spiritual can be seen in poem CXXIV.

35 Tennyson, pp. 970-71.
36 In a discussion of Buckland's Bridgewater Treatise, Rupke writes, "From the outset he emphasized that the language of rocks and fossils are as much a divine revelation of truth as the language of the Bible." Rupke, p. 204."No one of the fixed and constant laws of the animate or inanimate world was subverted by human agency, and… the modifications produced were on the occurrence of new and extraordinary circumstances, and those not of a *physical*, but a *moral* nature." Lyell, I, p. 164.
37 Aidan Day, p. 138.

I found Him not in world or sun,
Or eagle's wing, or insect's eye;
Nor through the questions men may try,
The petty cobwebs we have spun:

If e'er when faith had fallen asleep,
I heard a voice 'believe no more'
And heard an ever-breaking shore
That tumbled in the Godless deep;

A warmth within the breast would melt
The freezing reason's colder part,
And like a man in wrath the heart
Stood up and answered 'I have felt.'

No, like a child in doubt and fear:
But that blind clamour made me wise;
Then was I as a child that cries,
But, crying, knows his father near;

And what I am beheld again
What is, and no man understands;
And out of darkness come the hands
That reach through nature, moulding men. (CXXIV. 5-24.)

Over the course of the poem, Tennyson tests the theory that study of the world will by necessity lead to the Creator, ultimately finding his theory wanting in consolation. The evidence of the physical world, even evidence most often called upon to attest to the divine perfection of creation (such as the mechanism of the eye, which had been used by Paley as an example of the sort of biological complexity that implies the existence of a Creator), do not offer proof of God. In Tennyson's view, study of the natural world creates only "petty cobwebs" of human knowledge. In poem XXV, when a spirit-voice denied the possibility of an afterlife, Tennyson marshalled an initial response of faith, only to have it countered. In CXXIV, the spirit-voice receives the subjective response, "I have felt," which serves to melt "freezing reason." Dean writes that "The essential change [in Tennyson has] been his subjective conclusion that laws of matter do not apply to spirit."38 That conclusion, though, leads to a further enmeshing of the physical and spiritual world: God's hands reach out *through nature* to enact God's plan, and God's plan concerns men, specifically.

38 Dean, p. 13.

The acceptance of alteration as a necessary part of God's design begins with Hallam's spirit re-entering the living world and acting upon it, and change extends to this spirit too.

> Thy voice is on the rolling air;
> I hear thee where the waters run;
> Thou standest in the rising sun,
> And in the setting thou art fair….
>
> Though mixed with God and Nature thou,
> I seem to love thee more and more. (CXXX. 1-4, 11-12.)

While Tennyson maintains that the soul will retain its individual characteristics, the identification of the spiritual force of Hallam's soul with the force of geological change has not only reconsecrated the world, but also mingled Hallam with God, acting through Nature in a strange trinity. The vision of Hallam's spirit in the world enables Tennyson to posit God and Nature as no longer at strife.

In the Epilogue, Tennyson's use of a directionalist, progressive geology operating under the guidance of a loving God is solidified through the image of the wedding, the child to be, and the ongoing development of mankind:

> …A soul shall draw from out the vast
> And strike his being into bounds,
>
> And, moved through life of lower phase,
> Result in man, be born and think,
> And act and love, a closer link
> Betwixt us and the crowning race
>
> Of those that, eye to eye, shall look
> On knowledge; under whose command
> Is Earth and Earth's, and in their hand
> Is Nature like an open book;
>
> No longer half-akin to brute,
> For all we thought and loved and did,
> And hoped, and suffered, is but seed
> Of what in them is flower and fruit;
>
> Whereof the man, that with me trod

This planet, was a noble type
Appearing ere the times were ripe,
That friend of mine who lives in God,

That God, which ever lives and loves,
One God, one law, one element,
And one far-off divine event,
To which the whole creation moves.39 (Epilogue. 123-144.)

Nature takes on a subordinate role; where she once decided the destinies of men and other species, now the development of the crowning race will remove her control over humanity. This separation between humanity and Nature is created over the course of the poem, and must be maintained by it and in making that division, the formerly "fruitless prayer" becomes "flower and fruit". The creation of a boundary between God and Nature becomes its own complication: the hands that reach out from darkness utilise progressive development, and the description of God's unknowable plan for the world draws on experienced cataclysm. The metaphoric identification of Hallam's personal abilities and the geological changes of the world provides a scheme by which the world can be understood as an expression of working spirituality. The standard phrase, he "lives in God," here implies Hallam's existence as an individual who also lives in the God . His spirit is merged yet individually extant. The ending of the Epilogue is characterised by its enjambement, which creates continual linkages across the stanzas; as the poem ends, full stops are replaced by semi-colons, continually elaborated clauses, connections.

Ideas of progressive change are initially comfortless in *In Memoriam*, because they threaten the survival of individuality through great alteration; Lyellian ideas of change appear randomly destructive and the use of geological models to explain death fails to produce spiritual meaning. However, after an act of faith which reads Hallam's spirit as extant in the physical world, Tennyson can posit a world in which cataclysm has hidden, beneficent ends. Geology is once again marshalled for use in a progressivist argument, but no longer relies on human knowledge of geological systems to establish its actual existence. Tennyson continues to read the physical world as an expression of a spiritual principle; the challenge posed by Lyellian geology has been overcome by assuming a separation and resolution that is not actually reached, only deferred: the crowning race will be capable of looking at human knowledge and understanding the direction of spirit in it. To them, if not to Tennyson, Nature will be "like an open book." Tennyson reads geology as subordinate to this spiritual resolution (the world operates as God and Hallam's spirit direct), and provides proof which cannot be empirically deciphered by human knowledge. Tennyson makes geological evidence serve the entirely subjective

39 Tennyson, pp. 986-88.

conclusion of faith. The central expression of this support is the re-claimed idea of progressive development, which implies directionality, and divine intent in the direction.

Bibliography

Armstrong, Isobel, "Tennyson in the 1850s: From Geology to Pathology—In Memoriam (1850) to Maud (1855)", in *Tennyson: Seven Essays*, ed. by Philip Collins (New York: St. Martin's, 1992), 102-140

Day, Aidan, *Tennyson's Scepticism* (Basingstoke: Palgrave Macmillan, 2005)

Dean, Dennis R., *Tennyson and Geology* (Lincoln: The Tennyson Society, 1985)

Gliserman, Susan, "Early Victorian Science Writers and Tennyson's In Memoriam: A Study in Cultural Exchange", *Victorian Studies* 18 (1975), 277-308, 437-59

Gould, Stephen Jay, "The Tooth and Claw Centennial", in *Dinosaur in a Haystack* (New York: Crown, 1995), 63-75 (p. 71-72)

Joseph, Gerhard, "Tennyson's Concepts of Knowledge, Wisdom, and Pallas Athene", *Modern Philology*, 69.4 (1972), 314-22

Lyell, Charles, *Principles of Geology*, 3 vols, (London: J. Murray, 1830-1833; repr. London: The University of Chicago Press, 1991), I-III

O'Neill, Patricia, "Victorian Lucretius: Tennyson and the Problem of Scientific Romanticism", in *Writing and Victorianism*, ed. by J.B. Bullen (London: Longman, 1997), 104-19

Rupke, Nicolaas A., *The Great Chain of History*, (Oxford: Clarendon Press, 1983)

[Scrope, G. Poulett], "Principles of Geology, being an attempt to explain the former Changes of the Earth's Surface, by a reference to Causes now in operation", *Quarterly Review*, 43.86 (October 1830), 411-469

Tennyson, Alfred, *The Letters of Alfred Lord Tennyson*, ed. by Cecil Y. Lang and Edgar F. Shannon, 3 vols (Oxford: Clarendon Press, 1982), I

Tennyson, Alfred, *The Poems of Tennyson*, ed. by Christopher Ricks, (London: Longman Group Limited, 1969)

Tomko, Michael, "Varieties of Geological Experience: Religion, Body, and Spirit in Tennyson's *In Memoriam* and Lyell's *Principles of Geology*", *Victorian Poetry*, 42.2 (2004), 113-33

Wickens, G. Glen, "The Two Sides of Early Victorian Science and the Unity of The Princess", *Victorian Studies: A Journal of the Humanities, Arts and Sciences*, 23 (1980), 369-88

BEAUTY AS A TERMINISTIC SCREEN IN CHARLES DARWIN'S *THE DESCENT OF MAN*

Kate Holterhoff
(Carnegie Mellon University)

Abstract

This paper analyzes the term *beauty* in Charles Darwin's *The Descent of Man* (1871) using Kenneth Burke's rhetorical tool, the terministic screen. I argue that by establishing what meanings, ideologies and prejudices the term beauty alternately reveals and conceals in Darwin's prose, scholars can better understand how Darwin reinforced a number of racial, gender, and colonial stereotypes while subtly shifting Victorian British modernity away from anthropocentrism. Although *Descent* analyzes a variety of species to argue for the importance of sexual selection and its frequent instrument beauty, and argues that the principal function of beauty is sexual selection; a truth encompassing the animal kingdom and 'savage' races, yet innovatively stretched to include 'civilised' (*i.e.* European) human beings. Focusing on beauty exposes *Descent*'s radical conclusion that while culture differentiates and ranks species, beauty connects and therefore humanity is neither separate from nor superior to the remainder of the animal kingdom.

I compare the definitions and roles of beauty formulated by nineteenth-century cultural critics John Ruskin, Edmund Burke, William Paley, and evolution critic George Campbell with those of Darwin to illustrate the complexity of this terministic screen. By using an aesthetic concept familiar in Victorian England, then shifting and adding to this convention, Darwin changed beauty into a term that both filters and mediates meaning, resulting in both the alteration and reinforcement of multiple issues in the accepted ontology of nineteenth-century Europeans. Analyzing the intersection between Darwin's rhetoric and his theories regarding aesthetics in evolution and sexual selection is essential because, far from a passive descriptor of physical objects, the aesthetic terminology in *Descent*, and beauty in particular is both a dynamic and fraught terministic screen.

Sometimes we can watch Darwin seeking to contain implications 1

What scientists do is interpret the empirical domain. What rhetors do is influence one another. What scientists do as rhetors is influence one another about interpretations of the empirical domain. 2

Darwinian aesthetics are generally discussed as the purview of biological specialists, not cultural critics. The cultural critic interested in tracing Charles Darwin's aesthetically charged rhetoric enters a wide field since much has been written about Charles Darwin as rhetorician (see Campbell Moore), while a mostly separate

1 Gillian Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction* (London: Routledge, 1983), p 55.
2 Allen R. Harris, 'Rhetoric of Science', *College English* 53.3 (Mar., 1991), p. 284.

catalogue surveys Darwinian aesthetics (see Hersey; Singh; Smith; Thornbill). This research remains inadequate because *On the Origin of Species by Means of Natural Selection* (1859) provides the primary text for most rhetorical exegesis, and, for the most part, contemporary critics fail to address two important issues. First, there has been little analysis of the relationship between aesthetics and Darwin's own language, and secondly there has been little critical study of how word choice functions in Darwin's exposition on sexual selection: *The Descent of Man, and Selection in Relation to Sex* (1871).

Aesthetic terminology in Darwin's writing is far from a one-dimensional descriptor of physical objects; as Gillian Beer reminds us, Darwin's evolutionism is 'rich in contradictory elements which can serve as a metaphorical basis for more than one reading of experience'. 3 The discourse of sexual selection is laden with aesthetic terminology. Since aesthetics are often a sphere as accessible to lay audiences as to scientific ones, *Descent's* engagement with aesthetics was culturally important for his contemporary readers, meaning that we need to see what meanings, ideologies, and prejudices Darwinian aesthetics alternately reveal and conceal.

I propose using Kenneth Burke's theory of terministic screens to analyze Darwinian aesthetics in *The Descent of Man*, particularly the term *beauty*. Although less canonical than *Origin* both today and during the nineteenth century, *Descent* contains one of Darwin's most revolutionary theses. This landmark text, contending that in evolution sexual selection plays a role of equivalent importance to natural selection, deserves greater cultural and rhetorical recognition. Critical disregard for *Descent* likely stems from the milieu of unpopular propositions cursorily implied in 1859, yet stated with striking candour by 1871. These arguments include the assertion of humanity's ape ancestry: 'man is descended from a hairy, tailed quadruped, probably arboreal in its habits'; principles foreshadowing eugenics, counselling '[b]oth sexes...to refrain from marriage if they are in any marked degree inferior in body or mind' and the presciently addressed, yet authoritatively dismissed, Christian opposition to evolution: 'this work will be denounced by some as highly irreligious'. 4 Contemporary rhetorical and cultural critics must analyze Darwin's polemical thesis in earnest since sexual selection transformed the way Victorians understood genealogy; moreover, *Descent*'s aesthetic discourse often resembles anthropology and cultural criticism more than biology or natural history.

Kenneth Burke's earlier terministic screens, developed in *Language as Symbolic Action* (1966), are a useful tool in cultural studies for parsing rhetorical agendas and understanding the power structures behind seemingly innocuous terms. As such Burke resembles Raymond Williams's advocacy in *Keywords* (1976) of the cultural and semantic importance of words in order to understand 'social and

3 Beer, p. 9.

4 Charles Darwin, *The Descent of Man and Selection in Relation to Sex*, ed. by James Moore and Adrian Desmond (New York: Penguin, 1871; repr. 2004) pp. 678; 688; 683. Further page references will be given parenthetically in the text.

intellectual issues, including both gradual developments and the most explicit controversies and conflicts, [which] could not really be thought through...unless we are conscious of the words as elements of the problems'.5 Kenneth Burke explains that his '*terministic screen*... directs the attention in keeping with its nature', alternately privileging and suppressing data to further the rhetorician's agenda. 6 Burke is useful in cultural criticism because he bridges the disciplinary gap between cultural studies and rhetoric. Like Williams, Burke recognizes that all terminology hinges on political and historical choices which cannot be ignored. In *Descent* beauty is often cited (there are approximately 170 instances), but is also an important term that informed the development of Victorian modernity, and therefore it has genealogical bearing on modern understandings of aesthetics.

'Definition itself is a symbolic act' according to Kenneth Burke, meaning that in interrogating aesthetic parlance critics must pay special attention to an intertextual and multiple, though necessarily inexhaustive representation, of Victorian definitions of beauty (p. 1340). For nineteenth-century Western readers, Darwin's usages of beauty are both normative, because he interpreted it as a homogenizing aesthetic principle, and transcendent, since art and evolution are intricate analytical tropes. Like Beer's groundbreaking project in *Darwin's Plots* (1983) interrogating 'the shared discourse' between the scientific community and non-scientists of 'not only ideas but metaphors, myths and narrative patterns', both scientific and literary writers engaged with the significance of beauty, sharing nineteenth-century aesthetic discourse.

I. Beauty and Species

In *Modern Painters* (1843) John Ruskin defines beauty as 'Any material object which can give us pleasure in the simple contemplation of its outward qualities without any direct and definite exertion of the intellect'. 7 But it is also critical for Ruskin that 'Consummate beauty...is not to be found on earth' because all cases of beauty are 'Divine in their nature, they are addressed to the immortal part of men' (II, pp. 283-84). Ruskin's layered characterization identifies beauty as intimately related to God's physical manifestation, but its divine ideal form is extra-sensory and cannot be found on earth. He also depicts beauty as simultaneously intellectual and simple, an intriguing proposition when contrasted with earlier aesthetic theories of Edmund Burke's *A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful* (1757). Burke had defined beauty as far less divine and cerebral, calling it 'that quality or those qualities in bodies by which they cause love, or some passion

5 Raymond Williams, *Keywords: A Vocabulary of Culture and Society* (New York: Oxford University Press, 1976), p. 16.
6 Kenneth Burke, '"Terministic Screens" From *Language as Symbolic Action*', *The Rhetorical Tradition: Readings from Classical Times to the Present*, ed. by Patricia Bizzell, Bruce Herzberg, 2nd edn (Boston: Bedford/St. Martin's, 1966; repr. 2000), pp. 1340-1347 (p. 1343).
7 John Ruskin, *Modern Painters*, 2 vols (Whitefish: Kessinger, 1843; repr. 2005), I, p. 24.

similar to it'.8 Unlike Edmund Burke, Ruskin does not incorporate love into his aesthetics in any serious way until *Love's Meinie* (1873), a text dealing exclusively with birds which must be read as a response to Darwin and sexual selection. 9 Burke establishes a number of situations causing man to experience pleasure from visual stimulus (with smoothness, gradual variation, and proportion according to species being among its causes), but like Ruskin, Edmund Burke also seems to consider beauty to be God-ordained, and without an empirical scientific function.

It is uncertain how much, if at all, Darwin consciously accepted or appropriated either Edmund Burke's or Ruskin's characterizations of beauty.10 More important for analyzing Darwin's understanding of beauty is William Paley, author of the *Natural Theology: or, Evidences of the Existence and Attributes of the Deity* (1802). As a fellow natural scientist, though of a decidedly less materialist persuasion, Paley's definition of beauty has a greater claim on Darwin's disciplinary sphere than those of Burke and Ruskin. Paley asserts that beauty is '[a] third general property of animal forms', establishing immediately the bearing of aesthetics on all animals, then going on to complicate this idea: 'I do not mean relative beauty, or that of one individual above another of the same species, or of one species compared with another species; but I mean, generally, the provision which is made in the body of almost every animal, to adapt its appearance to the perception of the animals with which it converses'.11 This definition indicates the relative nature of beauty for

8 Edmund Burke, 'A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful', *A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful and other Pre-Revolutionary Writings*, ed. David Womersley (New York: Penguin, 1757; repr. 1998) pp. 49-200 (p. 128).

9 See Jonathan Smith's *Charles Darwin and Victorian Visual Culture* (New York: Cambridge, 2006). Smith claims 'Beauty for Darwin was neither a Divine gift to brighten our days nor a sign of moral and spiritual health, as it was for natural theologians and Ruskin' (p. 3), suggesting that Darwin aligned religiously minded individuals into two groups which formerly had little to do with one another: traditional aesthetes like Ruskin, and natural theologians like Campbell.

10 We do know that Darwin was familiar with Edmund Burke's *Philosophical Enquiry* based on his 1836-1844 notebook entry: 'The extreme pleasure children show in the naughtiness of bothering children shows that sympathy is based as Burke maintains on pleasure in beholding the misfortunes of others' (Darwin, *Notebooks* p. 274). See *Charles Darwin's Notebooks, 1836-1844: Geology, transmutation of species, metaphysical enquiries*, ed. by Paul H Barrett (Cambridge: Cambridge University Press, 1987). Darwin and Ruskin had a more intimate, if antagonistic relationship, recorded in a humorous anecdote by Darwin's daughter Henrietta Litchfield: 'His manner to my Father was rather elaborately courteous & by some odd blunder he knighted him in his imagination & constantly said "Sir Charles" ' (3C). She also recalls: 'I do not think my Father got any pleasure out of Ruskin's Turners. He said "they are beyond me" ': an intriguing aside as the Romantic painter Turner was championed endlessly in Ruskin's criticism, and it is easy to see how the hazy, modern quality of these works flummoxed the biologist (Litchfield 3D). See Henrietta Litchfield, 'Sketches for a biography', *The Complete Works of Charles Darwin Online: University of Cambridge*, dir. Dr John van Wyhe, 2 April 2008 <darwin-online.org.uk/> [accessed 15 May 2008].

11 William Paley, *Natural Theology: or, Evidences of the Existence and Attributes of the Deity*, ed. by Matthew Eddy and David M. Knight (Oxford: Oxford University Press, 1802; repr. 2006) p. 115. According to his autobiography, Darwin was intimately familiar with Paley's work from an early age, reading his texts at Cambridge in the late 1820s. Darwin remembers:

> In order to pass the B.A. examination [and after reading Euclid], it was, also, necessary to get up Paley's *Evidences of Christianity*, and his *Moral Philosophy*. This was done in a thorough manner, and I am convinced that I could have written out the whole of the *Evidences* with perfect correctness, but not of course in the clear language of Paley. The logic of this book and as I may add of his *Natural Theology* gave me as

species; animals find that other members of their species with which they converse possess varying degrees of attractiveness. Therefore, according to Paley, interspecies evaluations of beauty are scientifically impossible because without an insider perspective (or unique psychology and physiology of the species being assessed), determining the level of beauty possessed by another is impossible. Similarly, since the term 'converses' is likely a euphemism for intercourse, Paley's categorization of beauty also points to its reproductive function, a connection more material than Burke's love, and absolutely crucial to Darwin's sexual selection.

Darwin defines beauty in several ways. In the 'Introduction' to *The Expression of the Emotions in Man and Animals* (1872) Darwin declares beauty is inextricable from art claiming 'in works of art, beauty is the chief object'. 12 But this statement serves more to define art than beauty. Interestingly, art points towards intentionality and a creator, a theory Darwin abandoned in his earlier definition in *Descent*, Chapter 3, which details a 'Comparison of the Mental Powers of Man and the Lower Animals'. In this section Darwin defines the phrase 'Sense of Beauty', as follows:

> This sense has been declared to be peculiar to man. I refer here only to the pleasure given by certain colours, forms, and sounds, and which may fairly be called a sense of the beautiful; with cultivated men such sensations are, however, intimately associated with complex ideas and trains of thought. (p. 114)

By describing beauty as a sensory experience which includes pleasurable visual and auditory stimuli, Darwin divorces it from Burke's and Ruskin's divinity.13 Darwin contends that in man these pleasurable senses are set apart by 'complex ideas', likely in reference to the criticism of both his contemporaries and predecessors including Edmund Burke, Ruskin and Paley. To illustrate and hone his definition of beauty, Darwin describes the continuity between men and animals:

> When we behold a male bird elaborately displaying his graceful plumes or splendid colours before the female, whilst other birds, not thus

much delight as did Euclid. The careful study of these works, without attempting to learn any part by rote, was the only part of the Academical Course which, as I then felt and as I still believe, was of the least use to me in the education of my mind. (p. 59)

See Charles Darwin, *The Autobiography of Charles Darwin 1809-1882*, ed. by Nora Barlow (London: Collins, 1958)

12 Charles Darwin, 'Introduction', in *The Expression of the Emotions in Man and Animals* (London: John Murray, 1872), p. 15.

13 It was just this sensory, materialist basis for beauty that Ruskin rejected out of hand because, 'for Ruskin nature is the creation of God', meaning that art must move beyond offering mere sensual pleasure to the viewer; Ruskin argues 'that to characterize the perception of beauty solely according to pleasure is "degrading it to a mere operation of sense"' (Smith, pp. 25-26).

> decorated, make no such display, it is impossible to doubt that she admires the beauty of her male partner. As women everywhere deck themselves with these plumes, the beauty of such ornaments cannot be disputed. (pp. 114-115)

Here, Darwin defines beauty and the beautiful as a link connecting animals and white European men.14 This dual definition mutually pairs and differentiates man and animals: a deft rhetorical move illustrating interspecies similarity via the unilateral attraction to bird feathers. Instead of separating these organisms into opposed categories showcasing the tastes of man versus not-man, Darwin shows that human females (presumably attempting to attract male humans) favour physical objects deemed attractive by birds, thereby insinuating that animal and human tastes in fact converge. Of course, Darwin never makes this fact explicit, allowing his readers to make all necessary but unsettling connections. He compares two kinds of aesthetic choices: one regarding the sexual preferences of birds and the other recounting female fashion trends. An afterthought tellingly resembling a disclaimer concludes his definition of beauty: 'With the great majority of animals, however, the taste for the beautiful is confined, as far as we can judge, to the attractions of the opposite sex' (p. 115). Darwin once again positions animals as other than humans in their specific, arguably low treatment of beauty.15 Always the shrewd rhetorician, Darwin claims that birds (here indicative of 'the great majority of animals') do not associate beauty with 'complex ideas and trains of thought', but merely with bestial sexual attraction (p. 115). Yet the careful reader need not extrapolate many layers from Darwin's phrasing to see the undeniable connection between man and animal forged by his definition of beauty: not merely birds, but humans also value plumage to enhance their sexual desirability. Despite his adroit rhetorical manoeuvres and politic phrasing, Darwin could not avoid the wrath of anthropocentric readers opposed to his inclusive, multi-species definition of beauty.

Ruskin, an indispensible player in Victorian aesthetic debates, was extremely anxious about Darwin's engagement in the aesthetic sphere. Jonathan Smith contends that after *Descent*, 'the Victorian aesthetic battlefield [was] largely divided into two camps': the Darwinian materialists and the Ruskinian ethicists. 16 Smith's argument that 'Darwin's work provided a direct and fundamental challenge to Ruskinian aesthetics, and that Ruskin understood this and sought to counter it' suggests the

14 Although Darwin's Eurocentric perspective is historically conventional and will later be discussed in greater detail, allow me now to disambiguate his masculine pronouns by stating that Darwin aligns his rhetoric with the male gaze; women are conspicuously absent as beauty determiners.

15 Darwin uses a number of offensive terms in *Descent* in reference to his own delineations of culture and taste including 'low', 'high', 'race', 'barbarian', 'savage', and 'civilised' (pp. 301; 687; 46; 116; 408). Like his predilection for sexist rhetoric, I want to draw attention to Darwin's racist and polarizing choice of words as an element of his rhetorical process which must be addressed. Be aware that all usage of these aggressive terms is a necessary and direct reference to Darwin's own lexicon.

16 Smith, p. 164.

subversiveness of *Descent* (pp. 2-3). Clearly, Darwin's intervention into the aesthetic sphere was not accidental, but it also does not comprise the entirety of his project: aesthetics were often a terministic screen behind which to criticize or express anxiety about greater issues and modernity in general.

Indeed, nineteenth-century aesthetic critics were not the only ones who opposed Darwin's re-envisioning of beauty on religious grounds. One of Darwin's most antagonistic detractors among natural theologians was the Duke of Argyll, George Campbell. Author of *The Reign of Law* (1867), Campbell critiques evolution and its premise that beauty is not God's gift to man, but merely a useful implement in the animal kingdom for sexual selection:

> although the laws which determine both form and colouring are...seen to be subservient to use, we shall never understand the phenomena of Nature unless we admit that *mere ornament or beauty is in itself a purpose, an object, and an end*. Mr Darwin denies this; but he denies it under the strange impression, that to admit it would be absolutely fatal to his own theory on the Origin of Species. So much the worse for his theory, if this incompatibility be true. 17

According to Campbell, the truth of God insists on beauty being an end in and of itself, not a means for propagating the species. Like Edmund Burke and Ruskin in many respects, Campbell holds the anthropocentric notion that beauty is the work of Providence, allowing man to transcend this mortal coil and contemplate the Almighty. Yet Campbell travels a step further, allowing evolution and God to reside alongside one another via the teleological argument of intelligent design.18 By appropriating Darwin's theses and scolding him for not seeing that God is behind the mechanism of evolution, Campbell shifts, if ever so slightly, the expectations of nineteenth-century Christians, asking 'Is it likely that this universal aim and purpose of the mind of Man should be wholly without relation to the aims and purposes of his Creator?' (p. 201). Because Darwin has generated a rift in the traditions of Victorian Christianity, this theistic complaint, which T.H. Huxley, "Darwin's Bulldog", called 'ecclesiasticism' is not surprising. 19

Although reluctant to backpedal for his religiously motivated detractors, in *Descent* Darwin admits that it is only with 'great difficulty' that humans feel comfortable 'admitting that female mammals, birds, reptiles, and fish, could have

17 George Campbell, *The Reign of Law* (London: Alexander Strahan, 1867), pp. 197-198 (emphasis mine).
18 Both George Combe, in *The Constitution of Man* (1828), and Robert Chambers, in *Vestiges of the Natural History of Creation* (1844), also use this teleological approach to natural history. Interestingly, William Paley, recipient of Darwin's youthful admiration, also utilized the watchmaker analogy his pupil would later attempt to discredit, stating 'suppose I had found a *watch* upon the ground, and it should be inquired how the watch happened to be in that place;...the watch might have always been there. Yet...when we come to inspect the watch, we perceive...that its several parts are framed and put together for a purpose' (p. 7).
19 Smith, p. 19.

acquired the high taste implied by the beauty of the males, and which generally coincides with our own standard' (p. 687). Until *Descent*, aesthetic taste had been considered the purview of European white human beings alone, not the majority of the animal kingdom. Although their opinions on intelligent design remain discordant, Darwin and Campbell's viewpoints do converge on the matter of humility. Unwilling to abandon anthropocentrism entirely, Campbell concedes that 'although Man was intended to admire beauty, beauty was not intended only for Man's admiration' 20—arguably less than a step away from Darwin's phrase 'Man, like every other animal' (p. 688). Humility plays a central part in Darwin's complex program to decenter Victorian notions of anthropocentrism as they relate to beauty.

Darwin's restructuring of Victorian aesthetics illuminates the stakes surrounding the re-evaluation of nineteenth-century definitions of beauty in terms of species-exclusivity: man was no longer entirely separate or higher than the animal kingdom. Darwin analyzes a variety of species including invertebrates, birds, monkeys, and humans to justify the link between sexual selection and beauty. In his writing Darwin defines sexual selection as 'the advantage which certain individuals have over others of the same sex and species solely in respect of reproduction' (p. 243). Following up this definition with two addenda, Darwin explains: first, not all traits obtained via sexual selection are beneficial since 'various unimportant characters' marking the 'unexplained residuum of change must be left to the assumed uniform action of those unknown agencies,' second, it 'appears to have acted powerfully on man, as on many other animals' (pp. 83; 229).In other words, adaptations caused by or related to sexual selection are not always beneficial to an organism, and, secondly, sexual selection is present in all animals: humans being no exception. Because *Descent* is Darwin's first extended treatment of aesthetics, and since he pairs sexual selection with this theory, Darwin cautions readers that 'several of my conclusions will hereafter be found erroneous': a fitting apology for the cautious rhetorician ploughing high-stakes and controversial fields furrowed by prior intellects in several disciplines (p. 4). I argue that in *Descent* the concept which ultimately destabilizes Darwin's egalitarian characterization of beauty is culture.

II. Beauty and Culture

Though sexual selection promotes a move towards species egalitarianism, *Descent* remains problematic along the lines of race, anthropocentrism, and gender—difficulties illuminated by a cultural studies reading of beauty by way of the focusing-mirror of a terministic screen. Consider Darwin's discussion of primates. Darwin devotes the last part of his chapter on 'Beauty of the Quadrumana' to monkeys deemed beautiful by human standards. Making this descriptive aim immediately

20 George Campbell, *The Reign of Law* (London: Alexander Strahan, 1867), p. 199.

explicit, Darwin claims 'Although many kinds of monkeys are far from beautiful according to our taste, other species are universally admired for their elegant appearance and bright colours' (p. 616). This use of the term *universal* is exclusive, homogenizing and therefore unsettling as it issues from a member of the scientific community: ostensibly the stronghold of objectivity and empiricism. Darwin's subjective assertion of taste above is one iteration of homogenizing aesthetics among countless others, and suggests that the impossibility of scientific neutrality became increasingly evident after *Descent* because he had included *Homo sapiens* into evolutionary discourse.

Assertions leaning more towards singular anecdote than scientifically reproducible fact also demonstrate *Descent's* essentializing discourse. For instance, Darwin cites his visits to the London Zoological Society's Gardens, where he records having 'often overheard visitors admiring the beauty of another monkey, deservedly called *Cercopithecus diana*' (pp. 616-17). While this conversational tone makes for a less dry and more engaging read, it sidesteps the standards of objectivity. But Darwin never attempts to veil the subjectivity of his argument, witnessed in the adverb 'deservedly' signifying that in addition to several other patrons of the Zoological Society's Gardens, he approves the Latinate species appellation *Cercopithecus diana* (commonly known as the Diana monkey), which associates the unwitting primate with a classical allusion to the Roman goddess of the moon, the hunt and virginity. Though the *Cercopithecus diana*'s native habitat is Western Africa, instead of using local nomenclature or indigenous folklore to classify the species, Western biologists dubbed the primate using a decidedly if not deservedly Western allusion. In this revealing, but by no means singular, instance of the Western gaze, Darwin contends that the appellation of this primate signals Classical beauty, while screening the implicit Western colonial agenda of the namer.

Another opportunity in *Descent* for interrogating beauty as an occidental construction projected onto the natural world is Darwin's use of art to define aesthetics. For Darwin, the artist is the connoisseur of female beauty *par excellence*. To illustrate the relative nature of beauty, and the taken-for-granted quality of one individual's beauty surpassing another, he claims 'Even man, excepting perhaps an artist, does not analyse the slight differences in the features of the woman whom he may admire, on which her beauty depends' (p. 693). Darwin assumes along with the reader that in the animal kingdom, discrimination and attention to the minutiae of fellow creatures, even possible mates, is unlikely. However, Darwin goes on to assert that, apart from the artist, human males too often shirk the careful observation of females, implying that they are no more observant than lower organisms. But the artist is not observing to obtain a mate; he is interested in replicating a visage in plastic form. The artist here is a sterile representative of the male gaze, having enhanced selective, but circumvented sexual, potency.

Beyond the gaze of artists themselves, Darwin uses the art object to demarcate

between Western, male conceptions of beauty and those attributed to 'savage races' (p. 46). He demonstrates the variety of tastes amongst the human races by arguing 'it is well to compare in our mind the Jupiter or Apollo of the Greeks with the Egyptian or Assyrian statues; and these with the hideous bas-reliefs on the ruined buildings of Central America' (p. 649). Outlining a qualitative difference between the art forms of these nations, Darwin seeks to exemplify through art the disparate tastes of various hierarchically arranged human races as delimited by Western, nineteenth-century criteria. Because Darwin considered a society's art an indication of its aesthetic ('in works of art, beauty is the chief object') he does not consider the possibility that art objects possess functions beyond beauty. 21 Darwin's conflation of essentialized beauty with an anthropological assessment of art undermines his message of species equality. Consider Darwin's handling of descriptive adjectives. The derogatory term 'ruined' is applied solely to the structures of Central America, while those in Greece, Egypt, and Assyria, often subject to an equal state of disrepair, are spared this word. Similarly, the subjective descriptor 'hideous' illustrates not only Darwin's xenophobic, yet unfortunately conventional, distaste for Central American art and personal intolerance for non-classical work, but also the rejection of objective scientific description.

Why does Darwin choose repeatedly to insert his judgments of beauty in this purportedly scientific document? I argue that in *Descent* this move was consciously motivated by a combination of political manipulation and philosophical and rhetorical conventions, not, as James Krasner argues, the use of the 'human, physiologically limited eye' to describe the natural world.22 Darwin illustrates with deprecating adjectives his thesis that aesthetic tastes differ among the human races, thereby personalizing taste fluctuation (what Central American savages deem beautiful, he does not). Additionally, this familiar tone and use of 'our' ingratiates Darwin with his cultured but sceptical audience (see Caudill), attempting to posit himself, to use Joseph Conrad's phrase, as 'one of us'. For someone arguing one of the most radical premises of the nineteenth century, this rhetorical ingratiation is invaluable for aligning readers with his viewpoint. Although Darwin does not mind differentiating his taste from those of savages, he desperately wants to show readers that because we are all of one mind on the topic of beauty, it is not such a leap to retain that single mindedness in embracing evolutionary sexual selection.

Indeed, emphasizing the variation of tastes among human races is a primary concern for Darwin because 'The taste for the beautiful, at least as far as female beauty is concerned, is not of a special nature in the human mind; for it differs widely in the different races of man' (pp. 687; 115). In differentiating between a 'civilised

21 Darwin, *Expression of the Emotions*, p. 15.

22 James Krasner, *The Entangled Eye* (New York: Oxford University Press, 1992), p. 5. Krasner argues that Darwin and later authors influenced by natural selection deliberately used a 'limited eye' because 'evolutionary nature can only be seen through the product of evolution—the human eye' meaning that 'scientists must always be aware of the physical limitations of their own acts of perception' (p. 5).

and savage' sense of beauty, Darwin continues his campaign against what he considers the hideous taste of savages, disclosing that 'Judging from the hideous ornaments, and the equally hideous music admired by most savages, it might be urged that their aesthetic faculty was not so highly developed as in certain animals, for instance, as in birds' (pp. 408; 116). Like *Descent*'s racist and essentializing dénouement, Darwin uses beauty in relation to animal versus savage taste to suggest the therapeutic value of including animals into the hierarchical continuum stretching from lower organisms, through higher species, until ultimately reaching the apex: European man.

The elevation of animals at the expense of savages prepares readers for the infamous conclusion to *Descent* (see Brantlinger; Deutscher; Sideris). Because the prospect of humanity's evolution from savages is scandalous if not horrific, Darwin argues 'He who has seen a savage in his native land will not feel much shame, if forced to acknowledge that the blood of some more humble creature flows in his veins. For my own part I would as soon be descended from that heroic little monkey... or from that old baboon...as from a savage' (p. 689). Tempering Darwin's radical claim that beyond equalizing man and animals as appreciators of beauty, some animals possess a greater understanding of beauty than some humans, but refusing to renege completely, that birds possess a greater understanding of auditory beauty than some savage races, Darwin assures his audience 'Obviously no animal would be capable of admiring such scenes as the heavens at night, a beautiful landscape, or refined music; but such high tastes are acquired through culture, and depend on complex associations; they are not enjoyed by barbarians or by uneducated persons' (p. 116).

Ostensibly, the great divide between humans and animals, then, is *culture*— a slippery term at best during the nineteenth-century (and one which remains unlikely to stabilize even today). Matthew Arnold had recently called culture 'a study of perfection' manifested by 'the best that can be known' in *Culture and Anarchy* (1869), while ethnographer Edward Tylor conflates civilization with culture in *Primitive Culture* (1871) as 'that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society'.23 Tylor's project of merging evolutionary science with sociology and Arnold's promotion of divine perfection as a national English project dovetail with culture according to *Descent*. However, because Darwin applies culture only to white, occidental iterations of civilization, Tylor might well criticize Darwin for being too exclusive, if equally paternalistic, citing scholars who do ascribe some 'half-incredulous appreciation of the beauty and simplicity' of the culture and mythologies in 'classic, barbarian, and medieval Europe'.24 Like Darwin, Tylor renders non-

23 Matthew Arnold, *Culture and Anarchy*, ed. by J. Dover Wilson (Cambridge: Cambridge University Press, 1869; repr. 1961), pp. 45; 179; Edward B. Tylor, 'The Science of Culture', *Primitive Culture*, 2 vols (London: John Murray, 1871), I, 1-22 (p. 1).
24 Edward B. Tylor, 'Mythology', *Primitive Culture*, 2 vols (London: John Murray, 1871), I, 285-332 (pp. 286; 326).

Western barbarians as evolutionarily more primitive in the visual arts across the board, citing only their mythological narratives as possessing beauty, however 'simple'. 25 But Darwin is largely uninterested in the anthropological beauty of a culture's mythology, concerning himself with grander narratives concerning all species.

Darwin's Arnoldian 'high taste' achieved only through culture complicates the role of beauty in *Descent*. Because culture is inextricably linked to art, and Darwin saw beauty and art as coupled, he is essentially asserting that 'barbarians' and 'uneducated persons' incapable of making 'complex associations' have only a primitive, animal-like appreciation of beauty (p. 116). In other words, in *Descent* beauty connects, while culture differentiates and ranks. Should we then interpret Darwin's conception of beauty by means of culture to argue that savages, like higher animals, use beauty for mate selection alone since neither possess the cognitive resources necessary to achieve a cultured high taste? Textual evidence in *Descent* points to the affirmative, but it is important to realize that Darwin judged humans on a sliding scale of development, claiming that man's 'progressive advancement' is in fact due to 'the powers of the imagination, wonder, curiosity, an undefined sense of beauty, a tendency to imitation, and the love of excitement or novelty' (p. 116). What is most striking about Darwin's division of savage and civilised is his reliance on intellectual development.

Like Arnold's sweetness and light, Darwin also holds that the sweetness of beauty must be joined with the light of intellect to sustain high culture. But by conflating cognitive development with beauty, arts, and culture, in conjunction with universal evolutionary 'progressive advancement', Darwin is implicitly opening the floodgates to assimilate all genders, races, and species into Western culture. Tracing beauty as a terministic screen implicates Darwin's *Descent* as the text which began the move within Western culture, with all its conflicting and messy implications, from exclusionary elitism, to a modernized, assimilative hegemony—a paradigm shift evidenced by the fast approaching scramble for Africa (1880-1920) whose major tool was cultural imperialism, today subsumed into globalization. The year 1871 saw not only the publication of *Descent* and *Primitive Culture*; it also marks the year that Stanley greeted Livingstone along the banks of the Ujiji in 'Darkest Africa'.26 The success of Victorian Britain's imperial project stands in large part due to its adherence to Livingstone's '"3 Cs": Commerce, Christianity and Civilization" which combined the social project of Western cultural imperialism, with the necessarily modern embrace of capitalism and industrialization.27

The hierarchy breakdown implicit in evolution admitted ambiguous organisms,

25 Consider the 'myth of the Four Winds ...developed among the native races of America' which, according to Tylor, possesses 'a range and vigour and beauty scarcely rivalled elsewhere in the mythology of the world' (p. 326).
26 Henry Stanley, *How I Found Livingstone: travels, adventures, and discoveries in Central Africa* (London: Sampson Low, Marston, Low, and Searle, 1872), p. 412.
27 Thomas Pakenham, *The Scramble for Africa* (London: Abacus, 2009), p. xxiv.

neither savage nor civilized, and underlined the import of hybrids. We must not forget that *Descent*, not *Origin*, was directly responsible for the anthropocentric search for missing-links which occupied naturalists well into the twentieth century (see Gould). Hybridity is imperative to Darwinian modernity; and yet segmented terminology seems to counter his prescription for 'progressive advancement' by consistently defining animals as either low or high, and humans as savage or civilized.28 Shirking the complexities of a non-dualistic ontology, while indicating that advancement is possible if not evolutionally inevitable, Darwin only simplified his denominations for the benefit of his mixed audience. However, knowing Darwin's affinity for our common ancestor, it is not implausible that he would include the savage races and also, perhaps over great stretches of time, higher members of the animal kingdom (such as the aforementioned song bird) in his homogenizing upward movement towards the cultural standards of Western civilization (p. 116). 29

Although Darwin shows through multiple examples the similarities between man and bird in *Descent*, he cannot affirm interspecies similarities without a nearby disclaimer: 'In man, however, when cultivated, the sense of beauty is manifestly a far more complex feeling, and is associated with various intellectual ideas' (p. 408). Therefore, although birds and humans share similar taste, it is the accompanying significance of beauty that differs. For birds, beautiful plumage is a tool of sexual selection, illustrating the male's fitness within the species. Among birds especially, males often possess grand, flashy feathers to impress the females, whose own plumage is understated. For Darwin, the peacock is an apt example of this biological trend, as well as a recognizable species for illustrating sexual selection to a European audience. Perhaps because the peacock is so familiar Darwin cautions his reader 'not to accuse birds of conscious vanity', while confessing 'when we see a peacock strutting about, with expanded and quivering tailfeathers, he seems the very emblem of pride and vanity' (p. 453). The projection of human characteristics onto animals is a conventional Victorian practice of which Darwin is notoriously guilty. Interpreting human traits such as vanity onto the mannerisms of animals is only a step away from reading Providence into the natural world, not to mention an important facet of anthropocentrism. Instead of asserting empirically that male birds display their plumage, Darwin claims, 'males take delight in displaying their beauty': a vague contention likely misrepresenting the actual thought process of these animals (p.

28 Darwin continually draws distinctions between what he interprets as low and high creatures: an assessment embedded in his hierarchical mindset. As one of the more problematic distinctions made by Darwin, this orientational mode of describing the evolutionary positioning of animals utilizes prejudicial rhetoric verging on the language of Social Darwinism and eugenics. One disturbing example of this positioning is the section description of Chapter Three: 'The difference in mental power between the highest ape and the lowest savage' (p. 11).

29 I say this despite Darwin's argument 'I do not wish to maintain that any strictly social animal, if its intellectual faculties were to become as active and as highly developed as in man, would acquire exactly the same moral sense as ours', which seems to go against any inclusive thesis of cultural 'progressive advancement', but because Darwin objects on moral grounds I contend his argument is restricted more by ethical decorum than an actual abhorrence of the idea (p. 122).

444). Assuming that birds 'delight' in something that may well be an instinct towards which they are emotionally indifferent once again betrays Darwin's subjective perception of animals, showing that although Darwin initiated one of the first steps away from a hierarchical, teleological and anthropocentric understanding of the world and towards one of postmodern inclusivity, the terministic screen beauty illuminates the problematic quality of his theses.

Yet, *Descent*'s notable kink is the fact that the causal relationship between sexual selection and beauty often applies only to animals Darwin deems of the higher variety. This makes the array of invertebrates, which are either hermaphroditic or breed via non-selective spawning in which the female and male sex cells are released into the water/air thereby uniting without the consent or discrimination of partners, either a red herring or serious conflict in Darwin's hypothesis of sexual selection. By human standards, invertebrates are often very beautiful, with Darwin citing various jelly fish, sea anemones, coral, molluscs and star fishes, some of which even feature different colour schemas for males and females (ostensibly the hallmark of sexual selection alone) 'ornamented with the most brilliant tints, or...shaded and striped in an elegant manner' (p. 301). Yet, because these species do not undergo sexual selection, Darwin concludes that 'it is almost certain that these animals have too imperfect senses and much too low mental powers to appreciate each other's beauty or other attractions, or to feel rivalry' (p. 301). So what use is beauty to these low species incapable of sexual selection? None, as far as Darwin can tell, a fact that seemingly confounds his causal theory that beauty functions instinctually in sexual selection. Reasoning that these bright colours likely are not camouflage, but may, in fact, indicate to predators that the organism tastes bad or possesses some protective weapon, the conclusive cause of these pleasing colourations remains humbly limited by the scientific community's 'ignorance of most of the lowest animals' (p. 302). But Darwin deems some loose conjecturing is warranted, deducing that 'bright tints result either from the chemical nature or the minute structure of their tissues, independently of any benefit thus derived' (p. 302). In other words, natural selection, not sexual selection, led to the coloration schemes of both hermaphroditic and low organisms that breed non-selectively, meaning their beauty is probably the product of natural survival processes. To better illustrate his theory, Darwin draws a suggestive parallel between human processes and those of beautiful invertebrates:

> Hardly any colour is finer than that of arterial blood; but there is no reason to suppose that the colour of the blood is in itself any advantage; and though it adds to the beauty of the maiden's cheek, no one will pretend that it has been acquired for this purpose. So again with many animals, especially the lower ones, the bile is richly coloured...chiefly due to the biliary glands being seen through the translucent integuments—this beauty being probably of no service to these animals. (p. 302)

Like his definition of beauty, Darwin here demonstrates the mechanism of attractive colorations in both human and animal terms. Why does Darwin persist in illustrating his theses using human and animal traits concurrently? Rhetorically, it serves to bring a concept closer to the readers' sphere of understanding since, in human terms, the blush is a conventional, accidental, but attractive event. However, this specific human subject clarifies a deeper significance. Darwin singles out the maiden as a beautiful blusher, not an extraordinary assertion since blushing virgins are a stereotype still extant today, yet comparing the beauty of maidens to invertebrates is a telling position because women are defined as beautiful, not men, making the blush gendered.

III. Beauty and Gender

The white, male gaze alluded to above, and implicit in the majority of Darwin's depictions of beauty, like his occidental leanings, further biased the empirical nature of his theories. Although Darwin was doubtless aware of women reading his texts, the strictures of decorum mandated addressing a specifically male readership.30 Yet this decision, in tandem with Darwin's aesthetic terministic screen, is complicated by the role of women in nineteenth-century Western society. Kay Harel criticizes the role of beauty in human sexual selection, noting beauty's 'differential value for women and men', since women need the attractions of beauty, while men get by with only social and economic appeal.31 Even before the Married Women's Property Act (1882), women's economic dependence on men made their opinions regarding beauty in the opposite sex largely irrelevant for practical matrimonial purposes. Harel complains: 'Darwin does not explore such disparities from a woman's point of view, nor from that of a feminist', making his assessment of beauty inherently chauvinistic (p. 38). 32 Disregard for the perspective of women is conventional to the era, meaning it should not be separated from the general social bigotry characteristic of nineteenth-century Europe, and George Levine is right to chide ideological critiques of sexual selection for having 'no purchase on the theory itself', but because ideology is precisely what has biases the term beauty, it must not go ignored and unaddressed when

30 While a female readership for *Origin* and *Descent* may readily be taken for granted, an example of this demographic is telling. In an 1865 letter from Charles Lyell to Charles Darwin, the former explains 'I had...an animated conversation on Darwinism with the Princess Royal, who is a worthy daughter of her father, in the reading of good books, and thinking of what she reads. She was very much au fait at the "Origin"...She said after twice reading you she could not see her way as to the origin of four things; namely the world, species, man, or the black and white races', indicating that at least aristocratic female response was deemed intellectually pertinent to contemporary discourse regarding Victorian natural history (Lyell p. 385-86).

31 Kay Harel, 'When Darwin Flopped: The Rejection of Sexual Selection', *Sexuality and Culture* 5.4 (2001), 29-42 (p. 38).

32 In England women were excluded from comprehensive social involvement even late into the nineteenth century. See Dorothy Stetson's *A Woman's Issue: The Politics of Family Law Reform in England* (1982) for analysis of the Married Women's Property Act.

interrogating beauty as a terministic screen.33

As with most issues addressed in *Descent*, Darwin's reading of gender is hardly uni-directional. Because among the majority of higher species excepting humans, males alone are concerned with wooing females, females ultimately control sexual selection. This thesis had serious consequences upon the Victorian psyche, since 'Sexual selection...challenged Man's longstanding hegemony over women'.34 Darwin himself contends in *Descent* 'I fully admit that it is astonishing that the females of many birds and some mammals should be endowed with sufficient taste to appreciate ornaments, which we have reason to attribute to sexual selection' (p. 686). Although his class of mammals includes *Homo sapiens*, Darwin leaves this assertion conspicuously unstated; perhaps because it points to the unnatural condition of women who are, for the most part, denied the natural right of mate selection. As is often the case when Darwin alludes to human sexuality, propriety eclipses offensive candour, however scientific its intent. The rhetorical decision to mitigate between humans and animals on this point, when measured in conjunction with the prominence of the male gaze, expertly softens the ontological disruption implied by a female's right to mate selection. If human females were given the choice, or at least the economic wherewithal, to select mates on the basis of beauty and ability to weather competition, as is the norm in the animal kingdom, they would usurp the role of men as sole determiners of aesthetics and even definers of beauty.

While loss of control over the aesthetic sphere is reason enough for white male anxiety, sexual selection's implicit argument suggesting the naturalness of an ascendant female taste logically destabilizes the reigning hierarchy placing women below men in terms of intellect. Beer notes Darwin's skewed loyalties respecting the role of intellect for sexual selection, observing that 'though he pays homage to the "mental charms" of women, he gives primacy to beauty'.35 Although Beer reads *Descent* as wholly intolerant of female intellectual dominance or even equality, paraphrasing Darwin's opinion as claiming 'that women are parallel on the scale of development with a less developed race, inevitably lagging behind European manhood' (p. 221), I argue Darwin's implicit message is more subversive.

While Darwin indeed relegates women to second-class status as objects of the male gaze, there is evidence that his inclusive project left room for female inclusion in ways inconceivable prior to *Descent*'s publication, even if, for the sake of his hypersensitive audience, Darwin suppressed the correctness of female taste. While after *Descent* adherents to aesthetic theories like those propounded by Edmund Burke and Ruskin had little cause to fear the rejection of their philosophies by a matriarchal sea change in European aesthetics, Darwin established first that women are naturally

33 George Levine, '"And if it be a Pretty Woman All the Better"— Darwin and Sexual Selection', *Literature, Science, Psychoanalysis, 1830-1970: Essays in Honor of Gillian Beer*, ed. by Helen Small and Trudi Tate (Oxford: Oxford University Press, 2003), pp. 37-51 (p. 37).
34 Harel, p. 33.
35 Beer, p. 211.

more aesthetically minded, and second the right to judge beauty as a demarcation of power.

Darwin realized that beauty is a source of power and can be psychologically terrifying for the male hegemony because it forecasts the loss of patriarchal control. Even without an apocalyptic rise of female cultural autocracy, feminine ability to manipulate male passions caused alarm within the misogynistic Victorian psyche (see Deutscher; Richardson). Harel sums up this anxiety explaining 'On the one hand, Man was insulted to think that women were selecting him for his beauty or his vigor. But equally bad was for Man to think of himself as the victim of women who decorate themselves, make themselves "intentionally beautiful"'.36 After *Descent* men may have felt backed into a corner and compelled to concede some sexual agency to women. Yielding power to females, ideally the models of passivity, invoked a paradox of control in which letting go of one bad thing enables another. Further, recognizing man's susceptibility to female beauty in *Descent* illustrates an added psychologically disturbing facet of beauty: male sexual yearning is centered more on base desire than appreciating woman's possession of civilized 'mental charms and virtues' (p. 653).

If beauty brings out the sordid side of Western man, how is he essentially more civilized than savages and animals? How can Western science contain the collapsing continuum which naturalists had once parsed into the hygienic species and varieties Darwin initially undermined in *Origin*? It was questions like these which came to disturb degenerationists, *fin de siècle* imperial gothic authors, and later modernists for decades to come, and few terms allow readers insight into the part *Descent* played in the build-up of nineteenth-century Western atavism anxiety better than beauty. Inferences drawn in *Descent* using beauty as a terministic screen undermine Western man's hierarchal understanding of gender, species and delineations of civilized versus savage. Beauty forces humility less through what is addressed than is left implied, meaning culture is the last bastion of differentiation and hierarchy. Beauty is a conduit by which to assess the austere purity of species, and the white European race particularly, since by including savages, animals and women into an intellectually robust occidental culture, Darwin simultaneously contributes to and destabilizes the greater project of modernity.

Why should contemporary critics track Darwin's rhetoric? As Darwin's contemporary G.H. Lewes reminds us, *Origin*'s concept of evolution provided 'articulate expression to the thought which had been inarticulate in many minds', suggesting that twelve years later Darwin's reputation for articulation made the word choices in *Descent* far from peripheral concerns.37 Analyzing beauty in *Descent* as a terministic screen suggests two conclusions: firstly, Darwin wrote to an audience consisting of European males attuned to a homogenous cultural notion of beauty, and

36 Harel, p. 37.
37 G.H. Lewes, 'Mr. Darwin's Hypothesis', *Fortnightly Review* 16 (1868) p. 353.

secondly, humans must reject the false opinion that they alone appreciate beauty. Darwin took the notion of beauty away from its formerly anthropocentric location, reinventing it as a sense common throughout much of the organic world, yet elevated by culture.

Bibliography

Arnold, Matthew, *Culture and Anarchy*, ed. by J. Dover Wilson (Cambridge: Cambridge University Press, 1869; repr. 1961)

Beer, Gillian, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction* (London: Routledge, 1983)

Brantlinger, Patrick, 'Victorians and Africans: The Genealogy of the Myth of the Dark Continent', *Critical Inquiry* 12.1 (Autumn, 1985), 166-203

Burke, Edmund, 'A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful', *A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful and other Pre-Revolutionary Writings*, ed. by David Womersley (New York: Penguin, 1757; repr. 1998), pp. 49-200

Burke, Kenneth, '"Terministic Screens" From *Language as Symbolic Action*', *The Rhetorical Tradition: Readings from Classical Times to the Present*, ed. by Patricia Bizzell and Bruce Herzberg, 2nd edn (Boston: Bedford/St. Martin's, 1966; repr. 2000), pp. 1340-1347

Campbell, George, *The Reign of Law* (London: Alexander Strahan, 1867)

Campbell, John A., 'Charles Darwin: Rhetorician of Science', *Landmark Essays on Rhetoric of Science: Case Studies*, ed. by Randy A Harris (Mahwah: Hermagoras, 1986; repr. 1997)

Caudill, Edward, 'The Bishop-Eaters: The Publicity Campaign for Darwin and on the Origin of Species', *Journal of the History of Ideas* 55.3 (Jul., 1994), 441-460

--- 'The Polemical Mr. Darwin', *Quarterly Journal of Speech* 61.4 (1975), 375-390

Darwin, Charles, *The Autobiography of Charles Darwin 1809-1882*, ed. by Nora Barlow (London: Collins, 1958)

--- *Charles Darwin's Notebooks, 1836-1844: Geology, transmutation of species, metaphysical enquiries*, ed. by Paul H Barrett (Cambridge: Cambridge

University Press, 1987)

--- *The Descent of Man and Selection in Relation to Sex*, ed. by James Moore and Adrian Desmond (New York: Penguin, 1871; repr. 2004)

--- 'Introduction', *The Expression of the Emotions in Man and Animals* (London: John Murray, 1872)

--- *On the Origin of Species by Means of Natural Selection*, ed. by Joseph Carroll (Ontario: Broadview, 1859; repr. 2003)

Deutscher, Penelope, 'The Descent of Man and the Evolution of Women', *Hypatia* 19.2 (Spring 2004), 35-55

Gould, Stephen Jay, *Hen's Teeth and Horse's Toes* (New York: Norton, 1984)

Harel, Kay, 'When Darwin Flopped: The Rejection of Sexual Selection', *Sexuality and Culture* 5.4 (2001), 29-42

Harris, R. Allen, 'Rhetoric of Science', *College English* 53.3 (Mar., 1991), 282-307

Hersey, George, *The Evolution of Allure: Art and Sexual Selection from Aphrodite to the Incredible Hulk* (Cambridge: MIT, 1996)

Krasner, James, *The Entangled Eye* (New York: Oxford University Press, 1992)

Levine, George, *Darwin and the Novelists: Patterns of Science in Victorian Fiction* (Cambridge: Harvard University Press, 1988)

--- ' "And if it be a Pretty Woman All the Better"— Darwin and Sexual Selection', *Literature, Science, Psychoanalysis, 1830-1970: Essays in Honor of Gillian Beer*, ed. by Helen Small and Trudi Tate (Oxford: Oxford University Press, 2003), pp. 37-51

Lewes, G.H., 'Mr. Darwin's Hypothesis', *Fortnightly Review* 16 (1868)

Litchfield, Henrietta, 'Sketches for a biography', *The Complete Works of Charles Darwin Online: University of Cambridge*, dir. Dr John van Wyhe, 2 April 2008 <darwin-online.org.uk/> [accessed 15 May 2008]

Lyell, Charles, 'To Charles Darwin Esq. January 16, 1865', *Life: Letters and Journals of Sir Charles Lyell*, 2 vols (London: John Murray, 1881) II

Moore, Randy, 'The Persuasive Mr. Darwin', *BioScience* 47.2 (Feb., 1997), 107-114

Pakenham, Thomas, *The Scramble for Africa* (London: Abacus, 2009)

Paley, William, *Natural Theology: or, Evidences of the Existence and Attributes of the Deity*, ed. by Matthew Eddy and David M. Knight (Oxford: Oxford University Press, 1802; repr. 2006)

Richardson, Angelique, 'Some Science Underlies All Art: The Dramatization of Sexual Selection and Racial Biology in Thomas Hardy's *A Pair of Blue Eyes* and *The Well Beloved*', *Journal of Victorian Culture* 3.2 (1998), 302-338

Ritvo, Harriet, 'Science as Literature, Science as Text', *Journal of Victorian Culture* 5.1 (2000), 136 -141

Ruskin, John, *Modern Painters*, 2 vols. (Whitefish: Kessinger, 1843; repr. 2005)

--- *Love's Meinie: Lectures On Greek And English Birds Given Before The University Of Oxford* (Whitefish: Kessinger, 1873; repr. 2006)

Sideris, Lisa, 'One Step Up, Two Steps Back: Aesthetics, Ethics and Savagery in Darwin's Theory of Evolution', *Soundings* 84.3 (2001), 365-388

Singh, Devendra, 'Adaptive significance of female physical attractiveness: Role of waist-to-hip ratio', *Journal of Personality and Social Psychology* 65 (1993), 293-307

Smith, Jonathan, *Charles Darwin and Victorian Visual Culture* (New York: Cambridge, 2006)

Stanley, Henry, *How I Found Livingstone: travels, adventures, and discoveries in Central Africa* (London: Sampson Low, Marston, Low, and Searle, 1872)

Stetson, Dorothy, *A Woman's Issue: The Politics of Family Law Reform in England* (New York: Greenwood Press, 1982)

Thornhill, Randy, 'Darwinian Aesthetics', *The Handbook of Evolutionary Psychology: Ideas Issues, Applications* ed. Charles Crawford and Dennis Krebs (New Jersey: Lawrence Erlbaum, 1998)

Tylor, Edward B, 'The Science of Culture', *Primitive Culture*, 2 vols (London: John Murray, 1871), I, 1-22

--- 'Mythology', *Primitive Culture*, 2 vols (London: John Murray, 1871), I, 285-332

Williams, Raymond, *Keywords: A Vocabulary of Culture and Society* (New York: Oxford University Press, 1976)

WHERE 'THINGS GO THE OTHER WAY': THE STEREOCHEMISTRY OF LEWIS CARROLL'S LOOKING-GLASS WORLD

Joanna Shawn Brigid O'Leary
(Rice University)

Abstract

In the opening scene of *Through the Looking-Glass,* Alice asks a feline friend, 'How would you like to live in Looking-Glass House, Kitty? I wonder if they'd give you milk in there? Perhaps Looking-Glass milk isn't good to drink?' Alice's speculation regarding the potability of Looking-Glass milk has long been considered by chemists to be Carroll's subtle reference to *stereoisomers.* Discovered by Louis Pasteur in 1848, stereoisomers are molecules that contain the same number and kinds of atoms but differ from each other in spatial orientation. The stereoisomers of lactose ($C_{12}H_{22}O_{11}$) in milk exist as non-superimposable mirror images of each other; therefore, the milk Alice would drink in the Looking-Glass House is of the opposite three-dimensional configuration than the milk of the 'regular' world, and for that reason, Carroll wonders if the former might produce an insalubrious, rather than healthful, effect. While much has been written about this particular representation of stereoisomerism in *Through the Looking-Glass,* scientists and literary scholars alike have failed to recognize the potential chemical subtext of the story's other mirror images. In this paper, I will argue that manifestations of stereoisomerism are not just confined to the looking-glass milk scene, and that the ways in which Carroll explores issues of doubling, inversion, and reversibility in the 'mirror world' suggest a far more elaborate contemplation of the implications of stereoisomers. Characters such as Tweedledum and Tweedledee and Humpty Dumpty, the notion of 'unbirthdays', and even to some extent Carroll's pseudonymity reflect the author's fascination with, and at times anxiety about ,the idea of a dual chemical existence, a world in which every person, place, and thing comprises two like yet non-superimposable forms.

In the opening scene of Lewis Carroll's *Through the Looking Glass*, a perturbed Alice tells her black kitten that if 'she's not good directly', Alice shall 'put [her] through into Looking-Glass House'. And, 'how', Alice then asks her cat, 'would you like *that*?'1 The Looking-Glass House, as one might infer, refers to Alice's home as it is reflected in the Looking-Glass, the house that is inside the mirror. Still dissatisfied with her cat's behavior, Alice continues to goad her feline friend with questions about the relative quality of a Looking-Glass existence: 'How would you like to live in Looking-Glass House, Kitty? I wonder if they'd give you milk in there? Perhaps Looking-Glass milk isn't good to drink?' (p. 131). Alice's statements may appear initially to be merely innocent musings, but, like many of the seemingly fanciful features of Carroll's stories, this little speech has more serious, even darker

1 Lewis Carroll, *Alice's Adventures in Wonderland & Through the Looking-Glass,* ed. Horace Gregory (New York: Penguin Putnam), p. 130. Further references to this edition are given after quotations in the text.

resonances.

Literary scholars and chemists alike have long considered Alice's speculation regarding the potability of looking-glass milk as Carroll's unconscious, indeliberate reference to a certain type of chemical compound discovered earlier in the nineteenth century. Four years before Carroll was born, a German scientist by the name of Friedrich Wöhler noticed that the compound cyanic acid, though composed of the same number and types of atoms as another compound, fulminic acid, possessed different properties. Such compounds, which have identical chemical formulas but vary in chemical properties, would eventually be called *isomers*.2

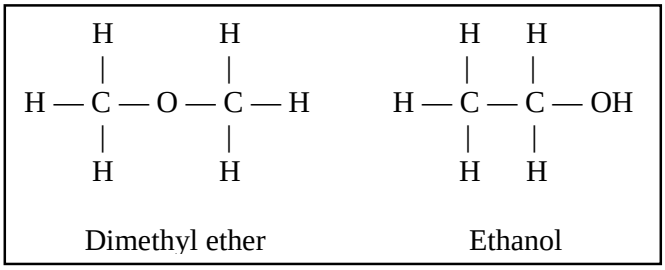

Figure 1: Isomers

Wöhler's 1828 finding was soon followed by similar discoveries by a number of other scientists, including Louis Pasteur, who in 1848 wrote about a particular type of isomer called *stereoisomers*, molecules that contain the same number and kinds of atoms but differ from each other in spatial orientation. Stereoisomers are the multiple physical forms that arise from one chemical formula; the hydrocarbon C_4H_{10}, for example, comprises two stereoisomeric forms, *cis*-two-butene and *trans*-two-butene.

Some stereoisomers exist as mirror images of each other; these compounds have at least one *asymmetric carbon*, that is to say, a carbon atom that is attached to four different atoms or groups of atoms (see image below). The presence of an asymmetric carbon renders the stereoisomers non-superimposable, and for that reason they are often metaphorized as the 'left-hand' and 'right-hand' versions of a molecule, with one stereoisomer oriented clock-wise and the other counter-wise.3

2 A *chemical formula* uses numbers and symbols (e.g. *O* for oxygen and *H* for hydrogen) to describe a compound's chemical composition (that is to say, the numbers and types of atoms it contains). For example, H_2O, the chemical formula for water, contains two atoms of hydrogen and one atom of oxygen.

3 The orientation of a stereoisomer refers to which direction (clockwise or counter-clockwise) it rotates the plane of polarization in a beam of light.

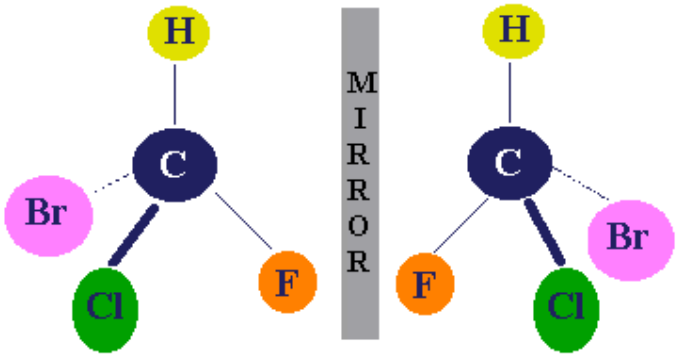

Figure 2: Stereoisomers of CHBrClF

The stereoisomers of lactose ($C_{12}H_{22}O_{11}$) in milk fit this description; therefore, the milk Alice would drink in the Looking-Glass world is of the opposite three-dimensional configuration than the milk in what this essay will henceforth refer to as the 'regular' world.

While Gardner and a few other critics have casually noted this particular representation of stereoisomerism in the story, neither science nor literary scholars have embarked on a more comprehensive stereochemical analysis of *Through the Looking-Glass*.4 Furthermore, the criticism that does exist on the prevalence of mirror images in the story does not recognize or too readily dismisses the possibility of a chemical subtext. In this paper, I will argue that manifestations of stereoisomerism in *Through the Looking-Glass* are not solely confined to the Looking-Glass milk scene, and that the issues of doubling, inversion, and reversibility Carroll explores through the 'mirror world' suggest a far more elaborate contemplation of the implications of stereoisomers. Characters such as Tweedledum and Tweedledee and Humpty Dumpty, the notion of 'unbirthdays', and even to some extent Carroll's pseudonymity reflect the author's fascination with, and at times anxiety about, the idea of a dual chemical existence, a world in which every organic substance comprises two non-superimposable, mirror forms, or as I will call them, *stereoisomeric doubles.*

This stereochemical analysis will first explore the author's relationship with those sciences that most informed his conceptualization of mirror images, chemistry and optics. I will next examine the representations and implications of doubles (stereoisomeric and non-stereoisomeric) in *Through the Looking-Glass* before moving on to consider how in light of the author's issues with pseudonymity, chemical duality was particularly relevant to Lewis Carroll (and Charles Lutwidge

4 Martin Gardner asserts that milk exists as stereoisomers but posits an incorrect timeline: 'it was not until several years after the publication of *Through the Looking-Glass* that stereochemistry found positive evidence that organic substances had an asymmetric arrangement of atoms'. *The Annotated Alice: Alice's Adventures in Wonderland & Through the Looking-Glass* (New York: Forum Books, 1960), p.183.

Dodgson).

The Science of Lewis Carroll

As mathematics lecturer at Oxford and author of several publications on logic, Carroll regularly drew upon these disciplines when penning *Alice in Wonderland* and *Through the Looking-Glass*. Critics in turn have been ready and willing to explore and accept the influence of the author's scholarly expertise on the content and construction of his work. But Carroll's academic interests were hardly confined to the syllogisms or word ladders or the determinants of square matrices. His fascination with gadgets, his fervid responses to vivisection, and his opposition to anti-vaccination campaigns certainly point to a sustained interest and engagement with other scientific disciplines, including, but not limited to, physics, medicine, and biology.

In their critical treatment of *Through the Looking-Glass,* however, scholars still seem to assume that Carroll had little to no knowledge of chemistry and, more importantly, was virtually unaware of recent developments in the field. In his annotation to the infamous milk scene, Gardner writes that 'Alice's speculation about looking-glass milk has a significance greater than Carroll suspected', thus eliding the possibility of a chemical component to the author's representation.5 Likewise, science critic Karen Schmidt's claim that 'the imaginative Lewis Carroll cooked up the possibility [that chemicals could come in mirror-image pairs]', assumes that Carroll, who was writing *Through the Looking Glass* in the early 1870s, was ignorant of Pasteur's work on stereoisomers done more than twenty years earlier.6 Although Carroll was probably not intimately acquainted with the nuances of Pasteur's findings, it is very likely that he had at least a cursory understanding of stereoisomers given that his favourite (and most famous) pastime required more than just a casual familiarity with chemistry. Indeed, of all Carroll's 'amateur' disciplines, that is to say those he did not pursue as a professional academic, chemistry figured most prominently in the author's every day life because a solid knowledge of its basic principles was necessary for successful picture-taking. As a photographer, Carroll developed film using the wet collodion process, which required careful and precise mixing of chemicals. Thomas Hardwich's 1883 *Manual of Photographic Chemistry, Theoretical and Practical* accordingly contains twenty-odd pages of instructions on how to prepare correctly the nitro-sulfuric acid, describing in detail how the slightest alteration in ingredient proportions renders the entire process ineffective.7

5 Gardner, p. 183.
6 Karen Schmidt, 'Mirror-Image Molecules', *Science News,* 143 (1993), 348–35 (p. 348).
7 Despite its many challenges, the wet collodion process was heartily embraced by Carroll and nineteenth-century photographers because it produced images that were clear and delicate, and unlike daguerreotypes, infinitely and easily replicable.

The contents of Carroll's personal library at the time of his death suggest that the vagaries of the wet collodion photography prompted the author to do further research on the composition of chemical compounds and that in the process he read about (perhaps not for the first time) the theory of isomerism. Carroll's science books included William Thomas Brande's *A Dictionary of Science, Literature, and Art* (1842); William Allen Miller's *Elements of Chemistry, Theoretical and Practical* (1855–1857) in three volumes, *Chemical Physics, Inorganic Chemistry,* and *Organic Chemistry)* and John Sadler's *An Explanation of Terms Used in Chemistry* (1804).8 All of these books contain information on chemical bonding and compound structures, but Brande's *Dictionary* is particularly relevant for its entry on *isomers.*9 While Carroll's ready access to these texts makes it likely that they at least in part served as the foundation for his scientific knowledge, these books should not, however, be considered the only means by which the author may have become familiar with stereochemistry. The development of this field was contemporaneous with the author's own science and mathematics education; indeed, the discursive history of isomerism in many ways runs parallel to Carroll's lifetime.

In the early nineteenth century, scientists generally thought that every chemical compound had its own unique chemical formula. This assumption was based in large part on the research of eighteenth-century scholars like Antoine Lavoisier, who in his 1789 *Traité Élémentaire de Chimie* ('Elementary Treatise on Chemistry', translated 1790) described his attempts (mostly unsuccessful) to determine what he considered to be the unique proportions of certain elements in various compounds.10 In 1809, Joseph Gay-Lussac improved upon Lavoisier's work on chemical formulas when he found that in the formation of water a certain volume of gaseous hydrogen is needed to react with a certain volume of gaseous water.11 The fact that volumes of combining gases occurred in simple ratios confirmed the findings of John Dalton, who one year prior had proposed in *A New System of Chemical Philosophy* that the relative numbers of atoms of elements in chemical compounds can be expressed in whole number ratios. Both Dalton and Gay-Lussac conceived of these atomic ratios as differentiating one compound from another but did not consider that a single ratio (as expressed through one chemical formula) could describe two different chemical compounds. As previously mentioned, it was Friedrich Wöhler who arrived at this conclusion in 1824 when he discovered his analysis of cyanic acid (chemical formula HCNO) was identical to an analysis of fulminic acid (*also* chemical formula HCNO)

8 Charlie Lovett, *Lewis Carroll Among His Books: A Descriptive Catalogue of the Private Library of Charles L. Dodgson* (Jefferson, NC: McFarland, 2005), pp. 54, 210, 269.

9 'Compounds which contain the same elements in the same ratio, and yet exhibit distinct chemical qualities, are said to be *isomeric*. The cyanic and fulminic acids are isomeric compounds of nitrogen, oxygen, and carbon. The distinctions thus arising are probably referable to the different ways in which the same elementary atoms are gropued [*sic*] in the compound'. William Brande, *A Dictionary of Science, Literature and Art* (London: Longmans, 1842), p. 713.

10 F.J. Moore. *A History of Chemistry.* (New York: McGraw-Hill, 1918), pp. 50–2.

11 This finding formed the basis of Gay-Lussac's 'law of combining volumes' and was published in his 'Memoir on the Combination of Gaseous Substances with Each Other' (1809).

published a year earlier in the journal *Annales de Chemie* (edited ironically by Gay-Lussac). Author of the fulminic acid analysis Justus Liebig initially accused Wöhler of falsifying his results, but through laboratory testing the former confirmed the latter's findings. Neither Liebig nor Wöhler, however, could immediately say why two distinct compounds with different chemical properties contained the same numbers and types of atoms.12 The correct explanation came from Swedish chemist Jöns Berzelius, who in his 1832 *Jahresbericht*13 outlined how one chemical formula could yield multiple structural arrangements of atoms (isomers) and hence multiple compounds with different properties.14 In 1848, Pasteur elaborated on this theory of isomerism while giving a paper to the Paris Academy of Sciences. In this landmark lecture, he noted how racemic acid comprised two types of crystals that under a microscope appeared to be mirror images of each other. Upon further testing, Pasteur correctly concluded that racemic acid exists as two isomers, one that rotates plane-polarized light clockwise and the other that rotates light counter-clockwise. This subtype of isomers would eventually be known as *stereoisomers.*

Given that such theoretical developments were well publicized in academic as well as mainstream venues, Carroll, as a frequent contributor to (and reader of) a wide range of periodicals, probably encountered the concept of stereoisomerism at multiple points throughout his life and in a number of different sources. Textual references to mirror-image molecules may have initially attracted Carroll's attention because of his fascination with looking-glasses. Like many Victorians, Carroll was intrigued by optical devices as well as instruments of visual perception, and regularly experimented with mirror reversals. To entertain himself and his young friends, Carroll composed letters in 'mirror-writing' that could only be read by starting at the last word and reading to the first and drew funny pictures that changed once turned upside-down.15 The inspiration for *Through the Looking-Glass* was, in fact, a very large mirror that sat above the drawing room fireplace at Hetton Lawn, the home of Alice Liddell's grandmother. After visiting Alice and her sisters there in early April of 1866, Carroll may have fantasized about what might happen should one climb up onto the mantelpiece and go through to other side of the mirror.16

In imagining the mirror to be traversable, Carroll imposed on it one of the definitive properties of another type of 'glass' with which he was unusually preoccupied, the photographic lens. The lens can be thought of as the antithesis of mirror, for whereas light passes through a lens and emerges "bent" on the other side (*refraction*), it hits and bounces away from a mirror (*reflection*). Refraction causes an

12 Soledad Esteban, 'Liebig–Wöhler Controversy and the Concept of Isomerism', *Journal of Chemical Education,* 85 (2008), p. 1202

13 The *Jahresbericht,* or annual report on advances in the field of chemistry and physics, was written by Berzelius and published through the Stockholm Academy. From 1821 to 1848 Berzelius published 27 volumes of the *Jahresbericht.*

14 Henry M. Leicester and Herbert S. Klickstein, *A Source Book in Chemistry, 1400–1900* (Cambridge, MA: Harvard University Press, 1969), p. 264.

15 Gardner, p. 182.

16 Morton N. Cohen, *Lewis Carroll: A Biography.* (New York: Alfred A. Knopf, 1995), p. 96.

object on the regular side of a lens to appear upside down on the other side. For that reason, the lens of the human eye produces an upside-down image; however, because we are neurologically programmed to deal with a 'right-side up' world, the brain 'flips' the image. Hence what we 'see' is actually the brain's 180-degree readjustment.

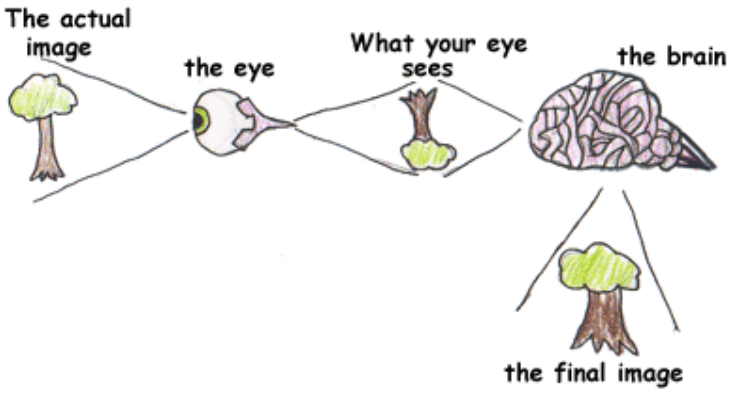

Figure 3: How We 'See'

As early as second century AD, Greek physician and philosopher Galen of Pergamun recognized this disconnect between ocular input and visual perception but could not offer a precise mechanism for image reversal. The invention of the *camera obscura* around 1000 AD forged the initial epistemological link between the eye and the photographic lens and gave rise to further debate as to the neurological origins of image reversal.17 The earliest prototype of the camera, the camera obscura produces an upside-down image by streaming light through a small hole in a darkened room or box. Its impact on the development of visual theory cannot be overstated, for as Christopher Otter notes, 'it affected the scientific imagination so greatly that by the seventeenth century it had become the model for the eye'.18 Accordingly, in his 1690 'Essay Concerning Human Understanding' John Locke highlighted the connection between human vision and photography by analogizing the darkened space of the camera obscura to the human mind, into which external images of the outside world must be conveyed.

What Locke notably did not address was the fact that the images produced in the dark room of the camera obscura (and by extension in the human mind) required neurological mediation as to register them 'right side up'. In 1601, Johannes Kepler

17 The earliest recorded construction and analysis of the camera obscura occurs in *Kitab al-Manazir,* written by Ibn al-Haytham. This work was translated into Latin (*Objectiva)* in the thirteenth century. Nicholas J. Wade and Stanley Finger, 'The eye as an optical instrument: from camera obscura to Helmholtz's perspective', *Perception* 30 (2001) 1157–77 (p. 1159).

18 Chris Otter, *The Victorian Eye: A Political History of Light and Vision in Britain, 1800–1910* (Chicago: University of Chicago Press, 2008), p. 26.

had argued in his *Astronomiae Pars Optica* (*The Optical Part of Astronomy*) that the lens of the human eye projects an inverted image on the human retina, but it was not until the nineteenth century that scientists arrived at a more precise understanding of the sensory systems involved in 'flipping' that image. In 1809, Franz Josef Gall proposed in *Recherches Sur le Système Nerveux* (*Research on the Nervous System*) that all physical functions were localized within the brain and more relevantly, that one of the three sections of the cerebral cortex was responsible for vision.19 Pierre Marie Flourens further established in 1824 that sight depends on the integrity of the cerebral cortex when he showed that removal of this organ in a bird causes blindness. With the 1833 publication of *Handbuch der Physiologie* (*Elements of Physiology*),20 Johannes Müller laid the groundwork for specifying the physiological link between the eye and the brain by introducing the idea that sensations (sight, for example) are associated with 'specific nerve energies'.21 This hypothesis presaged later work on the role of the optic nerve in transmitting information to the cerebral cortex.

The work of Gall, Flourens, Müller, and other scientists have led many critics to identify the Victorian Era as a time in which both scholars and lay people were uniquely interested in visual perception. R. Steven Turner notes that literature on vision studies flourished during this period, growing almost exponentially between the years 1840 and 1844 and 1890 and 1894. Jonathan Cary has further argued that flurry of optical developments in the first half of the nineteenth century gave rise to a 'visual culture of modernity' that involved new ways of seeing**.**22 Central to the development of this new visual culture were devices like the camera and the looking-glass, which alternately replicated and opposed the work of the human eye. For in contrast to the refracted, upside-down image produced by the lens of a camera or an eyeball, the reflected image produced by the mirror is right-side up but reverse in orientation.

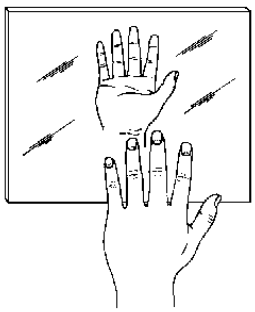

Figure 4: Mirror-Image of Human Hand

19 Zola-Morgan, S., 'Localization of Brain Function: The Legacy of Franz Joseph Gall (1758–1828)', *Annual Review of Neuroscience*, 18 (1995), p. 365.
20 An English edition of Muller's work translated by William Bayly was published in London in 1839.
21 Laura Otis, *Müller's Lab* (Oxford University Press, 2007), pp. 7–10.
22 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990).

Because, as Crary further argues, 'an analysis of vision gives crucial insight into the way Victorians constructed experience', it is beneficial to examine carefully why in *Through the Looking-Glass* Carroll focused on 'mirror' rather than 'lens' images.23 In producing refracted as opposed to reflected images, the looking-glass provides an opposite perspective to that afforded by the human eye and, in so doing, makes available an alternate yet scientifically sanctioned world. Given that the contents of this world are derived from and adhere to scientific (specifically, optical) principles, the narratives that emerge from it can be considered more along the lines of science fiction rather than fantasy. Writing about Looking-Glass people, places, and things was thus both alluring and challenging for Carroll, who, as an author, must not and could not rely solely on his own imagination to construct the mirror world.

In *Through the Looking-Glass,* Carroll's decision to privilege reflection over refraction, the world of the mirror over the world of the lens is represented early in text through Alice's choice of punishment for her troublesome pet. 'When I saw all the mischief you had been doing', Alice warns the black kitten, 'I was very nearly opening the window, and putting you out into the snow!' (p. 128). Alice threatens the black kitten with the frosty world beyond the window, but when it continues to misbehave 'to punish it she [holds] it up to the Looking-Glass, that it might see how sulky it was' (p. 130). As Alice forces Kitty to face her naughty self in the mirror, she realizes the mirror, like the window, might serve as a threshold and begins to enumerate 'all her ideas about the Looking-Glass House' (p. 131). The Looking-Glass House, specifically the Looking-Glass drawing-room, is simultaneously foreign and familiar to Alice, who knows that it is 'just the same as our drawing-room, only the things go the *other* way' (p. 131). Her confidence in this assertion comes from empirical evidence; having 'held up one of [her] books to glass', she knows that in the Looking-Glass world the 'books are something like our books, only the words go the *wrong* way' (p. 131; italics mine).

Alice's conflation of *wrong* and *other* in this opening scene lays the groundwork for the complex consideration that follows in *Through the Looking-Glass* as to the possibility that stereoisomeric doubles correlate with moral binaries. When Alice steps into the Looking-Glass, she crosses over into a scientifically Other world, one that mimics yet ultimately deviates chemically from the regular world in a way that is nonsensical, confusing, and 'wrong' to outsiders like Alice, but rational and reassuring to its inhabitants who operate under a different set of rules and assumptions. Cohen calls this world a 'mysterious place', where 'even the laws of nature, law of gravity, for instance do not work as they should', but this description is misleading. Laws of nature are working the way they 'should', but in the Looking-Glass World, that way is unfamiliar and unconventional. Because Carroll does not believe there is a 'right' way in which laws of nature 'should' operate, he uses

23 Carol T. Christ and John O. Jordan, 'Introduction', in *Victorian Literature and the Victorian Visual Imagination* (Berkeley: University of California Press, 1995), p. xx.

stereoisomeric doubles, as well as the other Looking-Glass people, animals, and institutions Alice encounters, to disrupt her and the reader's sense of order, balance, and continuity in a way that causes both to rethink their conceptions.

Two By Two In *Through the Looking-Glass*

Carroll's preoccupation with doubles (stereoisomeric or otherwise) becomes quickly apparent in *Through the Looking-Glass*, which begins, 'One thing was certain, that the *white* kitten had had nothing to do with it — it was the black kitten's fault entirely'(p. 128). In emphasizing the singularity of this instance, Carroll implicitly posits all else but this "one thing" as unfixed and undetermined. Certainty is indeed a scarce commodity in the Looking-Glass World, where things mutate without rhyme or reason, or, at least, not with a rhyme or reason to which Alice is accustomed. Here, however, certainty emerges with regard to the black kitten and the white kitten, phenotypic opposites that represent an optical dichotomy familiar to Victorian photographers, scientists, and certainly to Lewis Carroll. The visible light spectrum, first experimentally produced by Newton in 1666, has at its polar ends *white* and *black*, with whiteness indicating the presence of light and blackness, its total absence.

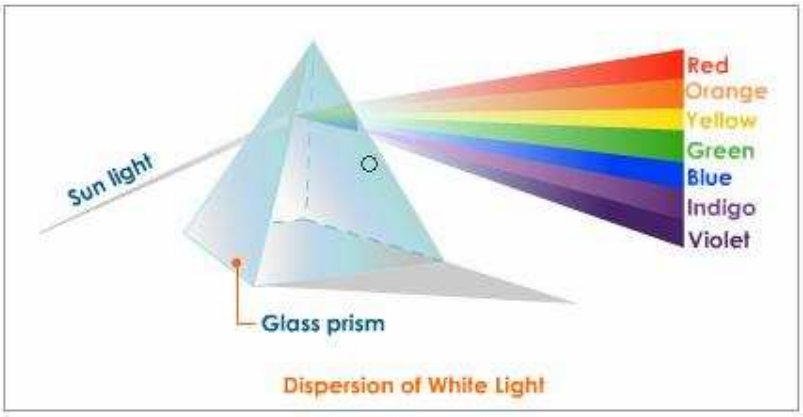

Figure 5: Visible Light Spectrum

The white kitten and black kitten can thus be considered as symbols of light and shadow, respectively, antithetical scientific phenomena that are produced by shining light through a prism, a triangular glass object that *refracts* light. In this way, the black kitten and white kitten initially appear to be *lens* rather than *mirror* doubles.

But the syntactic structure of this first sentence as well as the 'certainty' of the black kitten's guilt suggests that the kittens may be figured as mirror doubles as well. In separating one part of the sentence from the other, the dash serves as a syntactical barrier; furthermore, because this barrier is oriented around the 'it' (the unravelling of the ball of wool) and each part of the sentence is similar but not identical to the other,

one might think of the dash as a figurative looking-glass that separates the *actual* from the *reflected,* the regular world from the mirror world. This syntactical division also explains why innocence and culpability are mutually exclusive in the case of the white kitten and the black kitten. The plane of the mirror denies the white kitten access to 'it', that is to say the *actual* ball of wool, so the black cat must be *entirely* at fault. Since as mirror doubles the cats literally cannot share the crime, they cannot share the blame.

The separation of the black kitten from the white kitten within the space of the sentence likewise represents (or reflects) their physical separation within the space of Alice's drawing room. As Alice points out, because 'white kitten had been having its face washed by the old cat for the last quarter of an hour', it '*couldn't* have had any hand in the mischief' (p. 127). Carroll's use of synecdoche here further supports a conceptualization of the cats as mirror doubles, for as previously noted, the relationship between stereoisomers was regularly metaphorized as a set of human hands, which are themselves non-superimposable mirror images. Describing the white kitten as having had no 'hand' in the mischief is not only amusing in its literal physical disjunction (the cat really had no *paw* in the mischief) but also suggestive of the chemical subtext to the representation of these feline doubles.

Although Alice's choice of punishment for the black kitten (reflection as opposed to defenestration) signals Carroll's decision to privilege the world of the mirror over the world of the lens, the kittens themselves are neither exclusively lens nor mirror images. Rather, they are liminal figures and represent the space between the two worlds. These doubles are similar in function to another optical hybrid, the Looking-Glass, which though opaque becomes momentarily transparent upon Alice fantasizing: 'Let's pretend the glass has got all soft like, gauze, so that we can get through. Why, it's turning into a sort of mist now, I declare! It'll be easy enough to get through' (p. 131). With this literal and figurative turn to the world beyond the kittens and the Looking-Glass, Carroll leaves behind the world of the lens, that is to say, the regular world, and shifts to examining doubles that are exclusively stereoisomeric mirror images.

This transition is marked by the Looking-Glass milk debate. When Carroll was writing *Through the Looking Glass,* scientists had not yet discovered the two isomers of lactose, but the idea that this compound (and by extension, milk) might exist in mirror forms was not lost on the author. Nor was the possibility that because Looking-Glass lactose 'went the other way' with regards to the orientation of regular lactose, the properties of the former would be the reverse of those of the latter. Looking-Glass milk would be harmful, not healthful, terrible, not tasty, and therefore not good to drink. In the twentieth century, scientists would confirm Carroll's hypothesis that a single compound may exist in 'good' and 'bad' isomeric forms, most famously in the case of the now banned drug thalidomide.24 With regards to lactose,

24 Of the isomers of thalidomide, one significantly alleviates morning sickness and another causes serious birth

we now know that it does not exist as 'good' and 'bad' isomeric forms. Both isomers of lactose are digestible; thus, Alice's hesitant prediction is incorrect.

That Alice ultimately refrains from imbibing the milk that 'perhaps isn't good to drink?', suggests that Carroll, at least initially, imagined stereoisomeric doubles as comprising 'good' and 'bad' forms. This idea that a person or thing can exist in two compositionally identical but functionally different forms (one helpful, the other harmful; one good, the other bad) certainly did not originate with Carroll, for dark doubles and evil twin figures abound in nineteenth-century literature, with *Jane Eyre* and *Frankenstein* being salient examples. But what is innovative, I would argue, about the doubles that occur in *Through the Looking Glass* is that their foundation is chemical rather than psychological. While the psychological double is most often a fantastic representation of a character's repressed desires or unconscious emotions, the stereoisomeric double is a specimen from a world in which alternate chemical forms are unavoidable natural phenomena. As opposed to being a 'literary, specifically fictional device for articulating the experience of self-division', the stereoisomeric double is a scientific, realistic device for expressing the experience of self-alternity.25

Stereoisomeric doubles provided Carroll a means by which to imagine and explore a world in which each person and thing existed in two chemical forms, each with its own distinguishing properties. Carroll's uncertainty about the implications of such doubling is reflected in Alice's uncertainty regarding the quality of Looking-Glass milk. Although in this scene Carroll seems to deem one form of milk 'good' and the other 'bad', this characterization should in no way be seen as the author's universal judgment on mirror forms. The increasingly complicated relationships between the sets of stereoisomeric doubles that follow suggest Carroll understood the ramifications of chemical duality, and indeed, human duality, to be infinitely complex.

Stereoisomeric Doubling in the Mirror World

Couples, pairs, and twosomes are frequent features in the world behind the Looking-Glass, and one must look carefully for those doubles that are specifically stereoisomeric in character. Some of Carroll's references to stereoisomerism are subtle, as, for example, the brief mention in the White Knight's Song. To comfort a sad-looking Alice, the White Knight presents her with a ballad, the last verse of which includes the line, 'If e'er by chance I madly squeeze a right-hand foot / Into a left-hand shoe / I weep, for it reminds me so / Of that old man I used to know who seemed distracted with his woe' (p. 217). Gardner identifies the White Knight's

defects.

25 John Herdman, *The Double in Nineteenth-Century Fiction* (London: Macmillan Press, 1990), p. 2.

mention of squeezing a right-hand foot into a left-hand shoe as another example of the sort of left-right reversal that occurs in the looking-glass world.26 To Gardner's observation, I would add that when Carroll emphasizes the fear and frustration that arises when one tries to superimpose the non-superimposable (that is to say, the right foot and the left shoe), he is imagining the perils of living in a dual chemical world in which one no longer could recognize the small differences between two otherwise identical objects, and, as a result, not understand why one served a different purpose than the other. With this reference to right-hand feet and left-hand shoes, Carroll is also asserting that any determination regarding the vice or virtue of respective stereoisomeric doubles may be context dependent. Just as the foot that is right proves 'wrong' when placed in the left shoe, so too may Looking-Glass milk prove harmful when consumed by a regular girl.

A second, more extensive representation of stereoisomeric doubles can be seen in Alice's encounter with the Tweedledum and Tweedledee. Although they are nearly compositionally identical in the sense that their visages and bodies are alike, Tweedledum and Tweedledee are not clones. 'Alice knew which was which,' Carroll writes, 'because one of them had "DUM" embroidered on his collar, and the other "DEE"'. Alice then supposes that 'they've each got "TWEEDLE" round at the back of the collar' (p. 159). As in the Looking-Glass milk scene, Alice's musings signal Carroll's imposition of a chemical subtext. If Tweedledum and Tweedledee do, in fact, have TWEEDLE embroidered at the back of their collars, then we can think of the plane of the mirror separating them at their backs, rendering them non-imposable mirror images.

In addition to this material marker, an old song also relates the stereoisomeric character of Tweedledum and Tweedledee and helps Alice know which is which, for as she recalls, 'Tweedledum and Tweedledee / Agreed to have a battle; / For Tweedledum said Tweedledee / Had spoiled his nice new rattle' (p. 160). By describing Tweedledum as in possession of a rattle, Carroll implies his ability *to rattle*, a property Tweedledee, despite his extreme physical similarity to Tweedledum, lacks. Tweedledee's attempt to destroy Tweedledum's rattle (rather than just use it himself) represents the sort of anxiety and/or discomfort Carroll imagines may ensue with the discovery of stereoisomeric difference, that physical and structural identicality does not correspond to like behaviours and capabilities.

Tweedledum and Tweedledee's near battle over the maligned rattle also suggests Carroll was uncertain as to the tenability of two stereoisomers occupying the same space. Looking-Glass milk and regular milk can exist without conflict because they are separated in their respective worlds by the plane of the mirror. However, in the case of Tweedledum and Tweedledee, worlds have seemingly collided; either Tweedledum or Tweedledee has migrated from the regular to the Looking-Glass world and dissension inevitably arises as they discover they are not one in the same.

26 Gardner, p. 181.

Although Carroll ultimately forecloses the possibility of violent conflict by allowing the crow to intervene as per the plot of the nursery rhyme, the threat that one stereoisomeric double may dominate or destroy the other still remains.27

The most complex representation of stereoisomeric doubling can be seen in Alice's interactions with Humpty Dumpty. Alice purchases the egg that grows to become Humpty Dumpty from the shopkeeper Sheep, who originally offers her 1 egg for fivepence farthing and 2 eggs for twopence. 'Two are cheaper than one?', asks Alice in response to this offer, to which the Sheep replies, 'Only you *must* eat them both, if you buy two' (p. 182). The fact that customers in the Looking-Glass world are financially incentivized to buy eggs in pairs, as well as instructed to consume them in the same fashion, suggests the eggs as stereoisomeric doubles. The eggs are seemingly identical, but having only one half of a pair is a liability for the shopkeeper, much like selling only left shoes would be to a cobbler's detriment. However, as opposed to Tweedledum and Tweedledee, who chafe against each other and thus seem better off existing in the regular and Looking-Glass worlds, respectively, these doubles are designed to be inseparable.

Despite the shopkeeper's entreaties, Alice purchases a single egg, thereby implicitly privileging one stereoisomeric double over the other. But that egg, which 'only got larger and larger, and more and more human', soon transforms such that it is no longer one unified egg, but rather something thing destined to end up in multiple parts, that is, as Alice says, 'HUMPTY DUMPTY himself'(p. 183). '*My* name means the shape I am', claims Humpty Dumpty, and indeed he is correct, for the orthographical structure of 'Humpty Dumpty' expresses his stereoisomeric character. Identical in spelling save one letter, the two parts of the egg's moniker, when oriented around the plane of the mirror, reveal themselves to be non-superimposable.

H-U-M-P-T-Y ¦ Y-T-P-M-U-**D**

↑

Mirror

Figure 6: Stereoisomeric Character of 'Humpty Dumpty'

Although Humpty Dumpy thinks his shape 'a handsome one', he is not meant to retain it, for, as Alice recalls, he is to have a 'great fall', after which 'All the King's horses and all the King's men / Couldn't put Humpty Dumpty in his place again' (p. 184). Here, Carroll appropriates Humpty Dumpty and the corresponding nursery rhyme to hypothesize that even seemingly singular persons and things eventually dissemble into stereoisomeric doubles. Considering Humpty Dumpty grew from one of a pair

27 'Just then flew down a monstrous crow, / As black as a tar-barrel; / Which frightened both the heroes so, / They quite forget their quarrel' (p. 160).

of stereoisomeric eggs, then even a stereoisomeric double has the potential to generate its own stereoisomers.

Just before going to pieces, Humpty Dumpty provides Alice with some advice on aging, and in the process, invokes another set of stereoisomeric doubles. In response to Alice's claim that 'one can't help growing older', Humpty Dumpty insists, '*One* can't, perhaps, but *two* can. With proper assistance you might have left off at seven' (p. 186; italics Carroll's). Alice subsequently interrupts Humpty Dumpty to admire his 'beautiful belt', because, she thought, 'they had had quite enough of the subject of age'. But Humpty Dumpty is far from finished with his lecture, and simply incorporates Alice's observation into his original line of argument about aging by telling her that the belt was a present for his 'unbirthday', which he defines as a 'day when it isn't your birthday' (p. 187). As the reverse of a regular birthday, the 'unbirthday' is very similar in structure to the birthday but by implication has one very important distinguishing property: the power to undo or reverse the effects of the regular birthday. Furthermore, Humpty Dumpty's previous assertion that *two* not *one* can halt the aging process suggests that birthdays and unbirthdays, unlike other stereoisomeric doubles, can in theory operate in harmony to produce some beneficial effect. But what is problematic and troubling about this conceptualization is that one stereoisomeric form (the unbirthday) exists in extreme disproportion to the other form (the birthday). The preponderance of unbirthdays means not that a person like Alice would be fixed at seven years, but that she would age backward until she no longer exists. As in the case of Tweedledum and Tweedledee, Carroll here imagines that when two stereoisomeric doubles occupy the same space they are inevitably pitted against each other in such a way as to cause one double to dominate the other. In this way, Carroll suggests a dual chemical world may be ultimately untenable and that some measure of segregation is necessary for stereoisomeric doubles to co-exist equally.

Stereoisomeric Doubling in the Regular World

The theory of stereoisomerism provided Lewis Carroll with a scientific foundation not only for the doubles in his work but also for those in his own life. Indeed, the idea of two-part self or 'double' identity would have held special significance for Lewis Carroll, or Charles Dodgson as he was better known to friends and family. The reverend and mathematician insisted on keeping these two identities distinct both to shield himself from unwanted publicity (he repeatedly writes of his aversion to talking to strangers about his books) and to maintain his professional integrity.28

28 Dodgson's fear that reviewers and academics who knew he wrote books for children might disregard his mathematical publications was not unfounded, for 'some reviews of his serious books fell into that superficial mode when the writers linked the two names' (Cohen, p. 298).

The fact that Dodgson so emphatically denied he had anything to do with Lewis Carroll has led many critics to pathologize his pseudonymity. Douglas Nickel notes that 'several authors, beginning with Langford Reed, saw in Dodgson's discomfort with Carroll evidence of a split personality'.29 Cohen acknowledges that 'others have seen [in Dodgson]…a bifurcation, a dual persona', but dismisses such an evaluation as 'a view easily disposed of'. The author's 'reasons for keeping his two identities separate and under control were rational and reasonable', counters Cohen, pointing out that maintaining a pseudonym was also important so that children would not be intimidated by Dodgson.30

But Dodgson's motivation to keep his two identities separate may have been based on science as well as reason. The great lengths to which he tried to isolate C.L. Dodgson from Lewis Carroll suggest he regarded them not only as separate but also, more importantly, non-overlapping entities. He did everything possible to establish author and mathematician as mutually exclusive, returning unopened letters received at Christ Church that were addressed to Lewis Carroll and referring to the author in third person in epistolary correspondence. One therefore wonders if and when Dodgson began to read about isomerism he found a chemical basis for thinking that one person could exist in two different chemical forms each with its own professional properties. Lewis Carroll and Charles Dodgson, the author may have been imagined, are human stereoisomers, structurally similar yet non-superimposable, each with his own professional attributes.

Stereoisomerism for Carroll thus provided a new scientific foundation for a much older idea: that any given person or thing could exist in two forms. By conceptualizing these two forms using theories of chemistry, Carroll innovated the motif of the double, changing it from a literary device to a means by which scientific fact could intervene in an otherwise fictional narrative. Stereoisomeric doubles therefore render the Looking-Glass world an alternative reality rather than an improbable fantasy. As specimens from this scientifically Other world, 'Unbirthdays', Humpty Dumpty, Tweedledum and Tweedledee, and Looking-Glass milk represent Carroll's intense contemplation on the complex implications of chemical duality. The diverse stereoisomeric doubles featured in *Through the Looking-Glass* complicate any assumptions that each set comprises a "good" and a "bad" form and instead suggests that each is suitable and appropriate in a certain space.

29 Douglas R. Nickel, *Dreaming in Pictures: The Photography of Lewis Carroll* (New Haven, CT: Yale University Press, 2002), p. 27.

30 'If [Dodgson's young friends] saw him as a famous man…they would grow shy and tongue-tied, and a natural friendship might never develop' (Cohen, p. 192).

Bibliography

Brande, William, *A Dictionary of Science, Literature and Art* (London: Longmans, 1842)

Carroll, Lewis, *Alice's Adventures in Wonderland & Through the Looking- Glass,* ed. Horace Gregory (New York: Penguin Putnam, 1960)

Christ, Carol T. and John O. Jordan, 'Introduction', in *Victorian Literature and the Victorian Visual Imagination* (Berkeley: University of California Press, 1995), pp. xix–xxix

Cohen, Morton N., *Lewis Carroll: A Biography* (New York: Alfred A. Knopf, 1995)

Crary, Jonathan, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990)

Dalton, John, *A New System of Chemical Philosophy* (Manchester Press, 1808)

Gardner, Martin, *The Annotated Alice: Alice's Adventures in Wonderland & Through the Looking-Glass* (New York: Forum Books, 1960)

Gernsheim, Helmut, *Lewis Carroll: Photographer* (New York: Chanticleer Press Inc., 1950)

Esteban, Soledad, 'Liebig–Wöhler Controversy and the Concept of Isomerism', *Journal of Chemical Education,* 85 (2008), 1201–3

Herdman, John, *The Double in Nineteenth-Century Fiction* (London: Macmillan Press, 1990)

Lavoisier, Antoine, 'Elemental Treatise on Chemistry', trans. Robert Kerr (1790)

Leicester, Henry M. and Herbert S. Klickstein, *A Source Book in Chemistry, 1400–1900* (Cambridge, MA: Harvard University Press, 1969)

Lovett, Charlie, *Lewis Carroll Among His Books: A Descriptive Catalogue of the Private Library of Charles L. Dodgson* (Jefferson, NC: McFarland, 2005)

Moore, F.J., *A History of Chemistry* (New York: McGraw-Hill, 1918)

Miyoshi, Masao, *The Divided Self: A Perspective on The Literature of the Victorians* (New York: New York University Press, 1969)

Nickel, Douglas R., *Dreaming in Pictures: The Photography of Lewis Carroll* (New Haven, CT: Yale University Press, 2002)

Otis, Laura, *Müller's Lab* (Oxford University Press, 2007)

Otter, Chris, *The Victorian Eye: A Political History of Light and Vision in Britain, 1800–1910* (Chicago: University of Chicago Press, 2008)

Reed, Langford, *The Life of Lewis Carroll* (London: Purnell and Sons, 1932)

Rogers, Robert, *A Psychoanalytic Study of The Double in Literature* (Detroit: Wayne State University Press, 1970)

Schmidt, Karen, 'Mirror-Image Molecules', *Science News*, 143 (1993), 348–35

Smith, Lindsay, *Victorian Photography, Painting and Poetry: The Enigma of Visibility in Ruskin, Morris and the Pre-Raphaelites* (Cambridge University Press, 1995)

Turner, R. Steven, 'Paradigms and Productivity: The Case of Physiological Optics, 1840–94', *Social Studies of Science*, 17 (1987), 36–68

Wade, Nicholas J. and Stanley Finger, "The eye as an optical instrument: from camera obscura to Helmholtz's perspective", *Perception* 30 (2001), 1157–77

Zola-Morgan, S., 'Localization of Brain Function: The Legacy of Franz Joseph Gall (1758–1828)', *Annual Review of Neuroscience*, 18 (1995), 359–383

THE AESTHETE AS A SCIENTIST: WALTER PATER AND NINETEENTH CENTURY SCIENCE

Kanarakis Yannis
(Aristotle University of Thessaloniki)

Abstract
This paper explores the impact of nineteenth-century science on Victorian literature by examining the way Walter Pater, the father of British aestheticism, was influenced by it. Pater adopted the rhetoric of new science and incorporated a wide variety of scientific maxims in his work in order to modernize art and render it timely. This was symptomatic of his anxiety that the sweeping force of nineteenth-century science would render art obsolete. His response to this threat came in the form of a series of suggestions for the role of art and the artist, which eventually comprised a new aesthetic program, aestheticism. Drawing on a plethora of interconnections that scholars have over the past years detected between Pater and the science of his time, my aim in this study is to systematize the interrelationship that the Oxford don established between the scientist and the aesthete, and to explore the grounds on which this association was made. As I shall show, Pater drew on an ethical and a structural kinship between the nineteenth-century artistic movement and contemporary science in order to present the aesthete as a scientist. The implications of this kinship will be addressed as a means of accounting for the fact that aestheticism constitutes a short-lived artistic phenomenon, unable, in the long run, to respond to the call of the times.

The period from 1860 to 1900 was a time when scientific progress achieved a profound impact on the cultural imagination of the Victorians, becoming, as Robin Gilmour puts it, 'something of a national hobby'.1 Science became 'a hot subject...precisely because so much of cultural weight depended on how it was imagining the world'.2 Scientific development, through the works of Darwin, Tyndall, Huxley and Spencer, among others, did not only mark a radical shift in the way the layperson perceived the world, but it also compelled nearly all other disciplines to shift their focus as a means of tuning in to the new reality that modern science had brought to light.

One of the first who attempted to modernize art by accommodating the givens of scientific advance into his aesthetic speculation and literary practice was Walter Pater, the so-called father of British aestheticism who urged his contemporaries to lead their lives 'in the spirit of art'. In his effort to align art with the progressive forces of the 'brave new world', Pater transubstantiated science into an aesthetic ideal, as we shall see, coming up with a rationalized aesthetic form where the older, Romantic

1 Robin Gilmour, *The Victorian Period: The Intellectual and Cultural Context of English Literature, 1830-1890* (London: Longmans, 1993), p. 111.
2 George Levine, 'Two Ways not to be a Solipsist: Art and Science, Pater and Pearson' in *Victorian Studies*, 43 (2000), 7-41, (p. 8).

role of the artist as a priest-like 'hierophant' was replaced by a vision of the artist as a scientist and artistic creation was replaced by a detached, ascetic and austere practice. It is my aim in this paper to explore the grounds on which Pater established such a peculiar interrelation, where the scientist and the aesthete joined hands, and the way it was ultimately presented in his work. Drawing on a plethora of interconnections between the British aesthete and the science of his time, I will examine the points of their paradoxical convergence in order to amplify and systematize this surprising correlation between the scientist and the aesthete and thus pave the way for the discussion of the implications of the aestheticism of science and the science of aestheticism.

Pater's first book, *Studies in the History of the Renaissance*, was released in 1873, but was compiled from a series of articles published from 1867 to 1871 in the *Westminster* and the *Fortnightly Review*. As Ian Fletcher argues 'in periodicals such as *The Fortnightly Review*, the troubled English mind struggled with competing loyalties to science and religion, to authority and "the free play of mind", reaching a remarkably articulate stage of self consciousness'.3 Pater's choice to publish his thoughts in the utilitarian *Westminster* and the scientifically oriented *Fortnightly* is indicative of his compliance with the progressive forces in their attempt to substitute a "modern" aesthetic compatible with the outcomes of new science for traditional beliefs. This compliance becomes explicitly manifested in the 'Conclusion' of the *Renaissance*, which forms in a very synoptic way Pater's early aestheticist manifesto.4

The 'Conclusion' actually consists of two parts. The first part employs a discourse that invokes the findings of contemporary science so as to discuss the recognition of fluidity in the physical world, whereas the second part employs the discourses of associationism, modern psychology and empirical skepticism to address the ethical consequences of such fluidity for the individual's thought. It comes then as no surprise that the 'Conclusion' has traditionally been read by Paterian critics along the lines of late nineteenth-century scientific development. Gerald Monsman, for example, argues that the real subject of the 'Conclusion' is not the Renaissance, but the ethical implications of new science,5 whereas F. C. McGrath affirms that 'in the middle of the nineteenth century [Pater] had already accepted the vision of humanity bequeathed by modern science' (p. 19).6 Since the "Conclusion," along with Pater's description of the Mona Lisa, has attracted the largest amount of critical attention among his works and is more or less widely known, I shall present it in sketch form, highlighting, nevertheless, the allusions to science that critics have so far detected in

3 Ian Fletcher, *Walter Pater* (London: Longmans, 1971), p. 6.
4 The ideas contained in it originally appeared in a sketchy form as the concluding paragraph of 'Poems by William Morris' (1868), one of Pater's first publications.
5 Gerald Monsman, *Walter Pater* (Boston: Twayne, 1977), p.57.
6 F. C. McGrath, *The Sensible Spirit: Walter Pater and the Modernist Paradigm* (Tampa: University of South Florida Press, 1986), p. 19.

order to demonstrate the extent to which Pater was implicated in the scientific project of his time.

In her influential survey, 'The Intellectual Context of Walter Pater's "Conclusion"', Andrew Billie Inman claims that the 'Conclusion' employs in its first part a discourse delivered from contemporary science, as becomes evident by the direct reference to science in the text (which is Pater's imitation of the style of scientific demonstration as exemplified by Bacon and Tyndall) and its allusion to concepts developed by the most prominent biological scientists of the late 1860's on the 'physical basis of life, or the absence of any force but chemical forces in all of life's processes, including thought'.7 Inman also lists as crucial influences on the 'Conclusion' G. H. Lewes' article on the simplest, microscopic forms of organic life, the protoplasm and the constitution of every organic or inorganic object by the relation of its molecules, 'the relation of its substance to all surrounding objects' (quoted in Inman, p. 14), as well as Spencer's discussion of the constitution of organic matter by chemical elements.8 In a similar manner, Charles Blinderman in 'Huxley, Pater and Protoplasm' regards both Huxley's 'On the Physical Basis of Life', which was published in the *Fortnightly Review* in February 1869, and Pater's essay on William Morris, which formed the backbone of the 'Conclusion' and appeared in the *Westminster Review* in October 1868, as responses to the notion of protoplasm.9 Blinderman confirms that, displaying similar 'diction and figures'(p. 482), both writers agreed on the role of protoplasm as the physical basis of life, as the means of 'supplying a continuity among living things' (p. 480). Other scientific influences on the 'Conclusion', Inman continues, include Tyndall's 'On the Relations of Radiant Heat to Chemical Constitution, Colour, Texture', which appeared in the *Fortnightly Review* on 15th February 1866. As a matter of fact, Inman argues that Tyndall's experiments with flames, and especially an experiment with lightless rays, the convergence of which produced heat powerful enough to fuse even the most solid of metals, appears to be lurking beneath Pater's famous image of the 'gem-like flame'.10

7 Andrew Billie Inman, 'The Intellectual Context of Walter Pater's "Conclusion"', in *Walter Pater: An Imaginative Sense of Fact*, ed. by Philip Dodd (London: Frank Cass and Company Limited, 1981), 39-54, (p. 14).

8 Inman refers to G. H. Lewes' 'Mr. Darwin's Hypotheses', published in the avant-garde *Fortnightly Review* 'at the beginning of the month in which Pater completed his review on Morris' in July 1868 (p. 14). Despite the fact that, as Inman herself admits, it is uncertain whether Pater read Lewes or Spencer, both Lewes' article and Spencer's *The Principles of Biology* (1864-67) expressed the idea that 'the physical constituents of the human body are constantly changing and that they are integral to a larger physical system' (p. 14).

9 A direct influence between the two thinkers cannot be established, as the chronology indicates. Nevertheless, as Blinderman argues, 'the two essays are very much alike in their articulation of the meaning of protoplasm'. See Charles S. Blinderman, 'Huxley, Pater, and Protoplasm', *Journal of the History of Ideas*, 43 (1982), 477-486, (p. 481).

10 Inman claims that it was this specific image of 'the flame at the focus of the pale rays' (p. 23) and its 'dazzling diamond-like limelight' (p. 24) which inspired Pater's image of the flame throughout his work, in 'Diaphaneite', in 'Rossetti', in *Plato and Platonism*, and concludes that 'the gem-like flame, thus, is associated with the white light, the perfect fusion of material and spiritual elements, the Dantean ecstasy' (p. 24). Inman considers the reason why Pater terms the image of the flame 'gem-like' and concludes that 'it is possible that Pater had conflated two images of flame described in Tyndall's essay' (p. 23), which reveals that the gem that Pater had in mind was the diamond – 'hard and radiant' (p. 24). Thus, 'the focus of the purest rays, the heat hot enough to fuse metals, and the dazzling diamond-like limelight gave him exactly the scientific, imagistic detail he could use to individualize his rather conventional general

Having elaborated on 'that which is without – our physical life', Pater turns in the second part of the 'Conclusion' to the 'inward world of thought and feeling' (p. 151) in order to address the psychological implications of the fluctuating reality that modern science depicts.11 He claims that reality seems to lose its objective touch when absorbed and then ramified by the individual mind; the solidity of external reality is unseated by a series of 'unstable, flickering, inconsistent' impressions, 'which burn and are extinguished with our consciousness of them', leaving each perceiving subject 'in his isolation, each mind keeping as a solitary prisoner its own dream of the world' (p. 151). It becomes obvious that the Oxford don is replicating here the then dominant tradition of scientific scepticism, where 'external phenomena' are reduced to 'possibilities of sensation', as Tyndall remarks, summarizing Mill's empiricism (p. 56).12 Jesse Matz also detects Hume's formulation of the impression and McGrath the philosopher's tenet of the subjectivity of knowledge (p. 7), whereas Ruth Child, in her turn, associates such relativism with Spencer's *Principles of Psychology* (1872), where the relativity of feelings was initially fully elaborated.13 In 'The Vocabulary of Pater's Criticism and the Psychology of Aesthetics', Ian Small, furthermore, argues that Pater adapted 'for his own special purposes' the discourse of the 1860s and 1870s British psychology, exposing the fact that psychology and literary criticism were then 'adjacent discourses'
(p. 84).14 After having established a correlation between Herbert Spencer, James Sully, Grant Allen and Pater, Small concludes his consideration with the way Alexander Bain's *The Emotions and the Will* (1859) might have influenced Pater, revealing that in his consideration of the psychological impact of the science on 'our physical life' Pater summed up the contemporary discourse of the emerging discipline of psychology.

It becomes evident through the numerous critics I have listed above that Pater was deeply influenced by contemporary science. One, however, might get easily confused here and jump to the conclusion that Pater was solely a passive recipient of scientific trends, which is definitely not the case. What I mean to say is that the critics mentioned above are right in bringing to our attention the extent to which Pater's work reflected the scientific advances of the time. Yet by considering Pater's relation

concepts' (p. 24).

11 Walter Pater, *The Renaissance: Studies in Art and Poetry* (Oxford: Oxford University Press, 1985), p. 150.

12 Consider here the striking similarity in tone and diction with Pater's illustration of scepticism and solipsism within an empirical context when Tyndall states that 'All we hear, and see, and touch and taste, and smell, are, it would be urged, mere variations of our own condition, beyond which, even to the extent of a hair's breadth, we cannot go. That anything answering to our impressions exists outside of ourselves is not *a fact*, but an *inference*, to which all validity would be denied by an idealist like Berkeley, or a sceptic like Hume'. See John Tyndall, *Address Delivered Before the British Association Assembled at Belfast, With Additions* (London: Longmans, Green, and Co., 1874), p. 57.

13 Jesse Matz, *Literary Impressionism and Modernist Aesthetics* (Cambridge: Cambridge University Press, 2001), p. 62; Ruth Child, *The Aesthetic of Walter Pater* (New York: Macmillan Co., 1940), p. 30.

14 Ian C. Small, 'The Vocabulary of Pater's Criticism and the Psychology of Aesthetics,' in *British Journal of Aesthetics*, 18 (1978), 81-87, (p. 81).

to science in the abstract terms of cultural influence and exchange they have failed to account for the specific grounds from which his preoccupation with science emerged. Drawing on their invaluable work, this is precisely the gap that my study aspires to fill by exploring the deeper reasons why Pater correlated art and science, which in turn will hopefully shed new light on his fascination with contemporary science and the aesthetic analogue it generated in his work.

We should not forget that being one of the most prominent aesthetes in Britain, Pater was not interested in science or psychology *per se,* but in the fate of art in the dawning of a modern world. Thus, it comes as no surprise that his manifesto in the 'Conclusion' culminates with the promotion of art as the ideal response towards the new reality that contemporary science had brought to light. It is the aesthetic dimension, art, 'the poetic passion, the desire of beauty, the love of art for its own sake' that is expected, he asserts, to deliver a "quickened" sense of life as a means of coming to grips with the "modern spirit', '[f]or art comes to you proposing frankly to give nothing but the highest quality to your moments as they pass, and simply for those moments' sake' (*Renaissance,* p. 153). Thus, it enables the subject to 'pass most swiftly from point to point, and be present always at the focus where the greatest number of vital forces unite in their purest energy' (*Renaissance,* p. 152). In his attempt to modernize art and attest its relevance Pater aligns it, through aestheticism, 'the love of art for its own sake', with the outcomes of physical science and its materialism as depicted in the first part of the 'Conclusion', and with sensationalism and relativism as illustrated in the second. This association examined above was not accidental but rather indicative of Pater's advocacy of a kinship between the artistic movement and the scientific developments of the late nineteenth-century.

In 'Intrinsic Earthliness: Science, Materialism and the Fleshy School of Poetry' Gowan Dawson regards both aestheticism and science as an overlapping between literary immorality and scientific materialism since both were considered to be 'conjoined manifestations of an amoral secularism, which according to their critics, urgently threatened Christianity and human civilization'.15 It is precisely because of this overlapping that Levine, in 'Two Ways not to be a Solipsist: Art and Science, Pater and Pearson', considers Pater as participating in the 'ethical project' of scientific epistemology (p. 13). The aestheticist discourse launched a fierce attack on Victorian morals through its formalistic preoccupations, which envisioned a form of art free from religious or utilitarian practices and through its implicit promotion of deviant sexual roles, whereas scientific progress at the time resulted in a relativization of traditional principles by providing a materialistic account of the world, which stripped it of its theological content. Nineteenth-century science and aestheticism were thus allied in their mutual appeal to freedom from social restraints and their common fight against traditional morals. Indicative of this 'conjoined' ethical cause

15 Gowan Dawson, 'Intrinsic Earthliness: Science, Materialism, and the Fleshy School of Poetry,' in *Victorian Poetry,* 41 (2003), 113-129, (p. 128).

was the fact that the 'Conclusion' triggered a great deal of controversy, to the extent that Pater was forced to reconsider and adjust some of the ideas originally contained in it, precisely because of its materialism and relativism which were of the very same nature as the ones that scientific discourse invoked.16 As the critic himself admitted in the *Renaissance*, he had applied 'the universality of natural law' not only to aesthetics, but to 'the moral order' as well (p. 148).

Dawson and Levine definitely pave the way for our understanding of the correlation between the aestheticist and the scientific programmes evident in Pater's work, yet highlighting the ethical compatibility between the aesthete and the scientist does not fully exhaust the issue. As I shall demonstrate next, the very historical period that Pater decided to focus on in his first book was a time when a series of artists and theorists like Leon Battista Alberti, Albrecht Dürer, and Leonardo da Vinci, to name but a few employed the sciences of mathematics, physics and anatomy in order to perfect the art of representation. Their insistence on art and science as forms of truth, was, in Pater's argument, indicative of their structural kinship. It is precisely through this structural kinship that we are able to account for the way the aesthete transubstantiated certain scientific givens into aesthetic maxims in his work. In this respect, throughout the *Renaissance* we are presented with a series of paradigms where art and science are structurally interrelated as forms of truth. Raphael is presented as an artist obsessed with knowledge, Winckelmann in his detachment and disinterestedness is illustrated as a scholar of scientific distinction, Giorgione's emphasis on technique so as to attain objectivity is aligned with the scientific paradigm and Pico, the scientist-humanist, is characterized by his obsessive pursuit of truth. Highly emblematic of this correlation between art and science is Pater's depiction of Leonardo da Vinci as the model of the artist-scientist. 'Leonardo' is very crucial for our consideration here because it further elucidates the grounds upon which Pater established such associations. In order to highlight this correlation I will employ Kant's account of the kinship between art and science, which I believe illuminates in a unique way Pater's model of the artist-scientist in the da Vinci essay.

It was Kant, in the *Critique of Judgement*,who first established an implicit relation between cognition and beauty on the grounds that in both instances the same mental faculties are involved.17 In cognition, according to Kant, imagination collects a given manifold and schematically presents it to understanding, which structures it through conceptualization into a unified whole. In judgements about the beautiful, on the other hand, imagination and understanding perform their tasks without being limited by a concept, they are in 'free play'; they are not guided by a determinate concept (p. 77). The mental state invoked here resembles that of cognition, since it

16 See for example Mrs. Oliphant's review of the *Renaissance* in *Walter Pater: The Critical Heritage*, ed. by R. M. Seiler (London: Routledge), 1995, (p. 91).

17 Judgements on beauty, for Kant, involve 'the mental state that we find in the relation between the presentational powers [imagination and understanding] insofar as they refer a given presentation to cognition in general'. See Immanuel Kant, *Critique of Judgment,* trans. by Werner Pluhar (Indianapolis: Hackett, 1987), pp. 61-2.

involves the cognitive faculties. Yet it does not employ a determinate concept that will ultimately lead to cognition, but instead a feeling of pleasure, since we feel that 'nature is systematically organized in a way that confronts to, or, in Kant's terms, is purposive for, our cognitive faculties'.18 In this sense, rational or scientific orderings possess, for Kant, certain aesthetic qualities (*Judgement,* p. 228), since aesthetic and scientific perception are deeply rooted in a common, a shared 'generic' origin that has to do with the fact that 'order, coherence and unity have the effect of integrating formal features into structures that give the impression of constituting unified wholes (or organic unities), which have great aesthetic appeal', as Gideon Engler puts it.19 Scientific research, likewise, Engler argues, exhibits a 'pattern organization usually made about activities of the mind with respect to art' (p. 208). Art and science, the subjective and the objective, are linked because of a common organizing perception of the world into ordered and coherent wholes, which is after all deeply aesthetic.

Taking these points into consideration, we can now return to Pater's 'Leonardo'. It becomes extremely hard in this essay to distinguish the scientific quest from the aesthetic. A tight analogy is established between science and art, since both are presented in a consummate Enlightenment *oeuvre*:

> if we think of him as the mere reasoner who subjects design to anatomy, and composition to mathematical rules, we shall hardly have that impression which those around Leonardo received from him. Poring over his crucibles, making experiments with colour, trying, by a strange variation of the alchemist's dream, to discover the secret, not of an elixir to make man's natural life immortal, but of giving immortality to the subtlest and most delicate effects of painting, he seemed to them rather the sorcerer or the magician, possessed of curious secrets and a hidden knowledge, living in a world of which he alone possessed the key (*Renaissance,* p. 68).

Leonardo's scientific quest and his aesthetic experimentations comprised for Pater facets of the same, unique world that he occupied. In other words, Pater did not differentiate Leonardo's science from his art: he regarded them both as parts of the same project. But on what grounds was this profound coincidence established? Leonardo's scientific and artistic endeavours both involved, Pater asserts, his quest 'to

18 See Hannah Ginsborg, 'Reflective Judgement and Taste', in *NOUS,* 24 (1990), 63-78, (p. 63). In this sense, aesthetic judgements for Kant are a form of 'pseudo-knowledge', they employ the guise of knowledge (the cognitive faculties) but they do not yield to it, since we utilize our cognitive faculties as if we were cognizing. It is precisely this 'as if' structure that establishes an analogy between cognition and beauty in Kant's project. See Terry Eagleton, *The Ideology of the Aesthetic* (Oxford: Basil Blackwell Ltd., 1990), p. 75.

19 Gideon Engler, 'From Art and Science to Perception: The Role of Aesthetics', *Leonardo*, 27, (1994), 207-209, (p. 207).

discover the secret'...the 'hidden knowledge', they both signified the pursuit of the hidden interconnectedness beneath an apparent discordance; they were both organized by the pursuit of what Huxley called 'the rational order that permeates the universe' (quoted in Gilmour p. 13). It was from nature, 'the true mistress of higher intelligences'(*Renaissance,* p. 66), Pater argues, that Leonardo learned 'the art of going deep, of tracking the sources of expression to their subtlest retreats, the power of an intimate presence in the things he handled', not only anticipating 'modern mechanics' (pp. 66-67) and 'the later ideas of science' (p. 70) but also expanding 'the destiny of Italian art by a larger knowledge and insight into things' (p. 65). Brooding 'over the hidden virtues of plants and crystals, the lines traced by the stars as they moved in the sky, over the correspondences which exist between the different orders of living things, through which, to eyes opened, they interpret each other' (p. 66),

Leonardo, who was 'always so desirous of beauty' (p. 82), turned his quest for a 'rigid order' (p. 68) into magnificent works of art. It was the beauty of a rational order discovered that eventually resulted in Leonardo's establishment of an organic interconnection between science and art. Pater is here in full accordance with Kant's position, where the illuminated alchemist-painter transubstantiated scientific quest into 'the most delicate effects of painting', into artistic perfection. As both a scientist and an artist, Leonardo, thus, emblematically stands for the common ground, the 'correspondences' that exist between science and art, which amount to the aesthetic appeal that stems from the ordering of the mass of experience into coherent rational wholes, into Logos.20 By bringing together 'curiosity and the desire of beauty' (p. 70), Leonardo eventually managed to create 'that larger vision of the opening world' (p. 72), in which the unifying force of Logos brought together the art of science and the science of art, where, in its quest for the non-apparent cause and scheme of things, science is joined by the aesthetic expedition to encapsulate the true meaning in the world without distortion.

Drawing on this ethical and structural compatibility with the scientific project, Pater moved on to turn certain scientific tenets into aesthetic ideals or criteria, which resulted in a profound rationalization of his artistic goals. In contrast to Matthew Arnold, who in 'Literature and Science' (1882) sceptically declared that science failed to deliver 'the sense in us for conduct, and the sense in us for beauty', Pater wholeheartedly embraced the ethical implications of the new science in the spirit of Bertrand Russell's *A Free Man's Worship* (1903) and Anatole France's *Le Jardin d'Épicure* (1894), as Helen Wadsworth Young stresses (p. 33), and integrated it into his aesthetic agenda.21 He brought together, to employ Arnold's phrasing, 'the knowledge of things' with 'the knowledge of words' (p. 1550), associating literature,

20 We can detect here Baudelaire's influence on Pater.

21 Matthew Arnold, 'Literature and Science', in *The Norton Anthology of English Literature, Vol. II,* 7th edition, ed. by M. H. Abrams (New York: W. W. Norton & Co., 2000), 1545-58, (p. 1558); Helen Wadsworth Young, *The Writings of Walter Pater: A Reflection of British Philosophical Opinion from 1860 to 1890* (Lancaster, Pa: Lancaster Press, 1933; rptd., New York: Haskell House, 1965), p. 33.

and by implication art, with science. Accordingly, for Pater, the function of the aesthetic critic

> is to distinguish, to analyze, and separate from its adjuncts, the virtue by which a picture, a landscape, a fair personality in life or in a book, produces this special impression of beauty or pleasure, to indicate what the source of that impression is, and under what conditions it is experienced. His end is reached when he has disengaged that virtue, and noted it, as a chemist notes some natural element, for himself and others (*Renaissance,* p. xxx).

The critic, as stated in the 'Preface' to the *Renaissance* and argued for throughout the book, must, in the spirit of a chemist, look for the 'formula' of the artist he studies through a process of strategic condensation.22 In his quest for the 'formula' the critic proceeds inductively so as to capture an objective ground that sums up the artistic oeuvre itself. Thus, 'in its emphasis on analysis into simples' (Young, p. 20), its underlining of analytic discrimination on the critic's part, its highlighting of 'fact', the *Renaissance* harmoniously brings together the fundamental premises of the 'science of things' with the 'science of words'.23 Such union is furthermore explicitly celebrated in 'On Style' (1888), where Pater establishes in the fashion of Baconian objectivity certain restrictive tenets for the artist and the scholar. For Pater, both artists and critics have to conform to certain rules that are nevertheless borrowed from scientific discourse: '*Exclusiones debitae* – the exclusions, or rejections, which nature demands – we know how large a part these play, according to Bacon, in the science of man'.24 The art of the scholar, very much like the scientist, 'is summed up in the observance of those rejections demanded by the nature of his medium, the material he must use' (*Appreciations*, p. 5). Such restrictions are promoted as a means of amplifying expression, 'that absolute accordance of expression to idea' (*Appreciations*, p. 15), where scientific precision is applied to the quest for the most suitable word as a means of attaining efficient textual economy and perfecting artistic form.25

22 'To define beauty, not in the most abstract but in the most concrete terms possible, to find, not its universal formula, but the formula which expresses most adequately this or that special manifestation of it, is the aim of the true student of aesthetics' (p. xxix). In this way, Michelangelo's essence is captured by his combination of 'strength and sweetness', Winckelmann's 'formula' coincides with his Greek temperament, Joachim du Bellay encapsulates the Italian influence on French taste, Giorgione the Venetian school of painting, Leonardo a return to nature and Pico the reconciliation of Christianity with Greek paganism.

23 The critic is urged to proceed with 'facts' since 'as in the study of light, of morals, of number, one must realize such primary data for one's self, or not at all' (p. xxix).

24 Walter Pater, *Appreciations, With An Essay on Style* (London: Macmillan, 1910), p. 4.

25 In terms of 'art and poetry' the aesthetic critic is urged to 'discriminate between what is more and what is less excellent in them, or to use words like beauty, excellence, art, poetry, with a more precise meaning than they would otherwise have' (*Renaissance*, p. xxx). Furthermore, Pater claims that 'to define beauty, not in the most abstract but in

Levine examines the impact of nineteenth-century science on art and establishes a relation between the positivist Karl Pearson and Pater on the grounds that 'both aestheticism and positivism are deeply rooted in empiricism' (p. 14). According to Levine, the epistemological tradition of empiricism that both thinkers drew on in their pursuit of knowledge led to certain 'constraints' as fundamental prerequisites of knowledge, which were part of a wider 'ascetic tradition' (p. 14). This tradition is defined in terms of 'an austere, rigorous restraint of the self that, from the basis of an inevitable subjectivity, issued in an impersonality that opened both to art and to truth' (p. 16). The 'ascetic tradition' of the restraint on the self is considered by Levine as the strategic means of overcoming the threat of solipsism and establishing the impersonal objective vigour of the scientific in both art and science. The consequences of ascetic discipline, Levine argues, 'produce an aesthetic analogue of objectivity – a firm, even a "gem-like" reality that is not merely subjective, that allows the perceiver to stand outside the flux he is describing, if only in order to describe it' (p. 14). In light, thus, of Pater's emphasis on 'love of art for its own sake' and on ascesis, self-restraint, renunciation and careful selection, it becomes easy to see that the 'aesthetic analogue of objectivity', which Levine mentions, in essence involves an analogy between scientific distance and aesthetic disinterestedness. This was the cornerstone of the short-lived tradition of decadent aesthetes: men like Wilde, Beardsley and Dawson.26 Levine's brilliant consideration could have been deeply enriched by the awareness that Pater associated aestheticism with empiricism and utilised art in his pursuit of knowledge, precisely because of the structural kinship between art and science, which was the theoretical device through which he was able to convert scientific tenets into aesthetic ideals.

Accordingly, the ascetic discipline of an artist or a scholar is considered by Pater as an aesthetic achievement in itself:

> [s]elf-restraint, a skilful economy of means, ascesis, that too has a beauty of its own; and for the reader supposed there will be an aesthetic satisfaction in that frugal closeness of style which makes the most of a word, in the exaction from every sentence of a precise relief, in the just spacing out of word to thought, in the logically filled space connected always with the delightful sense of difficulty overcome (*Appreciations,* pp. 6-7).

It is exactly in this sense that Pater detected in Heraclitus's natural philosophy 'a

the most concrete terms possible, to find, not its universal formula, but the formula which expresses most adequately this or that special manifestation of it, is the aim of the true student of aesthetics' (p. xxx).

26 Even though Pater's writings carry in embryonic form the seeds for such a decadent development, Pater himself was not interested in social rupture but in unfolding his politics of accord.

poetic beauty in mere clearness of thought, the actually aesthetic charm of a cold austerity of mind; as if the kinship of that to the clearness of physical light were something more than a figure of speech'.27

The emphasis here on the 'aesthetic charm' of 'clearness' and 'light' touches the core of Pater's aesthetics, his promotion of an ascetic form of induction, termed 'eager observation' (p. 152) in the 'Conclusion', which is also tightly linked to the principle of ascesis. Continuing with the long sequence of associations that critics have established between the fundamental premises of Pater's aesthetics and nineteenth-century science, I would like to return to Levine, who relates Pater's emphasis on observation to a very influential scientific breakthrough. Levine argues that this 'eager observation' highlights the aesthetic espousing of Darwinian 'gradualism' but also the 'historicist implications' of 'the necessity to consider one's location as observer in space and time' (p. 16). Darwinian evolution, as we know, decisively elongated the human perspective, rendering the amplification of observation an indisputable necessity, so that the subject would firmly ground its historical presence within a now exceedingly widened spectrum, full of scattered visual signs coming from its long historical course that only a trained eye would be able to detect and, thus, reassert its present position in terms of a gradually emerging past.28 Darwin's constant appeal to a highly trained form of observation as means of overcoming the difficulties of the geological record exemplifies this. Likewise, the ascetic moulding of the sensory apparatus, particularly the capacity for observation, becomes of foremost importance for Pater as a novel faculty of truth for the subject, manifesting once again what Levine leaves out of his consideration, the structural analogies that he established between art and science. In this sense, by regarding the world as a field pregnant with a hidden meaning waiting to be interpreted, the aesthete and the scientist join hands in their optimization of an optics of decoding as an instrument of realistic explanation. Indicative of this implicit affiliation between Darwinism and aestheticism, through their shared preoccupation with vision, which eventually resulted in a form of corporeality, sensualism and sensationalism, is the fact that they both historically prepared the grounds for the emergence of Decadence.29

Pater's prominent notion of aesthetic selection can be considered under the prism of evolutionary theory. The role of selection derives its significance not only from its affiliation with ascesis and scientific objectivity, as we have seen, but also

27 Walter Pater, *Marius the Epicurean: His Sensations and Ideas* (London: The Soho Book Company, 1985), p. 124.
28 As Levine states in another essay, 'the only special power that Darwin attributes to himself in his autobiography is the power of observation; through observation, natural selection conducts experiments and after much trial and error selects variations that will serve the ends of the species'. See George Levine, 'By Knowledge Possessed: Darwin, Nature, and Victorian Narrative', in *New Literary History* (1993) 363-391, (p. 383).
29 Blinderman notes that 'Darwinism, I believe, was part of the network of ideas leading to the full expression of Decadence. It did appear, at least, to emphasize the animal resident in the human being. It did help corrode traditional religion. And if our relationship to each other is essentially that of protoplasmic machines, then the model for sexual engagement could well be that of predator and prey', pp. 485-86.

from the fact that it is presented as a life-giving principle, since the critic or the artist, in the manner of Botticelli 'plays fast and loose with...data, rejecting some and isolating others, and always combining them anew' (*Renaissance*, p. 35). In view of this structural kinship between art and science I want to argue here that aesthetic choice and the 'new combinations' it achieves can be seen as his cultural equivalent of the highly influential Darwinian principle of 'selection', and consequently of 'natural selection'. In *The Origin of Species* (1859) Darwin starts his exploration with the strategies that domestic breeders employ, with 'man's power of accumulative selection: [where] nature gives successive variations [and] man adds them up in certain directions useful to him. In this sense, he may be said to make for himself useful breeds'.30 Moreover, Darwin admits that 'breeders habitually speak of an animal's organization as something quite plastic, which they can model almost as they please' (p. 90). Man's power to 'adapt organic beings to his own uses', however, is contrasted to 'Natural Selection', which 'is a power incessantly ready for action, and is immeasurably superior to man's feeble efforts' (p. 115).31 Being a synonym for the struggle for existence, natural selection denotes that 'any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be *naturally selected*' (p. 68).

What is important for our consideration here is the fact that the notion of selection, in its plasticity as a moulding force, being a replication of the more powerful and extensive force of natural selection, actually bears a firm artistic undercurrent, where man seems to reproduce to his advantage nature's ways. The artist's, or the critic's, careful selection of words as a means of perfecting form and creating new meaning can be seen here as analogous to the organic sway of selection in its ability to fortify the form of the species in the evolutionary scheme. Drawing on this analogy, Pater seems to echo the Darwinian paradigm in his quest to establish an enhanced literary medium 'for the modern spirit', a form of narrative that will endure the conflicting strains of his time. Thus, aesthetic choice for Pater replicates natural selection as an economy of survival.32

The specific narrative form that Pater actually singles out as the appropriate response to the 'modern spirit' is that of the essay. Pater provides the reader with a justification of his selected medium through a self-reflexive reference to the form of his writing, which establishes a meta-narrative implicit in his texts, facilitating our understanding of his choice. In *Plato and Platonism* (1893), the critic refers in a

30 Charles Darwin, *The Origin of the Species by Means of Natural Selection, or The Preservation of Favoured Races in the Struggle for Life*. ed. by J. W. Burrow (London: Penguin, 1985), p. 90.

31 For the differences between selection and natural selection see Darwin, pp. 132-33.

32 We have seen that in 'On Style' Pater more or less considers the concept of selection in economic terms. As is well known, Darwin himself admits that he had been influenced by Malthus in his formulation of natural selection. Struggle for existence is actually 'the doctrine of Malthus applied to the whole animal and vegetable kingdoms' (p. 68). In this sense, overpopulation leads to a harsh struggle for food supplies, which inevitably results in the fact that that only those individuals who are naturally selected can survive and propagate.

Hegelian fashion to three different intellectual traditions of 'composition', three different literary methods throughout history: 'the poem, the treatise, the essay'.33 Interestingly enough, Pater considers these three methods as 'no mere accidents...but necessities of literary form, determined directly by matter, as corresponding to three essentially different ways in which the human mind relates itself to truth' (p. 175). Thus, 'the poem', responds to an age when 'philosophy was still a matter of intuition, imaginative, sanguine, often turbid or obscure' (p. 174). 'The treatise' refers to a time 'when native intuition had shrunk into dogmatic system, the dry bones of which rattle in one's ears', whereas 'the essay', Pater's favourite, stands 'midway between those opposites' (p. 174). His justification for the appropriate form of writing is further on elaborated in 'On Style' (1888), where the critic also considers that 'midway' between poetry and the treatise, now termed 'imaginative prose', to be 'the special art of the modern world' (*Appreciations*, p. 4).

The explanation that Pater gives for this preference has firstly to do with the fact that the 'chaotic variety and complexity' of intellectual issues render all restraints quite useless, as reflected in the 'lawless verse of the nineteenth century', and secondly that current 'naturalism' involves 'a certain humility of attitude', moving towards 'the less ambitious forms of literature' (*Appreciations*, p. 4). Thus, Pater's corroboration of his favoured medium, the essay, revolves around two arguments: its privileged 'midway' position between extremes, and the fact that it is considered as the most suitable response to the 'naturalistic' call of the times. A closer look at Pater's argumentation, nevertheless, reveals that both concepts implicitly invoke a scientific discourse, revealing, once again, Pater's profound transfiguration of contemporary science into aesthetic criteria.

Standing 'in-between' the inclusive oral tradition of poetry and the closed form of a rigorous discourse, the essay is favoured by Pater as a balanced medium that mediates between two oppositional poles bringing them together into a single whole. The prominent notions here of mediation, of hybridism, of a balanced struggle between different forms, firmly suggest an undercurrent of cultural Darwinism. Just like Darwin, who undermined the idea of clear-cut, stable, distinct species, and through the notion of hybridism was able to depict how certain traits as environmental mechanisms of defence are transported or developed into various species throughout time, Pater envisions, through a diachronic discourse, a cross-generic reciprocity between genres that enforces the vitalism of each genre, or of the essay itself, as a means of transcending their shortcomings.34 The essay presents us

33 Walter Pater, *Plato and Platonism: A Series of Lectures* (New York: Greenwood Press, 1969), p. 175.

34 '[T]he species of the large genera are related to each other, in the same manner as the varieties of any one species are related to each other. No naturalist pretends that all the species of a genus are equally distinct from each other; they may generally be divided into sub-genera, or sections, or lesser groups' (Darwin, p. 112). Furthermore, 'the belief that species were immutable productions was almost unavoidable as long as the history of the world was thought to be of short duration' (p. 452). '[N]amely, that the vigour and fertility of all organic beings are increased by slight changes in their conditions of life, and that the offspring of slightly modified forms of varieties acquire from being crossed increased vigour and fertility' (p. 437). 'Natural selection will tend to modify all the individuals of a varying species throughout

with an evolved version of prior forms, where the biological principle of hybridism is transformed by Pater into literary form, rendering the critic able to infuse his promoted medium with the force of an organic vitalism and to articulate his aesthetic considerations through a discourse with powerful contemporary currency. In this sense, the genres, and by implication the essay as the form of mediation, very much in the spirit of the species, are connected not only because they share certain characteristics, but mainly because they share an organic response to their needs, which leads to survival through adaptation to environmental stimuli and the inheritance of the most enhanced traits. The benefits implicit in the amalgamation of divergent characteristics in the form of hybrids is actually the topic of the *Renaissance* itself, where Pater states that

> in its special mode of handling its given material, each art may be observed to pass into the condition of some other art, by what the German critics term an *Anders-streben* – a partial alienation from its own limitations, through which the arts are able, not indeed to supply the place of each other, but reciprocally to lend each other new forces (p. 85).35

In Pater's preferred form of expression we can nevertheless detect yet another undercurrent, which again involves the structural correspondences he drew between art and science, what the critic terms as the spirit of 'relativity' (*Plato,* p. 175). There is no space, according to Pater, for fixed absolutes in these 'modern' times but only for reconciliatory relatives. Even 'beauty' is rendered according to the scientific spirit as 'relative' (*Renaissance,* p. xxx). Relativity, for Pater, is ideally reflected in the form of the essay, which best suits a mind 'for which truth itself is but a possibility, realizable not as a general conclusion, but rather as the elusive effect of a particular personal experience' (*Plato,* p. 175). The scepticism invoked here involves the condition of 'suspension' of judgment, a form of 'receptivity' as the 'salt of truth, even in the most absolutely ascertained knowledge' (p. 196) that the form of the essay

the area in the same manner in relation to the same conditions' (p. 149).

35 Pater then proceeds with a long list of artistic forms that actually benefit from their hybrid character: '[t]hus, some of the most delightful music seems to be always approaching to figure, to pictorial definition. Architecture, again, though it has its own laws – laws esoteric enough, as the true architect knows only too well – yet sometimes aims at fulfilling the conditions of a picture, as in the *Arena* chapel; or of sculpture, as in the flawless unity of Gioto's tower in Florence; and often finds a true poetry, as in those strangely twisted staircases of the *chateaux* of the country of the Loire, as if it were intended that among their odd turnings the actors in a theatrical mode of life might pass each other unseen; there being a poetry also of memory and of the mere effect of time, by which architecture often profits greatly. Thus, again, sculpture aspires out of the hard limitation of pure form towards colour, or its equivalent; poetry also, in many ways, finding guidance from the other arts, the analogy between a Greek tragedy and a work of Greek sculpture, between a sonnet and a relief, of French poetry generally with the art of engraving, being more than mere figures of speech' (pp. 85-86). Pater's obsession with historical periods of transition, which can themselves be considered historical hybrids in the sense that they harmoniously bring together the traits of a prior and an emergent tradition, can also be seen as reminiscent of this Darwinian hybridism.

promotes through the endless succession of arguments that are not forced to reach a conclusion.36 It is interesting to note here that in its dialectical, its relative attitude towards truth, the essay seems to be 'mimicking Darwin's fact-finding voyage toward an unknown origin' as the paradigmatic form that captures the 'perpetual conflict of ideas, which is the highest form of the struggle for existence', in David Ritchie's words.37 Accordingly, throughout Pater's discussion, the essay form is presented in the imagery of a journey (*Plato,* pp. 175, 178, 184), a process (*Plato,* pp. 179, 188, 192), juxtaposed to the exactness of mathematical reasoning (*Plato,* p. 179) or the 'absolute and eternal' (*Plato,* p. 187), putting one into a 'receptive attitude towards such possible truth [since] it does not provide a proposition, nor a system of propositions, but forms a temper' (*Plato*, p. 188). It is precisely because of this pervasive relative character that the essay is singled out as 'the characteristic type of our own time, a time so rich and various in special apprehensions of truth, so tentative and dubious in its sense of their *ensemble*, and issues' (*Plato,* p. 174). In this structural association, Pater establishes a nearly modernistic interrelation between relativistic content and relativistic form, where 'the very form belongs to, is of the organism of, the matter which it embodies' (*Plato*, p. 176). It is said to be 'co-extensive with life' (*Plato,* p. 188) as the appropriate means for the 'modern spirit' of conveying 'the subtlety, complexity, flexibility and fugitive nature of experience' (McGrath, pp. 29-30) that the scientific world-picture has brought about.

As we have seen throughout this study, Pater's work provides fertile ground for establishing a plethora of correspondences with contemporary science, which range from the notion of protoplasm to evolutionary theory and from the ethical ramifications of science to the basic premises that constitute the quintessence of scientific discourse. These correspondences, as I have shown, primarily derive from Pater's belief that art and science share a common generic origin, which eventually enabled him to hybridise his conception of art. Contrary to the stereotypical image of the aesthete who is locked in his Ivory Tower obsessed with his disinterested art, Pater, the father of British aestheticism, adopted the rhetoric of science by opening himself up to the call of the times, absorbing into his aesthetic agenda a series of

36 Lene Østermark-Johansen argues that Pater's obsession with flux was evident through the fact that the Victorian critic transfigured the Renaissance artistic devices of the '*figura serpentinata*' and the '*contraposto*' into 'a literary style' that relies on 'antithesis and inner dialectics', which to a large extent encapsulates Pater's conception of the medium of the essay. See Lene Østermark-Johansen, 'Serpentine Rivers and Serpentine Thought: Flux and Movement in Walter Pater's Leonardo Essay',*Victorian Literature and Culture*, 30 (2002), 455-482, (p. 457).

37 Alison Booth, 'The Author of the Authoress of the Odyssey: Samuel Butler as Paterian Critic', *Studies in English Literature, 1500-1900*, 25 (1985) 865-883, (p. 865); Ritchie, in 1893, implicitly alludes to Darwin through a discourse that constantly invokes the scientist so as to promote an appropriate form of thought for the 'modern spirit':'[t]he great constructive philosophers seem indeed to gather up into their thought all the elements that existed scattered in preceding systems; but the time comes when a new criticism and then a new reconstruction are needed, if philosophy is to remain living and not to be fossilized in a traditional dogma. "Let us follow whithersoever the argument leads us"; and, if we do not let ourselves become "misologists", we must hold fast this Athenian faith in the value of the perpetual conflict of ideas, which is the highest form of the struggle for existence'. See David Ritchie, *Darwin and Hegel: with other philosophical studies* (London: Swan Sonnenschein & Co., 1893), p. 65.

scientific tenets, in order to modernize art and make it timely and relevant, contributing, thus, to the 'spirit of the age', as Mill would have defined it. Such amalgamation was actually symptomatic of Pater's anxiety that the sweeping force of scientific advent and the new reality it brought about would eventually render art obsolete. The critic's answer to this threat came in the form of a series of suggestions for the role of art and the artist, which, in their turn, comprised a new aesthetic program, aestheticism.

Pater's promotion on the one hand of a moral agenda that was affiliated with that of the new science on the grounds of their common appeal to freedom, and his underscoring of a structural kinship between the two world views on the other, reveals that his argument was deeply influenced by the Kantian tradition. Kant's three Critiques involved exactly the same argument as the one Pater's work implies, in the sense that the German philosopher highlighted the role of art in his third *Critique* as the mediating principle between knowing the world (first *Critique*) and enjoying our freedom on it (second *Critique*). In this respect, despite its modernizing guise and its rationalizing effort, Pater's *oeuvre* was in effect deeply Romantic and to a certain extent, unfortunately, outdated. This was precisely why the aesthete and the scientist went separate ways. Regardless of his affiliation with scientific practice, the aesthete was eventually rendered, because of his close association with art, as the effeminate other of the vigorous scientist: a figure who still clung to the past and was consequently doomed, in a world fascinated with novelty, to decadence.

Bibliography

Arnold, Matthew. 'Literature and Science', in *The Norton Anthology of English Literature, Vol. II,* 7th Edition, ed. by M. H. Abrams (New York: W. W. Norton & Co., 2000), 1545-58

Blinderman, Charles S., 'Huxley, Pater, and Protoplasm', *Journal of the History of Ideas,* 43 (1982), 477-486

Booth, Alison, 'The Author of the Authoress of the Odyssey: Samuel Butler as Paterian Critic', *Studies in English Literature, 1500-1900,* 25 (1985), 865-883

Child, Ruth, *The Aesthetic of Walter Pater* (New York: Macmillan Co., 1940)

Darwin, Charles, *The Origin of the Species by Means of Natural Selection, or The Preservation of Favoured Races in the Struggle for Life,* ed.

by J. W. Burrow (London: Penguin, 1985)

Dawson, Gowan, 'Intrinsic Earthliness: Science, Materialism, and the Fleshy School of Poetry', *Victorian Poetry,* 41 (2003), 113-129

Eagleton, Terry, *The Ideology of the Aesthetic* (Oxford: Basil Blackwell Ltd., 1990)

Engler, Gideon, 'From Art and Science to Perception: The Role of Aesthetics', in *Leonardo,* 27, (1994), 207-209

Fletcher, Ian, *Walter Pater* (Essex: Longmans for the British Council, 1971)

Gilmour, Robin, *The Victorian Period: The Intellectual and Cultural Context of English Literature, 1830-1890* (London: Longmans Group Ltd., 1993)

Ginsborg, Hannah, 'Reflective Judgment and Taste', *NOUS,* 24 (1990), 63-73

Inman, Andrew Billie, 'The Intellectual Context of Walter Pater's "Conclusion"', in *Walter Pater: An Imaginative Sense of Fact,* ed. by Philip Dodd (London: Frank Cass and Company Limited, 1981), 39-54

Kant, Immanuel, *Critique of Judgment,* trans. by Werner Pluhar (Cambridge: Hackett, 1987)

_____ *Critique of Pure Reason,* trans. by J. M. D. Meiklejohn (London: Everyman's Library, 1969)

_____ *The Moral Law: Groundwork of the Metaphysic of Morals,* trans. by H. J. Patton (London: Routledge, 2005)

Levine, George, 'By Knowledge Possessed: Darwin, Nature, and Victorian Narrative', *New Literary History,* 24 (1993), 363-391

_____ *Dying to Know: Scientific Epistemology and Narrative in Victorian England,* (Chicago: University of Chicago Press, 2002)

_____ 'Two Ways not to be a Solipsist: Art and Science, Pater and Pearson', *Victorian Studies,* 43 (2000), 7-41

Matz, Jesse, *Literary Impressionism and Modernist Aesthetics*

(Cambridge: Cambridge University Press, 2001)

McGrath, F. C., *The Sensible Spirit: Walter Pater and the Modernist Paradigm* (Tampa: University of South Florida Press, 1986)

Monsman, Gerald, *Walter Pater* (Boston: Twayne, 1977)

Østermark-Johansen, Lene, 'Serpentine Rivers and Serpentine Thought: Flux and Movement in Walter Pater's Leonardo Essay', *Victorian Literature and Culture,* 30 (2002), 455-482

Pater, Walter Horatio, *Appreciations, With An Essay on Style* (London: Macmillan, 1910)

_____ *Marius the Epicurean: His Sensations and Ideas* (London: The Soho Book Company, 1985)

_____ *Plato and Platonism: A Series of Lectures* (New York: Greenwood Press, 1969)

_____ *The Renaissance: Studies in Art and Poetry* (Oxford: Oxford University Press, 1985)

Ritchie, G. David, *Darwin and Hegel: with other philosophical studies* (London: Swan Sonnenschein & Co., 1893)

Seiler, R. M., ed, *Walter Pater: The Critical Heritage* (London: Routledge, 1995)

Small, C. Ian, 'The Vocabulary of Pater's Criticism and the Psychology of Aesthetics', *British Journal of Aesthetics,* 18 (1978), 81-87

Tyndall, John, *Address Delivered Before the British Association Assembled at Belfast, With Additions* (London: Longmans, Green, and Co., 1874)

Young, Helen Wadsworth, *The Writings of Walter Pater: A Reflection of British Philosophical Opinion from 1860 to 1890* (Lancaster, Pa: Lancaster Press, 1933; rptd., New York: Haskell House, 1965)