ROOTS OF CHARLES DARWIN'S CREATIVITY

A dissertation submitted to the Caspersen School of Graduate Studies

Drew University in partial fulfillment of

The requirements for the degree,

Doctor of Letters

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Madison, New Jersey

May 2016

ABSTRACT

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Doctor of Letters Dissertation by

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The Caspersen School of Graduate Studies
Drew University May 2016

Many concerns contributed to the creative success of Charles Darwin's theorizing, including his humble character, reading Wordsworth, courting Emma for his wife, and considering the origins of creative thought in a material mind. Creativity is not straightforward; in Darwin's case, it was fed by diverse interests, literary sensitivities, character traits, unusual introspection and even thoughts of marriage.

During the time frame of this study, the two important years between his return from the *Beagle* and his Malthusian insight that led to natural selection, Darwin twice read *The Excursion* and fell in love. While he thought hopefully of Emma, he was focused on reproduction to understand species transmutation and pondered evolved roots for emotions like love, thus linking his sexual and creative stimulation. Part of his drive to succeed was for Emma's approval, to be a victorious naturalist and demonstrate that he would be a good provider. Emma appreciated Darwin's humble character, a trait that also allowed him to question belief systems and intellectual conceits that restricted other naturalists. Darwin noted that many of his peers were blocked from understanding

species transmutation by their intellectual vanities—like the idea that man was the crown of creation instead of just one species in nature's panoply.

In the intellectual culture of Darwin's time creationism was science, while scientists competed with poets for authority over explaining nature. Wordsworth epitomized creativity while asserting that *The Excursion's* themes were man, nature and human life—parallel to Darwin's. Wordsworth's insights into human emotions, morality and creativity were important to Darwin, who needed to explain all human traits, physical, emotional and mental, as evolved from simpler animals. Darwin reflected on the roots of imaginative thought and proposed a process for thinking that he applied it to his own theorizing; from nascent generation of ideas through rigorous dialectic testing to solid conclusions, thus demonstrating thoughts in competition.

The strong correlation between the productivity of Darwin's theorizing and his humility, poetry, Emma and considerations of creativity, offers new insights into the path of his theorizing, and perhaps into the origins of creativity itself.

Dedication

To my mother, Anita Dee, who never completed her own dissertation because her professors urged that she prematurely publish her important seminal research on teaching sign language to death infants. The early publication of her findings helped numerous deaf children communicate with their parents, transforming the lives of many young families. She said: "A deaf child has the right not to be a stranger in his own home." Now aged ninety, whenever I mentioned writing about Wordsworth she recited “The Daffodils” to me, verbatim.

Contents

Acknowledgements

I would like to thank my wife, Marilyn, our children, all my family and friends for their understanding and encouragement, and Arnold Siegel for his classes in Autonomy and Life that supported my creativity and equanimity.

I would like to thank my committee, Dr. David Kohn and Dean Robert Ready, who taught me to understand, think and write—gently, firmly and with abundant patience. Thanks, also, to The Caspersen School at Drew University, and the indispensable Drew University Library.

I would also like to thank the Syndics of Cambridge University Library for giving me permission to access their Darwin collections. And thanks again to Dr. David Kohn and the Darwin Manuscript Project at the American Museum of Natural History, for putting so many primary sources at my computer fingertips.

Introduction

This study considers several roots of Charles Darwin's creativity that played a part in his theorizing: unusual humility, interest in Wordsworth's poetry, courtship with his future wife, Emma Wedgwood, and his simultaneous efforts to draw on his creativity while speculating on that same mental faculty. My intent is to demonstrate that these four areas intertwined with and supported his creativity. My timeframe in this study ends on September 29th, 1838, when Darwin read Malthus's *Principle of Population*, had his "Malthusian epiphany," and first began to formulate natural selection (Kohn 1975 136, D 134-5).

My time frame mostly coincides with a chapter in Darwin's *Autobiography*, titled: "*From my return to England Oct. 2, 1836 to my marriage Jan. 29, 1839*" (69). In that chapter title Darwin mentions his marriage, while in the chapter he mentions poetry: "About this time I took much delight in Wordsworth's and Coleridge's poetry; and can boast that I read the *'Excursion'* twice through" (71). The chapter begins: "These two years and three months were the most active ones which I ever spent" (69). These years were so significant to Darwin that he repeats the phrase "During these two years" to begin three paragraphs over two pages (69-71).

The particular roots of Darwin's creativity on which I will focus—poetry, humility, marriage and his speculations on creativity—point to a breadth of influences beyond a purely scientific focus. In his notebooks, one of the metaphors Darwin offered for how a material mind could generate creativity involved the collaboration and contrast of parallel trains of thought (M 34, 83, 113). Darwin's complex theorizing process can be viewed as the interaction of parallel trains of thought, including reading poetry,

questioning intellectual arrogance behind accepted beliefs, speculating on the material basis of creativity in the brain, and even wanting to win a spouse.

I am not arguing that these topics are directly related to each other, although one could imagine that Emma was attracted to Darwin's humility, *The Excursion* gave him a non-scientific topic to discuss with Emma, and his humility allowed him to consider the mind's creativity as purely material without requiring any special metaphysical component. In exploring the diversity of the entwined roots of creativity, I present these four factors as linked not only in time, but also as similarly under-appreciated influences on Darwin's focused theorizing.

There were many roots in the "entangled bank" of Darwin's creativity, to use his own metaphor for the complexity of nature (*Origin* 489). The larger ones have been examined in great detail in the secondary literature, both those related the scientific path of his thinking and many influences not directly scientific such as his culture, politics, religion, upbringing, education, financial security, dogged focus, wide-ranging reading and experiences on the *Beagle* journey. While many writers have considered the origins of Darwin's theory, some of his character traits and varied interests should also be viewed as supportive of his creativity.

Chapter I will explore how Darwin's unusual humility might have enhanced his creativity. His modest character has been discussed occasionally in secondary literature and remarked upon by his contemporaries. Darwin's letters and autobiography noted personal feelings of pride and characterized them as embarrassing habits. In his notebooks and even in *Origin* he commented on how the intellectual vanity of "experienced" and "eminent naturalists" restricted their ability to contemplate species

transmutation (481, 482). Preexisting beliefs, which I will call intellectual vanities, blocked them from framing important questions about species origins. For instance, racial and religious vanities prevented some experienced naturalists from seeing species as related, an early and necessary step on the path to Darwin's theory. Darwin's awareness and introspection helped him avoid or reduce many shared intellectual conceits of his time, thus unblocking potential avenues of creative thought.

One such conceit was racial pride, common not only among class-conscious Londoners at the height of the British Empire. Even many who supported emancipation of black slaves could not imagine being related to them. Suggestions of having descended from animals brought derisive laughter (*Punch* 1861). I am not suggesting that Darwin was alone in considering man related to all animals—his grandfather Erasmus Darwin was one of many with similar beliefs—but his unusually zoomorphic view connecting all species should be considered as one piece of a complex puzzle.

Darwin was not alone in questioning natural theological explanations, but he was one of those able to sidestep most of the religious vanity that led some naturalists to use nature to prove the existence of God, rather than to look for overarching natural laws. In his marginalia and notebooks, Darwin often took exception to natural theology posing as science. Religious vanity led some people to foundational beliefs in revealed truths, obviating the need for any theorizing about the creation of man or beast. During most of the two years under consideration, Darwin was a liberal Deist envisioning a world in which a deity had created laws and then allowed then to play out, not just in geology, chemistry and astronomy, but also in biology—including the origin of species.

Darwin's scientific theories created a paradigm shift. But old belief systems can take time and effort to supersede. Thomas Kuhn points out that a variety of scientific and intellectual conceits defend the prevailing paradigm in which one has earned a degree and built a career (Kuhn 144-59). Many naturalists of Darwin's time were mired in old paradigms and understandings of nature by their intellectual, racial and religious vanities, which reinforced each other in ways both obvious and covert. Darwin's character, upbringing and education combined to support an intellectual humility that expanded the possibilities that he envisioned and considered.

The Latin root of the word "humility" is "humus," which means the ground or the earth (*OED*). The final book that Darwin published in his life, *Vegetable Mould and Earthworms*, discussed the importance of worms making fertile humus as the foundation of all life (1881). That concern with rarely-considered earthworms reflects Darwin's own intellectual humility. He envisioned an inclusive tree of life connecting man to earthworms and beyond. I suggest that humility acted like those earthworms to help fertilize Darwin's imagination.

Chapter II gives historical background of changing cultural styles of scientific inquiry leading up to Darwin's day. To varying degrees, the prevailing views of the workings of nature were informed by philosophy, religion, science and poetry. Not only in England, but intellectuals across Europe at that time were at odds over how to understand nature (Wulf 34). Philosophical rationalism (loosely speaking, thinking one's way to the truth) still directed the theorizing of many naturalists, while scientific empiricism was on the rise with experimental evidence increasing in importance. Darwin accepted and used both philosophical and empirical approaches to science.

The word "scientist" was not invented until Darwin was on the *Beagle*, an important historical episode that offers an insight into the cultural mindset of early nineteenth-century science. At that time, some scientists still consulted with poets—as did young Humphry Davy when Wordsworth and Coleridge asked his help in editing *Lyrical Ballads*. In the revised *Preface* to that work, possibly written in response to Davy's glorifying of science, Wordsworth addressed the possibility of poets walking beside scientists (*Preface* 302). Darwin appreciated poetry, carrying his well-used copy of Milton's *Paradise Lost* on *Beagle* land excursions. Poetry offered different insights into man and nature than did empirical science; Darwin found a place for both into his considerations of man and nature.

Chapter III focuses on Wordsworth's poetry and possible parallels in Darwin's theorizing. Wordsworth was known not only for the depth and imagination of his poetry, but also for his insights into man, nature, and even science. In the Preface to *The Excursion* he claimed that his domain included man, nature and the "mind of man," all of which were of prime importance to Darwin (*Excursion* Preface 27, 40). The poet and scientist shared many themes, including the meaning of life's inexorably harsh cycles, human emotions, the importance of small and seemingly common details to demonstrate large ideas, and even concern with life's origins. The fact that Darwin twice read Wordsworth's three-hundred-page *The Excursion* during those two busy years leads to an inference of influence. Several scholars have asserted similar hints of influence more strongly than I, including Gillian Beer, Desmond King-Hele and David Amigoni. I will use approaches similar to theirs in comparing some of Darwin's notebook passages to Wordsworth's verses.

There is no real way to prove that Darwin read Wordsworth for more than pleasure and relaxation. Darwin may have read the poet purely to improve his own prose. When he was engaged in writing his section of the *Journal of Researches* from the *Beagle* voyage, he wrote to a friend: "I shall always feel respect for every one who has written a book, let it be what it may, for I had no idea of the trouble, which trying to write common English could cost one" (*Correspondence* 2:29). Darwin had quickly reached the humbling insight that even the seemingly simple act of putting words on paper was a huge challenge.

Chapter IV will consider Darwin's own speculations on creativity occurring at the same time that he was at his most creative. Darwin questioned the possibility of free will and the nature of creativity in a mind that was solely the product of a material brain, evolved from simpler species. These questions seemed to reflect back on his theorizing in several important ways. Although Darwin never said that he wanted to understand creativity in order to become more creative, that intriguing possibility seems implicit in several notebook entries.

The origins of mind, including free will and creativity, were important to his developing theory of species transmutation. He realized that his developing theory not only would have to solve the mystery of species creation, but also would need to explain the origins of man's mind in the context of natural laws versus supernatural belief systems. Without a soul or something metaphysical generating mental activity, questions previously answered by religion would now require more empirical explanations. Darwin would not need to *prove* a theory of material creativity, but he would need to offer a plausible model for an evolved mind or his entire project would become suspect.

Chapter V will discuss how Darwin's courtship of Emma may have aided his creative endeavor in unexpected ways. For instance, his consideration of marriage coincided with his theorizing about the importance of sexual crossing and heritable traits, an irony that Darwin may have noticed. But because his theorizing was centered on sex and heredity, it would be a mistake to consider that every reference related to sex was also related to Emma. That having been said, I will point out specific instances when Emma may have been in his thoughts while he was theorizing.

His rare visits to Emma seemed to correspond with an increase in notebook reflections not only on sexual issues but also on subjects that might have interested her, or that he discussed with her, like religion and morality. He may have experienced increased urgency to succeed in his theorizing from a need to prove to himself, and possibly to Emma, that he was a worthy husband both as a good provider and sexually worthy, as any animal would demonstrate by defeating a rival.

The question of what constitutes influence is a backdrop to all these considerations. While many scholars offer explanations of Darwin's path to his theory, the topics I am considering are mostly absent in secondary literature about his theorizing and creativity. I will discuss and expand upon existing literature, including Darwin's *Autobiography* and biographies on Charles and Emma. Biographical works by Janet Browne, Adrian Desmond and James Moore, Loy and Loy and Healey, are detailed and insightful. There is general agreement that Darwin was focused and persistent in pursuit of his theory, and that his own voluminous and diverse reading aided his effort (Beer, de Beer, Bowler, Colp, Gruber, Herbert, Kohn, Manier, Richards, Schweber). The path of Darwin's theory development, sometimes called "The Origin of the Origin," has been

extensively studied (Herbert 1971; Schweber 1977, 1978; Kohn 1975, 1980, 1982, 1996; Ospovat; among others).

The primary sources for this study include Darwin's books, letters, notebooks and marginalia. Darwin's notebook speculations are more revealing of his method than are his published writings. Even his letters are more guarded than the notebooks, since letters are intended for other people to read. Darwin also presented unvarnished and intriguing thoughts in the immediate responses he jotted in the margins of the books he was reading. In his marginalia, he "appears more relentless, dismissive and self-regarding than his modulated public persona would imply" (Di Gregorio xiii). That description of Darwin's impatience points to exceptions of his humility, usually occurring when he encountered religious explanations presented as science.

Similar to his notebook entries, Darwin's marginalia reflect his inexorable search to understand and describe the complexity of nature. The marginalia give glimpses into the origins of ideas Darwin chose for speculation, while his notebooks offer deeper insights into his creative process at work. "The whole process was strongly purposive—namely to assemble a vast store of sometimes tiny points of information in order to illustrate and support the Great Theory" (Di Gregorio xiii).

Darwin gathered ideas in his reading which he then tested in the notebooks, often putting contrasting thoughts in competition with each other. He sometimes followed both sides of arguments to their conclusions with such balanced debate that one cannot tell which side he believed to be true, as in his speculations on free will. He noted other scholars' ideas (for instance, Abercrombie) and responded with his own. And when he

proved a fact to his satisfaction, he then continued as if he were asking: “If this is so, what would that mean—what else is suggested?”

This is a study of the creativity of one man, and understandably only a narrow view. Its intent is to offer a few more dimensions adding to the rich picture of Darwin’s creativity. His view of nature was complex, as were the roots of his creativity. Rather than attempt to simplify the subject, there is importance in the very diversity of influences, just as the value of nature’s intricacy is exposed in Darwin’s theory. Darwin hoped that collecting a multitude of details would reveal the clear outlines of a bigger picture of nature’s laws. I plan to do the same with a few influences that fed Darwin’s own creativity, by exploring his humble world view, his blending of poetry with science, his heartfelt quest for Emma, and his speculations about the physical foundations of creative thought. These are concerns that cannot resolve to simple answers, but tell a persuasive story through the very complexity of their interdependence.

Chapter I

Humility Supports Creativity: The Biological Order Does Not Revolve Around Man

Unusual humility assisted Charles Darwin's creative success. To Darwin, pride was a character problem, humility a virtue. In his notebooks, almost as an aside, he speculated that pride would prevent people from supporting his theory. He may not have recognized that his humility assisted his open-mindedness and facilitated his creativity by allowing him to ask questions that others overlooked and re-open questions others thought settled.

This chapter will consider various elements of Darwin's humility and how they could have assisted his theorizing. While many intertwined character traits supported Darwin's creativity, I suggest that his humility is important enough to be considered individually. No single attribute, his humility represented a suite of character traits that led to his unprejudiced scientific vision. Darwin's modest character, his acute awareness of problems posed by intellectual vanity, uniquely suited him to see beyond blind spots that limited the creativity of many of his peers.

His humility was part of the reason that Darwin was able to remove man from the center, or cause, of all life on earth. When he left on the *Beagle* he still subscribed to the prevailing anthropocentric view. But early during that voyage, examining samples of creatures "low in the scale of nature," he began to question why there was so much beauty in minute creatures he netted in the middle of the ocean that no human would see—why they were "created for such little purpose" (Darwin 1988 22). Considering that

man was not be the reason for all creation, and valuing life's minutiae, were early steps in Darwin's inquiry.

The humility that helped Darwin's creativity was *not* in the sense of meekness or any absence of self-assertion. Darwin's humility was in opposition to arrogance, vanity, conceit and pride. Arrogance made unwarranted claims on the authority of culturally accepted belief systems and forestalled creativity. Darwin discounted most unexamined claims to scientific authority, whether intellectual or religious. The *Oxford English Dictionary* quotes Darwin's *Expression of Emotions* for an example of "arrogant:" "The arrogant man looks down on others, and with lowered eyelids hardly condescends to see them" (IX 264). Darwin certainly did not look down on others but considered opinions from diverse sources.

Pride is a high opinion of oneself, a feeling of superiority that is usually unwarranted. Modesty can include moderation, temperance, and forbearing exaggeration. Conceit brings a kind of closed mindedness, "a mind ... inclined to think in a specified way" (OED). Darwin's humility supported his free thinking open-mindedness. Not only did he carefully avoid making unwarranted or exaggerated claims on authority or knowledge, he also questioned the conceits behind accepted beliefs. He reexamined old ideas that had been discarded or discounted without full scientific investigation, while carefully critiquing his own ideas.

Several different and overlapping vanities restricted the thinking of many of Darwin's fellow naturalists. 1) Personal vanity that made it hard to listen to other points of view, a vanity that tended to underpin other conceits. 2) Religious vanity, which is tricky to isolate since science and religion were still intertwined, allowing for a strong

vein of religious vanity in some naturalists who saw the role of science as a way to prove the existence of a creator. Such foundational certainties preempted the asking of many important questions about nature. 3) There was overt and covert racial vanity—such as that the human race was special and distinct from all other animals—smug beliefs that blocked the vision of all species being related 4) There were intellectual vanities—the unquestioning belief in the authority of what one had been taught, of existing paradigms, as Thomas Kuhn noted (Kuhn 149-52). Kuhn quoted Darwin's *Origin* to help describe intellectual vanities. ". . . I by no means expect to convince experienced naturalists whose minds are stocked with a multitude of facts all viewed, during a long course of years, from a point of view directly opposite to mine" (481).

That thought from *Origin* points out Darwin's awareness of some of the intellectual vanities against which he struggled when arguing for the truth of his theory. I suggest that he was also aware of, and resisted, similar vanities in his own theorizing—both in the science he was reading and in how his mind, too, was "stocked with a multitude of facts" that he needed to rethink. I argue that this awareness was tied to the personal modesty that supported his questioning his own taught beliefs, including religious and scientific 'truths.'

Once could look at the challenge of dealing with existing beliefs from an historical perspective, using August Compte's view of how humankind viewed nature through history, in three phases from superstitious to metaphysical to scientific. But by framing Darwin's humility being opposed to the various conceits that he faced, a different and useful perspective is obtained. Imagining the intertwined vanities of the "experienced naturalists" of his time can assist in explicating the complicated problem of

Darwin's creativity, and it can work like one of Daniel Dennett's "intuition pumps," thinking tools to simplify the complex (Dennett 6). The fact that Darwin noticed conceits of other "experienced naturalists," and mentioned humility in several introspective notebook passages, adds support to my thesis.

While I will separate these vanities in this study, in reality they were woven together in subtle and powerful ways. For instance, although the fact of adaptation and variation of species were noted and accepted by natural theology, the accepted scientific belief held that while species could adapt to local environment changes, they must remain true to created type. Darwin believed species transmuted into other species, and he saw adaptation as one starting point of his theorizing.

Accounts by contemporaries testify to Darwin's modest nature (Martineau 335-6). Many of Darwin's letters and notebook entries show his concern with the importance of humility, and also reflected that trait in his writing. Secondary literature mostly supports (and occasionally questions) these assertions of Darwin's humility. While nobody has focused directly on the relationship of Darwin's humility to his creativity, a few contemporary and current authors offer valuable related insights.

Like his peers, Darwin had been taught the existing beliefs about species. How he integrated those ideas into his theories is an open question. Ospovat argues that early in his theorizing, Darwin accepted as a matter of course "perfect adaptation and the purposiveness of variation. . . . [T]hey gave the early theory of natural selection the structure of a mechanism to preserve harmony" (Ospovot 231). Darwin's ideas evolved and developed as he questioned simple certainties, avoided siding with any accepted authorities, and kept open opposing possibilities. Kohn noted Darwin's increasingly

thoughtful ambiguity, arguing that "his science was socially constructed. . . . [H]e is a scientific theorist with a conflicted religious family background and training, who is operating in a complex religious, scientific, and political setting, and who is struggling with the metaphysical consequences of his scientific theory" (1985b 220).

One pillar of Darwin's thinking rested on his humble view of man as just one more product of transmutation, like all species from the simplest plants to complex animals, with physical and mental variations inherited from ancestors. "Just as Copernicus showed how our abode the earth is not the center of the solar system, so Darwin showed how the biological order does not revolve around man" (Gruber 1981 12). Darwin's zoomorphized view of man as just one of many living species has proved as powerful as Copernicus's view of the heavens. It even led to Darwin's tracing man's moral traits, like humility, to less complex species.

The intertwining of science and religion was highlighted by Paley's 1802 *Natural Theology: or, Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature*. While after his return from the *Beagle* Darwin considered Paley to be one of the few worthwhile studies he undertook at Cambridge, experiences on that voyage led him to question Paley's "proofs, including his famous watchmaker metaphor for creation" (*Autobiography* 50-1). I will use the phrase "religious vanity" to characterize those who relied on natural theology as unquestioned scientific proof. Paley's accepted vision kept God comfortably in charge of nature, of species and (separately) of man. As George Bernard Shaw suggested: "The churches must learn humility as well as teach it" (36)

Beyond just religious anthropocentric, the racial pride of many "experienced naturalists" also narrowed their vision (*Origin* 481). Most Englishmen still considered people of different color to be separate races, if not species, even while many supported emancipation of slaves. "It was a 'scale' calibrated in Eurocentric units; those at the top judged those at the bottom" (Desmond and Moore 2009 191). That the human race was distinct from other animals seemed too obvious for most, but not all, people to question.

At the height of the British Empire, the Union Jack dominating the globe and Napoleon recently defeated, the British were confident of their preeminence in the human hierarchy. The pinnacle of the British populated London's private clubs with their Cambridge and Oxford degrees. It is no wonder that many of his peers reveled in their own eminent reflections. Yet there sat Darwin dining in the Athenaeum, the top intellectual club in England (newly elected in the same group as Charles Dickens), humbly seeing himself (and each of us) as related to the basest species (Desmond 1991 253).

Darwin was encouraged to question religious authority over nature by the circle of friends, dissenters and reformers around his brother Erasmus and Harriet Martineau. As Desmond and Moore put it:

> Anglican priests were keeping the people down. This, of course, was why some radical Unitarians saw reform and evolution as going hand in hand. A self-developing nature held no terrors for them. Eras's group, with Martineau at its center, gave Charles the license to work out his own deterministic theories. . . . [Charles's] father worried about Martineau's radicalism and its influence on the boys. (1991 217)

While Darwin was the first to propose natural selection, he was not the first to consider a world that followed nature's laws rather than the whims of a creator.

Since the Renaissance, the sciences steadily advanced their authority. Copernicus and Galileo introduced modern astronomy, Newton discovered many laws of physics, Hutton, Lyell and others expanded man's vision of geology, and many brilliant chemists were advancing their field. But biology, species creation, and particularly man were much touchier subjects. Before Darwin, man's unquestioned belief, or conceit, of his special place in theological creation was a barrier to understanding the relatedness and transmutation of species.

One could argue, conversely, that Darwin's view of man's relatedness to other species *led* to his vanity. That argument is intriguing, and certainly possible. But there are traces of Darwin's humility, and concern with humility, as a youth and pre-*Beagle*, before his theorizing expanded his zoomorphic vision. I do believe that his humility interacted with his levelling view of species connectedness to form a synergy that encouraged creative scientific open-mindedness. Accepting the premise of species evolution could make a man more humble.

Certainly Darwin was not completely immune to his own cultural influences and prideful urges, but he was aware of many of them as will be demonstrated in his own writing. Darwin's humility was more than lip-service, it was a self-defined goals. His son Francis noticed that: "Often, when writing . . . what he calls a boasting letter, he laughs at himself for his conceit and want of modesty" (Darwin 1901 134). Darwin studied his own character weaknesses, including moments of pride, conceit and boasting, to help

understand the origins through transmutation of all emotions, feelings and thinking from simpler animals through variation and adaptation over long expanses of time.

Darwin was aided in overcoming his vanity by his family's liberal culture, tradition of questioning religious and scientific dogma, and committed efforts to abolish slavery. Darwin recoiled from the mistreatment of slaves during his *Beagle* travels. Adrian Desmond and James Moore's 2009 book, *Darwin's Sacred Cause*, argues that Darwin's hatred of slavery—and his ability to envision kinship with black slaves—was a driving force in his dogged pursuit of the mechanism of evolution.

While I appreciate Desmond and Moore's scholarship, I find their conclusion too simple. I think that Darwin's concern for the treatment of slaves was one of a long list of irritants that fueled his desire to show the relatedness of all species. I am suggesting that there were many roots of Darwin's creativity, a few of which are uncovered in different chapters of this work, and many more are discussed in the voluminous literature on Darwin's path to his theory. Understanding the relatedness of all men was important, but Darwin took a bigger view uniting all life from the simplest forms to plants and animals, each playing a part in the vast entangled bank of nature. Seeing man as the lynchpin of the theory reflects the anthropocentric fallacy, one more instance of racial vanity.

Darwin's *Autobiography* notes other roots of his humility in his youth, such as his embarrassment from an impulse to exaggerate in storytelling. Darwin recounted one such incident noting, even as a youth, his "conscience having been afterwards sorely troubled by it" (*Autobiography* 22). His awareness of that unpleasant and prideful urge toward heroism as a weakness that needed tempering, also taught the importance of staying true to the facts. That yarn-telling anecdote indicates an early desire to entertain with his

stories, perhaps foreshadowing a lifelong concern to write interesting, accessible and popular prose.

Darwin's *Autobiography* reported an adolescent passion for hunting. His competitive nature, keeping meticulous count of every animal he shot during hunts, was so obvious that even his shooting companions noticed. So they once played a practical joke on him by claiming their own priority for almost every one of his kills—thus vastly diminishing his personal "score." Darwin noted his inordinate anger upon discovering the trick, and then his introspective intention to correct his over-competitive character. "I think that I must have been half consciously ashamed of my zeal" (*Autobiography* 47). Darwin used introspection to examine a shared human nature, including blind-spots caused by excessive vanity.

Darwin's *Autobiography* also recounted his memories of school: "I was for my age neither high nor low in it; and I believe that I was considered by all my masters and by my Father as a very ordinary boy, rather below the common standard in intellect" (27). Here was an early incident that may have lowered Darwin's expectations and supported an honest expression of humble intellectual abilities. The fact that he recounted it in his *Autobiography* shows that it was important enough to register on his memory. He may have mentioned it to encourage his descendants (ostensibly for whom the book was written) to persevere, but it also points to potential psychological events in his youth.

Darwin recalled being complimented by Sir James Mackintosh when they first met, in the summer of 1827. That was at Maer, the home of his uncle, Josiah Wedgwood, whose daughter, Emma, was to be Charles' future wife (although there is no mention if she was present at the meeting). "To hear praise from an eminent person, though no

doubt apt or certain to excite vanity, is, I think, good for a young man, as it helps to keep him in the right course" (*Autobiography* 14). Once again he noted his own tendency toward vanity, but in this case in the context of its occasional value, that praise could keep one on "the right course." Here was another instance of his awareness of his own habitual emotional reactions, one more bit of evidence that vanity was in his sights, and also an example of how his mind was always looking for the advantages of mental traits.

Darwin's liberal views of politics and religion, his productive skepticism, and possibly some of his creativity can be traced through his parents to his grandfathers. Josiah Wedgwood was the brilliant founder of the famous pottery works that bore his name. Erasmus Darwin had been a renowned poet and scientific genius in his own right (King-Hele 301). Erasmus had even written evolutionary poetry, including suggesting that all species "seem to have been formed by the original living filament" (E. Darwin 1794 1:505). But Erasmus failed to propose a viable mechanism to explain species descent from that first life form.

Erasmus's unorthodox politics and evolutionary speculations ran him afoul of public opinion and religious mores to such an extent that he was publicly excoriated both in press and from the pulpit (King-Hele 89). Perhaps this bit of family history explains some of Charles Darwin's public caution. While Charles never turned away from his focused mission, he seemed worried that he would face attacks from critics similar to those levelled at his grandfather, Erasmus.

Charles was open-minded while aware of the accepted religious and philosophical views of man's place in nature. He jotted some related thoughts in his notebooks: "Those will not object to my theory, those the philosophers who soar above the pride of the

savage, they perceive the superiority of man over animals, without such resorts" (B 248). This was about nine months before he discovered natural selection. He was hoping that fair-minded people would support his theory. But he was concerned that pride could restrict people's ability fairly to consider his theory. He understood man's differences from other animals without resorting to a claim of specially created status.

Despite Darwin's humility, he could not escape being implicated by his culture in using the term "savage," even while repeatedly arguing for the similarity and connectedness all people. On the Beagle voyage he had seen the Patagonian "savage" act as pridefully as any Englishman and realized that neither civilized man nor "savage" *needed any reason* to feel pride. He came to view pride as one more character trait inherited from animals, which could be governed through intellect and education.

Darwin argued against needing to "resort" to ideas like racial superiority or God-given exceptionality to separate man from other animals. Science clearly showed "the superiority of man" in many distinct evolved attributes, mental as well as physical (B 248). Darwin was trying to look at all animals scientifically, while including man as just one related species. Even though he would leave out discussions of humans in the *Origin*, he knew that ultimately his theory would include mankind's relatedness to all life.

Darwin's theorizing began with the premise that all species had transmuted *somehow* from the simplest lifeforms. From that foundation, man's relatedness to animals became part of the inquiry, not an end. The 'end' was the mechanism of transmutation, through laws of nature. One starting point for Darwin was sex, the importance of procreation for species to change and survive. The unquestioned assumptions of most

"experienced naturalists," including their anthropocentric view of man being the cause and the end of creation, obscured the relatedness of all life (*Origin* 481).

Schools and churches taught the traditional view of man's central place in the scheme of nature. Man was the pinnacle of God's perfect plan, even the reason for it. John Locke (1632-1704) reinforced the accepted view of man being sovereign and above all living species, while "all quite down from us the descent is by easy steps, and a continued series of things, that in each remove differ very little one from the other" (Locke 293). Locke's *Essay Concerning Human Understanding* was one focus of Darwin's Cambridge examinations where he scored quite well (Desmond and Moore 1994 87-8). Locke asserted that all species live in "magnificent harmony" through "the grand design and infinite goodness of the Architect" (Locke 294).

Alexander Pope (1688-1744), in his "Essay on Man," famously spoke of a "vast chain of being! Which from God began" with perfect gradations and no missing links stretching up to man at the top of mortal creations (Pope I:237). Then the angels and all heavenly creatures stretched in a similar chain from man to God. The world was perfect by necessity because it was made by God. This was the belief system against which Darwin theorized, and in which he was raised.

One observation allowing Darwin to unlock the secret of natural selection was the messy *imperfection* of heritable descent. This led to his image of an irregularly branched "Tree of Life," the only illustration in the *Origin* (B 36, *Origin* 163). Darwin came to see that man was not at the top of a vast chain of mortal being, and mankind was anything but the center, or reason, for all creation. Such a view suggested more natural explanations.

Darwin became particularly disturbed when religious arguments were professed as scientific. He railed against the proposition of a nature created for man's benefit, calling it particularly void of scientific meaning, as in his reactions to arguments by Mayo and Whewell: "Mayo (Philosop of Living) quote[s] Whewell as profound. Because he says length of days adapted to duration of sleep of man.!!! Whole universe so adapted!!! & not man to Planets.— instance of arrogance!!" (D 49, Aug 25 1838). Such arrogance seemed to gall Darwin, and often generated energized responses.

Man was one more example of natural laws at work, not the crown of creation. "The great achievement for which Darwin's work is sometimes called the second Copernican revolution was to remove man from the center of the stage in our conception of nature" (Gruber and Barrett 12). Reducing mankind's importance is difficult for many people: "One of the hardest ideas for humans to accept is that we are not the culmination of anything. . . . It is part of our vanity as humans that we tend to think of evolution as a process that, in effect, was programmed to produce us" (Tattersall, qtd. in Bryson 449). Levelling man's place in the natural order allowed Darwin to ask productive questions.

Darwin's developing view saw man as the product of a messy, imperfect history of animal descent, based on laws he was beginning to perceive. He saw humans as an adapted response to challenging environments over vast lengths of time. Some of his notebook speculations about our relatedness to animals ended with the powerful image of being "netted together," which was at once empowering, haunting, restricting and somehow freeing (B 232). His image of being closely related to all animals consciously included "savages" and slaves as our relatives (Desmond and Moore 2009 115).

Darwin, and his family, fervently supported the British abolition movement of his day, with all its history and politically charged implications (Desmond and Moore 2009). Descended from Josiah Wedgwood, a key funder and supporter of the British abolition movement, Darwin was soon to marry Josiah's granddaughter, Emma Wedgwood, also an ardent abolitionist. Raised in that climate, he was able to envision that slaves, free men, "savages" and even animals were related, with a common ancestor as our humbly shared origin.

In *Darwin's Sacred Cause*, Desmond and Moore argue that Darwin's strong abolitionist views was a key impetus his his evolutionary theorizing, since if Darwin could prove that white Europeans were the same species as black "savages," it would be harder to justify keeping them as slaves (2009). Although I find that too strong an assertion of causation, I do believe that British racial pride, religious vanity and scientific smugness resisted both abolition and evolution. Darwin was understandably nervous that people would object to his developing theory.

British gentlemen, including many of Darwin's professors, mired in the certainty of their own racial superiority, could not conceive of being related to black slaves, let alone base animals. "Darwin loathed the cosmic arrogance that could lead to these views. He castigated the devout dons . . . who separated 'godlike' humans from a bestial nature" (Desmond and Moore 2009 115). Darwin also worried that he might not be able to convince such a skeptical, arrogant audience. At several points in his notebooks, even before he had discovered the mechanism of evolution, he was thinking of finding allies.

Previous authors had argued for evolutionary origins, albeit without mechanism of natural selection. All of them had been publically scorned or attacked by critics, even

the serious scientific ones like Lamarck and his grandfather Erasmus, (Lamarck by Darwin's friend and mentor, Charles Lyell). The danger was not only that the science of his developing theory would be questioned, but also that it would be ridiculed. Even during his early theorizing he may have thought that he needed to do more than just solve the mystery of species origins. He would have to sell it. He could not do so by himself: he would need allies.

Darwin was not alone in connecting the abolition movement to evolution. His critics would soon do the same, taking a sly swipe at abolition when attacking the *Origin*. In response to the publication of *Origin* n 1859, "Punch" magazine printed a cartoon of

(Fig. 1. *Punch* Cartoon, 18 May 1861)

(Fig. 2. Wedgwood medallion, *PBS*)

an ape, which mimicked the famous Wedgwood medallion, the official symbol of the British Anti-Slavery Society.

When Darwin connected man and animals, he did so not only through our *physical* resemblance but also emotionally, through shared feelings and habits—a bolder step. Having evolution encompass man's emotions raised larger questions, ultimately

about the source and origin of the mind. Some of Darwin's earliest evolutionary speculations began in the spring of 1837, and by that fall Darwin was already considering a possible argument to address the unquestioned belief in man's special mind:

> People often talk of the wonderful event of intellectual Man appearing.— the appearance of insects with other senses is more wonderful, its mind more different probably [. . .] hard to draw line. [. . .] The difference is that there is wide gap between Man & next, animals in mind, more than in structures. — (B 207-8)

Darwin saw the gap between ape and man, even including the intellect, as smaller than the jump to "a bee <<compared to cheese mite>> with its wonderful instincts" (B 208). Slavery seemed to be on his mind when he considered the evolution of the intellect.

Darwin visited the popular exhibit of Jenny the orangutan at the London Zoological Society and observed the similarity between the young ape and a human child. In a letter to his sister Susan, Darwin noted that when Jenny's keeper teased her with an apple: "she threw herself on her back, kicked & cried, precisely like a naughty child" (*Correspondence* 2:80). When the keeper told Jenny she would get the apple if she stopped crying, Jenny "certainly understood every word of this, &, though like a child, she had great work to stop whining, she at last succeeded, & then got the apple" (2:80). Darwin noted many points of similarity between the orangutan and a child in Jenny's countenance, mood and actions that argued for our close relatedness to apes. But it was that very assertion that became a public flashpoint, striking a deep vein of racial vanity.

To accurately gauge the heat of the public response to levelling man and apes, I will move ahead several decades to an incident soon after the 1859 publication of *Origin.*

Darwin was challenged by Bishop Samuel Wilberforce, a noted cleric, to debate the truth of his theory. Religious and intellectual vanity, and monkeys, seemed poised at the heart of the dispute. Darwin's shy nature made him hesitate to speak publicly in his own defense. This could have been related to his modesty or just embarrassment—a distaste of public speaking.

Darwin's friend and supporter, Thomas Henry Huxley, stood in his place. Huxley would soon become *Origin*'s public face and was dubbed "Darwin's Bulldog." Wilberforce (called Soapy Sam by his critics) had vowed to prove in the debate that evolution was a hoax. His views and religious certainty were mirrored, among others, by many of Darwin's own professors. "The thrust of Darwin's work on evolution . . . was now set against the hauteur of Cambridge's clerical professors with their 'godlike' image of man" (Desmond and Moore 2009 115). Wilberforce epitomized the type of arrogant, dogmatic and unrepentant critic Darwin had feared.

There is no exact transcription of that noted debate; several different versions of the story seem to have some credence. "Although the legend is historically untrue in almost every detail, its persistence suggests that it may nonetheless be true in some deeper, mythical, sense" (Lucas). The most popular current account of the tale asserts that Wilberforce's strategy was to ridicule evolution.

Expecting evolution to be laughed out of court, Wilberforce asked Huxley whether he was descended from a monkey on his grandmother's side or his grandfather's. He was relying on British racial pride to see the absurdity of man being descended from animals. But the quick-witted Huxley supposedly retorted that he would rather be descended from a monkey than be a man who used his great intellect to hide the truth

(implying the Bishop's subterfuge). Huxley is said to have won the day, by exposing the Bishop's strategy as childish humor and obfuscation rather than serious scientific debate (Lucas).

J. R. Lucas writes about the legend that grew around that encounter, including its impact on history:

> ...Huxley's simple scientific sincerity humbled the prelatical insolence and clerical obscurantism of Soapy Sam; the pretension of the Church to dictate to scientists the conclusions they were allowed to reach were, for good and all, decisively defeated; . . . the claim of plain unvarnished truth on men's allegiance was vindicated, however unwelcome its implications for human vanity might be. (Lucas)

Lucas suggests that simple sincerity "humbled" religious pride, which some considered an "unwelcome" outcome in its "implications for human vanity." "Soapy Sam" epitomized smug assurance in revealed authority. Lucas' suggestion of a decisive defeat, of the Church dictating to scientists, may have been premature.

A contemporary author, Harriett Martineau, asserted that Huxley's "simple scientific sincerity" was shared by Darwin (Lucas). Martineau knew Darwin well, and was a close friend of Charles' brother Erasmus. All three socialized often during the two years leading up to his 1838 evolutionary breakthrough. In her 1877 autobiography, just before she writes about Darwin, Martineau spends a few pages railing at the vanity of most of the famous scientific minds of England. She then points to Darwin and his friend Lyell as humble exceptions:

> In what noble contrast were the eminent men who were not vain! [. . .]

> There were the friends Lyell and Charles Darwin [. . .] —Lyell with a Scotch prudence [. . .] and the simple, childlike, painstaking, effective Charles Darwin, who established himself presently at the head of living English naturalists. These well-employed, earnest-minded, accomplished and genial men bore their honours without vanity, jealousy, or any apparent self-regard whatever. (Martineau 355-6)

Darwin's humility was a "noble contrast" to the overblown self-regard of most of his contemporaries—and Martineau uses an exclamation point (Martineau 355). As well as Darwin's humility, Martineau notices his serious and dogged work ethic, another key to his creative success which was reflected in his notebooks and letters.

Martineau's description includes being "earnest-minded" and "genial," two traits often related to modesty. Martineau sees Darwin as "simple" and "childlike," unusual word choices for a preeminent scientist, pointing to innocence as a partner of his humility. Lucas talks about Huxley's "simple scientific sincerity," and here Martineau affirms a similar trait in Darwin (Lucas). "Simple" here means straightforward and transparent, without pretense or duplicity. "Childlike" also points to openness and sincerity, to viewing the world with "childlike" wonder, and with a willingness to contemplate new ideas—like a blank-slate, open to creativity. Darwin was not jaded or pompous, according to Martineau, even though he soon accumulated honors and "established himself . . . at the head of living English naturalists" (Martineau 355-6). Martineau's inclusion of Lyell in the same positive vein as that of Darwin could explain their friendship.

Gillian Beer suggests that to both Darwin and "the geologist Charles Lyell, man's preoccupation with himself had distorted past records of the earth and obscured the laws underlying occurrences" (Beer 1983 16). Beer believes that Darwin and Lyell noticed that their fellow scientists were handicapped in their understanding of nature by the anthropocentric foundations of culturally shared belief systems (16). It seems that not many of their peers could sidestep natural theology's limiting vision of man as the center, and the reason, behind all of nature's biology, geology and astronomy.

While responses to publication of *Origin* would vary, "many gentlemen of substance believed it their duty to steer science in a respectable direction" (Desmond 1991 491). Richard Owen, who Darwin considered a friend, wrote a scathing review of *Origin* in the *Edinburgh Review* (Desmond 1991 490, Owen). He specifically objected to a passage in *Origin* where Darwin noted that many "eminent naturalists" insisted on believing that species in general were "independently created," even while they themselves pointed out specific species that were changing due to variation (Owen, *Origin* 482). Darwin continued: "The day will come when this will be given as a curious illustration of the blindness of preconceived opinion" (483). That is exactly what I am suggesting, that the "blindness" of "eminent naturalists" of his day highlights Darwin's own unusual vision, and that his humility was part of the reason for his open-mindedness.

Owen took personally Darwin's charge of "blindness." Owen's 'scientific' critique of *Origin* became political, personal and religious. He charged that *Origin* presented exactly the type of anti-creationist thinking that led to the revolution in France, and tied Charles Darwin's thoughts to those of his oft-criticized grandfather, Erasmus: "The name of (Erasmus) Darwin was already associated with subversive atheism"

(Desmond 1991 491, 12). Although Charles Darwin had been aware of the potential parallel with Erasmus, and had expected criticism, the "hypersensitive" Darwin was "so shocked" by Owen's review "that he lost a night's sleep" (Desmond 1991 490).

Not all reviews were critical of *Origin,* and many people responded quite positively. Thomas Henry Huxley was reputed to have said: "How exceedingly stupid of me not to have thought of that" (Mitchell 102). Natural selection as the basic mechanism of evolution eluded the greatest thinkers before Darwin, and many since. Vanity was not the only problem they needed to rise above, but a closed-minded and parochial view may be part of the difficulty that locks much scientific thinking into accepted belief systems, even when they are failing.

Darwin's vision not only soared above the thoughtless "pride of the savage" (B 248). I propose that he also travelled *below* the high self-opinions of most eminent naturalists, as was possibly suggested later in Darwin's life by his naming his 1871 book on man "*The Descent of Man*." That title points not only to the idea of evolved descent, with its hereditary echoes, but perhaps also it was a play on words about man's fall. It is possible that the word "descent" was used as a reminder that man should not consider himself to be near the top of any ladder of creation, that even his moral senses were products of a long, continuing descent through random variation and natural selection.

Darwin's scientific humility reflected a complex mix of character traits that included affection for his family, compassion for animals, liberal charity and a good dose of self-doubt (as Martineau pointed out). Some of Darwin's own self-deprecating fears were recounted by his daughter, Henrietta. She noted her father's hesitation and difficulty to work up the courage to propose marriage to Emma Wedgwood in the autumn of 1838.

He thought Emma would refuse his proposal. "[H]e had the strange idea that his delightful face, so full of power and sweetness, was repellently plain" (*Emma* II:1). In announcing his engagement to Emma, Darwin recounted to Charles Lyell his "most sincere love and hearty gratitude to her for accepting such a one as myself. . . . I hardly expected such good fortune would turn up for me" (*Emma* II:1).

After they were engaged in November, Charles told Emma about his hesitations and fear of rejection, as Emma recounted in a letter to her favorite aunt, Jessie Sismondi: "He told me he should have spoken to me in August but was afraid, and I was pleased to find that he was not very sure of his answer this time. It was certainly a very unnecessary fear" (*Emma* II:7). Emma appreciated Charles's self-effacing view of himself, as well as his deep love for her.

In that same letter, she described more of Charles' character that attracted her: "He is particularly affectionate and very nice to his father and sisters, and perfectly sweet tempered, and possesses some minor qualities that add particularly to one's happiness, such as not being fastidious, and being humane to animals" (II:6). Emma's insights echoed Martineau's. Emma's view of Charles was not just a snap judgments from a few months of courting, but reflected experiences gathered over a lifetime. As cousins, they had visited each other's homes for occasional family gatherings since childhood.

Charles' letters showed that even as his success grew he did not become vain. His deep affection toward his family also appeared repeatedly in heart-felt, open, and observant comments. His chatty style reflected an unusual modesty and lack of duplicity—even seen from the privileged perspective of our historical ability to compare so many of his notes and actions. His love of animals, reflected often in his notebooks, is

confirmed by regular contributions to animal charities listed in his personal account books (CUL). He donated money also to a wide variety of good causes (CUL).

Darwin's biographers do not always agree that he had a modest nature. Ralph Colp suggested that as Darwin experienced early success he became very proud and expanded his ambitions (Colp 1980 10). Colp discussed Darwin's physical and mental state during the two key years following his return from the Beagle voyage. According to Colp, the publication of Darwin's first book: "*Journal of Researches* . . . made him feel like 'an angel,' and . . . his theory of the origin of coral atolls . . . was well received and caused him to feel 'like a peacock admiring his tail'" (*Correspondence* 2:29 in Colp 1980 10).

That particular paper on coral atolls that allegedly had Darwin cooing, solved a problem that had stymied previous observers. I suggest that it is natural for anyone to experience an immediate jolt of pride from delivering a successful research paper. This is distinct from a character full of smug intellectual conceit. How Darwin reacted to his own warm "peacock" feelings was more telling. The fact that he was keenly aware of his vanity and confessed it in a letter to a good friend suggests that Darwin experienced guilt, surprise and some embarrassment over those immediate feelings of self-importance. In this case Darwin's momentary pride, counterintuitively, pointed to his humility.

To set the context of Darwin's "peacock" and "angel" remark, what he said next was: "If I live till I am eighty years old I shall not cease to marvel at finding myself an author: in the summer, before I started, if anyone had told me I should have been an angel by this time, I should have thought it an equal improbability" (*Correspondence* 2:54). This longer quote hints at Darwin's modesty and sense of humor, not his pride. He was

surprised by his success, about which he would never "cease to marvel." He had thought, in his humility, that the odds of being a successful author within that year were extremely slim—similar to his chances of dying and going to heaven. In fact, Darwin here was scoffing at either outcome.

Colp does not attempt to distinguish Darwin's modesty or vanity in any instances other instances than the "peacock" and "angel" remarks. Colp does point out that Darwin's competitive drive contributed to increasing stress, which was part of his makeup: "As Darwin experienced such ambitions and saw the very real progress of his scientific career, he also experienced anxieties, psychosomatic heart palpitations, and stomach upsets, caused by several psychological stresses" (Colp 1980 11). Darwin was a sensitive young man, and he probably realized that his developing theory was both powerful and potentially very dangerous. I agree with Colp's thesis that Darwin's great ambition drove him to succeed. Ambition is an important character trait in people who work to transform their disciplines. But his innate ambition seemed to be tempered by deeply rooted modesty.

The combination of sensitivity, humility and a driving ambition could have led to some of the "anxieties" and "psychological stresses" that Colp notes. They may also have stimulated the creativity of his theorizing. The sensitivity that caused his recurring psychological distress became one more element of the human condition for Darwin to study. That is, in his notebooks Darwin reflected on his own character traits and disturbed moods, considering himself an example of shared human emotions, and then looked for similar traits in other animals.

After a long notebook speculation on puppies and free will where he presented evidence both for and against determinism, Darwin returned to his own temperament in the context of mental materialism. He wondered if he could improve his own moral qualities if the mind was purely mechanical and solely the product of the way the material of the brain was organized:

> My wish to improve my temper[ament], what does it arise from but organization, that organization may have been affected by circumstances & education, & by choice which at that time organization gave me to will— Verily the faults of the fathers, corporeal & bodily are visited upon the children. (M 73)

Darwin's wish "to improve my temper[ament]," his moral attributes, hints at a personal effort to overcome what he saw as shortcomings in his own character.

The science of his day allowed scientists to be their own subjects, reflected in Darwin's repeated introspection. He pondered whether his own temperament might purely reflect his brain's "organization." Then he pushed one step further: "that organization may have been affected by circumstances & education" (M 73). If the brain's material organization changed due to education, then improving his temperament would improve the organization and could be inherited. The idea of learned changes as heritable was one part of Lamarck's theory that had been heavily criticized, but Darwin still kept an open mind.

It was widely accepted that physical traits and even animal instincts were heritable. But Darwin speculated that human character traits also could be passed down to offspring, just like animal instincts. If character is inherited by offspring, and character

can be molded by education, then even *learned* morality and humility may be heritable. That thought brought Darwin to consider that *lack* of moral education would also be heritable, that: "the faults of the fathers [. . .] are visited upon the children" in a very literal way. He seemed to be hoping that this was the case, since it would be a strong argument for morality without the need for any religious underpinnings.

Darwin believed that vanity was one of the shortcomings of the way his mind was organized. After the success of *Origin*, Darwin wrote a letter that the believed sounded vain and he chastised himself, as his son Francis reported hearing: "as though he were departing from his ideal—a love of truth and carelessness about fame" (Darwin 1901 134). A concern for humility stayed with Darwin throughout his life. He seemed to see modesty and vanity, along with other character ideals, as part nature and part nurture. If both mental as well as physical traits could be passed to offspring, he hoped that one could make a bit of improvement through education during one's lifetime.

Darwin continued pursuing what else it might mean if acquired mental characteristics really were heritable, in the final part of this series of notebook speculations:

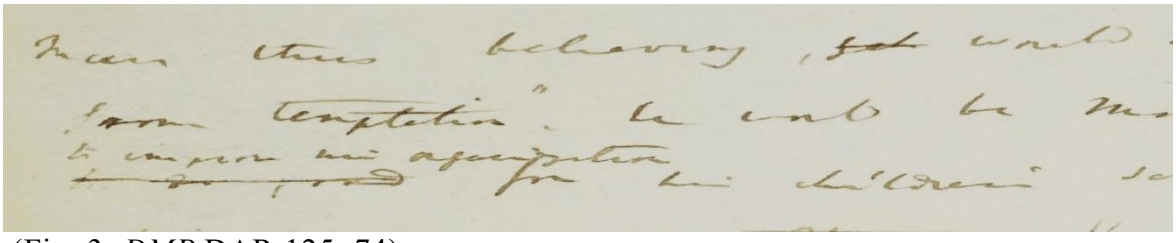
> Man thus believing, ‹~~yet~~› would more earnestly pray 'deliver us from temptation,' he would be most humble, he would strive ‹~~to do good~~› «to improve his organization» for his children's sake & for the effect of his example on others. (M74)

Darwin used the figure of speech "earnestly pray," adding the biblical invocation to: "deliver us from temptation." Or perhaps it was not a figure of speech.

Since Darwin had just been writing about a wish to improve his own temperament, this 'prayer' seemed partly personal–to improve his ability to resist temptation and increase his humility. He focused specifically on the area of moral rectitude, and he highlighted humility. He opined that his theory should make men more humble, since under his deterministic view of materialism they could take no pride even in their good works. Although this argument seems tenuous, since even a commitment to morality must require free will, remember that this was brainstorming, not a final theory.

Darwin was considering a reason "to do good" that was not based on a religious argument, but instead was for the sake of offspring, of children. He was thinking that if a man worked hard to improve his temperament, his children would inherit a brain shaped by that moral effort. Darwin's own effort for humility could breed more humility for future generations. He was tentatively considering the evolution of virtue.

When Darwin wrote these entries, between August 8th and 12th, 1838, he was simultaneously pursuing a wife and had noted his intention to have children. So he may have framed this moral striving partly "for his [*own*] children's sake." One correction he made while writing was to change his original words, that a man would "strive to do good," by crossing out "to do good" and replacing it with "to



(Fig. 3. *DMP* DAR 125: 74)

improve his organization." His original thought suggests that Darwin was considering that "do[ing] good" might stem from a heritable "organization" of the brain (M 74).

If even "doing good" was an inherited trait, Darwin was further marginalizing the possibility of choice in moral action, as he contemplated next: "It may be doubted whether a man intentionally can wag his finger from real caprice. it is chance, which way it will be, but yet it is settled by reason" (M 75). Darwin took the logical next step and doubted if *any* of man's actions come from free will, from "caprice," or are they purely "settled by reason." He included the qualifier about chance, perhaps suggesting that what seems like chance is really determinism. Once again we see the firm Enlightenment belief in the supremacy of reason. Ironically, Darwin's creativity showed most clearly when he was arguing for the impossibility of the very free will that would allow for it.

Darwin's discussions of free will and morality were part of his focus on heritable traits for his developing theory. He continued on the next notebook page, now responding to Martineau's and Mackintosh's ides of morality versus Abercrombie's thoughts on free will. Darwin began by noting that Martineau believed that "conscience varies in different races" of man (M 75). Darwin integrated that fact into his theory of inherited mental traits by suggesting that such variation in conscience was "no more wonderful than [that different races of] dogs should have different instincts" (M 75). It required unusual racial humility for Darwin to consider moral traits, like a conscience, to be analogous to the instincts of dogs. He saw moral sense as a human adaptation built on the social instincts of animals.

A few weeks after these notebook entries on free will and morality, Darwin returned to the same ideas as if he were revising and expanding the implications of his arguments. This suggests that his musings on a heritable conscience, free will and humility were not just isolated thoughts or a dead end, but an ongoing concern. On September 6th Darwin made notes mentioning Comte, free will, chance, heritable traits and humility. Again responding to Abercrombie, Darwin carefully listed a variety of ideas that would hold true if there were no free will. He began by stating: "Every action whatever is the effect of a motive" (*Notebooks* OUN:25). "A motive" here is synonymous with a cause; that is, all actions are directed by determinism, by natural laws as opposed to chance or free will.

Darwin then asserted a universe driven by natural causes and effects in a way that was reminiscent of his 'prayer:' "This view should teach one profound humility, one deserves no credit for anything. (yet one takes it for beauty & good temper)" (OUN:27). Darwin believed his theory would teach "profound humility" – deep, serious and scientifically grounded, whereby people would stop taking prideful credit for their character or good looks. These sound like the views of a man who disliked prideful people, and one who was concerned with his personal modesty. Darwin kept returning to the origin of character traits, teasing out creative arguments for inherited morality, and humility.

When Darwin contemplated a world without free will he noticed a potential problem. If morality were heritable and one has no free will about one's actions, then criminals should not be blamed for their misdeeds. He worried (as was his habit) that these ideas about criminals could prove dangerous in the wrong hands. Possibly he

thought that his arguments could be misused as a legal defense. So he carefully addressed his own concern about the view of criminality as an inherited trait: “This view will not do harm, because no one can be really *fully* convinced of its truth. Except man who has thought very much, & he will know his happiness lays in doing good [. . .]” (OUN:27).

In his concern to “not do harm” we again see Darwin’s upright character. He made an important distinction between casual speculation of his ideas, and thinking hard enough about all the nuances to be “*fully* convinced.” Most people would disregard his intellectual parsing of free will and continue to hold criminals responsible for their crimes. He believed that only a few very serious thinkers would be able to reach his own level of certainty, perhaps similarly to the few noble “philosophers who soar above the pride of the savage” (B 248). By Darwin’s logic, or hope, the few who engaged such serious thinking would certainly be more interested in “doing good” than in using his theories for evil ends. Darwin considered himself to be a man “who has thought very much” about these ideas, so we could conclude that Darwin, of all people, “will know his happiness lays [sic] in doing good.”

If humility is heritable, Darwin’s father and grandfather gave him a good start. His father Robert had written a pamphlet to defend his grandfather Erasmus against the remarks of a colleague, in which he contended: “Your pride dazzles your eyes and will not permit you to see your own ignorance” (King-Hele 1999 225-6). Darwin was certainly interested in the nature of urges like pride, as can be seen in the topics he noted in the margin or Burke’s discussion of that trait: “ambition, pride, fame, vanity, arrogance, conceit, sense of beauty, instinct, sublimity, triumph, and pleasure” (N 57 fn1, *Marginalia* 102-3). For example, Darwin considered: “Arrogance a determination to

show pride without real pride having been attained" and "Conceit – pride without foundation and on trifling subjects?" (*Marginalia* 102).

Religious, intellectual and racial pride were some of the reasons why evidence for species relatedness was often ignored by many of Darwin's peers. But this is more than a critique of intellectual vanity. Darwin saw the importance of taking a humble view of the world, and himself, not only for his own moral improvement but also for the support and open-mindedness it lent to his theorizing. Beer suggests that Darwin's modest view of human mental abilities may have led him to question if he even had the capacity to uncover the laws behind transmutation, because his:

> . . . sense of incongruity—the insufficiency of man's reason as an instrument for understanding the material universe—was always with Darwin, though never perhaps more profoundly than during those early creative years at the end of the 1830s when he was struggling with the basic arguments and observations which were to feed the remainder of his life's work. (Beer 1983 46)

Darwin's education and life experiences may not have been enough for him to reach his vision of natural selection if he had been stuck in past paradigms of anthropocentrism, arrogant class structures, prevailing scientific certainties, and smug dead-ends of natural theology. Bertrand Russell said that "the fundamental cause of the trouble . . . in the modern world [is that] the stupid are cocksure while the intelligent are full of doubt" (Russell 28). The conceits that restricted "eminent naturalists" were related to the pompous certainty which Russell attributed to the stupid (*Origin* 482). Darwin was

anything but cocksure, constantly reexamined the scientific veracity of all plausible explanations of species creation.

It may not have been enough for Darwin to question all extant theories on species and the problems surrounding a growing number of anomalous specimens. I believe that Darwin's unusually modest nature assisted his theorizing by widening his vision, although it was only one facet of a complex set of moral and intellectual values. Creativity is an "entangled bank" (*Origin* 489).

Darwin's humility has been examined from several angles: how it was an important part of his own character and how it supported his creative effort to uncover the mystery of species origins. Darwin even thought that his audience would need to overcome their pride, especially anthropocentric conceits, in order to accept his theory. Darwin's theorizing was aided by his awareness of the importance of humility, as well as its practice.

Chapter II

Science and Poetry, an Entangled Vision:

Not In Opposition to Wonder

This chapter contains a discussion of the interplay and changing relationships between science and poetry that form the background of much of Charles Darwin's theorizing, beginning roughly with his grandfather, Erasmus Darwin. Reading poetry, such as Wordsworth's *The Excursion*, was part of an intellectual web of influences connecting Darwin to many previous thinkers, including Samuel Taylor Coleridge, Humphry Davy, and Adam Sedgwick (to name just a few). My belief is that reading Wordsworth was one of many factors that nourished Darwin's creative efforts.

This chapter proceeds mostly chronologically in suggesting a context for Darwin's theorizing beyond its purely scientific underpinnings, pointing to the cultural interplay of poetic, religious, and scientific ideas that infused Darwin's thinking and writing. Until very recently in history, the authority to speak about nature's laws did not reside solely in science. Some of the earliest descriptions of the natural world were posited by Greek philosophers, and soon religious thinkers and poets put their stamps on belief systems.

The Renaissance began the break between religion and science, but it was a slow transition that continued for centuries with philosophers, theologians, naturalists and poets reflecting the changing moods of their times. The Enlightenment accelerated this shift in authority, and by the end of the eighteenth century we find Erasmus Darwin, a doctor, philosopher, poet and man of science, influencing Wordsworth and Coleridge. Those two poets subsequently affected the scientist Humphry Davy, and all of them

played a part in Charles Darwin's education. I will use the word scientist for convenience even though it was not invented until 1833, as will be discussed later in this chapter.

During the late eighteenth century and early nineteenth, scientists and poets were often companions in inspiration and friends both personally and professionally. Wordsworth wrote that poets and the scientists were "twin labourers and heirs of the same hopes" (Ross 24, *Prel.* V 43). But during the years preceding and during Darwin's life, "a rivalry ensued that became the catalyst for both groups to initiate the delineation and emphasis of their differences" (Ross 24). That rivalry, still simmering during Darwin's lifetime, is at the heart of this chapter.

At stake was the mantle of authority to explain the natural world to an interested public, an explanation in which Charles Darwin would play a large part. "It is impossible to develop an accurate account of Darwin's self-image as an inquiring scientist unless one understands that his self-image changed and developed as a result of the changing social role of science and of a changing philosophical understanding of the nature of scientific discourse" (Manier 15).

Darwin lived at a time when both poets and scientists could rightfully claim control of expertise of the deepest knowledge of nature. While men of science were slowly wresting that control from the poets, many poets only grudgingly conceded ground. Better poets were aware of the latest science, while similarly the more sensitive scientists found much value in poetry. By the time Darwin was at Cambridge, Wordsworth was receiving critical acclaim for his poetry and its insights into man and nature. Darwin not only enjoyed good poetry, but also pursued all avenues that might offer explanations of natural processes.

In the 1830s, an investigation into the roots of emotion and creativity would have included the ideas of the leading poets. William Wordsworth was then the recognized leader of a modern poetry movement (later to be called the Romantic movement), and offered both a sensitive and nuanced view of human feelings and imagination. In that context, it is no surprise that Darwin referred to Wordsworth in his notebooks when contemplating feelings. It also makes sense that during Darwin's most focused evolutionary theorizing in 1837 and 1838, he took time to read Wordsworth's *The Excursion*.

There was a rich intellectual history supporting Darwin's theorizing and underpinning the imagination he brought to bear on his species speculations. The beliefs of Darwin's time, place and culture should all be factored into his challenges and successes during the two years after his return from the *Beagle* voyage. Influence is difficult and complex to prove. How Darwin viewed *The Excursion* must be considered both part of, and shaped by, the many varied roots of his culture and upbringing.

We cannot be certain why Darwin read that long poem. It may have been only for amusement, or as a break in the focused theorizing that was giving him headaches. But those reasons do not explain why he read *The Excursion* a second time. Perhaps he gained insights into imagination, nature or human emotions. Wordsworth's poem may have stimulated his thinking in many areas. I argue that some important foundations of Darwin's thinking originated in the entangled poetic and scientific insights of his study of nature, human nature and creativity, including *The Excursion*. The time in which Darwin lived and his family's intellectual history played a large part in this story.

Darwin's grandfathers, Erasmus Darwin and Josiah Wedgwood, were both linked to William Wordsworth and Samuel Taylor Coleridge. These two poets, in turn, invited into their lives the young scientist, Humphry Davy—whose science outshone his mentors' poetry, for a time, in the eyes of an impressed public. The innovative and practical science that Davy represented established him as a hero to the public, including the youthful Charles Darwin. Davy epitomized the new breed of scientist that was helping fuel the industrial revolution, both figuratively and literally.

Davy and Wordsworth were colleagues and competitors at the forefront of the shifting relationship between science and poetry. This complex but mostly respectful story would engage, among others, the Reverend Adam Sedgwick, Charles Darwin's geology professor at Cambridge. Sedgwick had led Wordsworth on several hikes to explain the latest geological theories. The fact that William Wordsworth's brother, Christopher, became a Cambridge Master gave Wordsworth another connection to a wide group of Cambridge intellectuals (Wyatt 82-3). At the prospect of Christopher Wordsworth becoming master, William Whewell wrote to a friend: "If this turns out so, he shall invite his brother [William] here, and . . . we will be the most poetical and psychological college in the universe" (Todhunter 38, in Amigoni 58). Charles Darwin's thought processes, ideas, and perhaps even metaphors, were shaped by Cambridge professors, Wordsworth's writing, and innovative scientists like Humphry Davy.

Darwin had to move beyond the accepted religious biases that colored much of the science of his day. Religious arguments were often in the background of science, and occasionally still considered final proofs. While the power of religious authority over scientific thinking had been weakening, perhaps since the Renaissance, change was

coming slowly. By the late seventeenth and early eighteenth centuries, non-religious based scientific questioning was expanding even into biology, at least in some quarters.

Still, by Darwin's day the post-Enlightenment vision of the world was not a post-religious view. Science and religion were in a complex interrelationship, which should not be stereotyped by the simplistic and erroneous view that "whenever science and religion came into contact, some degree of scientific excellence was sacrificed, if only because the scientists themselves believed in the theological ideas" (Cannon 1964b 65). Many devout scientists still sought to glorify God through their science, with varying degrees of success, while others were able to separate their scientific objectivity by compartmentalizing their religious belief. The *Bridgewater Treatises*, a series of books published between 1833 and 1840, were planned to follow Paley's *Natural Theology*, and "played endlessly on the theme of God's wisdom and goodness deduced from nature" (Desmond 1991 213). But before the last one was published, "the enterprise was positively passé to the cynics and secularists" (Desmond 1991 213).

Any discussion of Darwin and Wordsworth must acknowledge that they both had untraditional (although very different) views of religion. Very briefly, the young Wordsworth held somewhat unorthodox, if devout, religious views that were presented quite ambiguously through his writing of *Lyrical Ballads*. He was more ambivalent when he wrote *The Excursion,* while later in life he shifted to fairly orthodox Anglican (Cannon 1964a 79). It was a very personal and deeply held faith. Much of his poetry intentionally unsettled accepted belief systems. Wordsworth used traditionally safe religious figuration as a way of undermining it in favor of a fairly radical secular or naturalistic humanism.

Kenneth Johnston pointed out that Wordsworth's destabilizing of religion was noticed by contemporaries, citing a review of *The Excursion* by Charles Lamb: "When Lamb speaks of its 'liberal Quakerism' and 'Natural Methodism,' his adjectives underscore by redundancy a paradox that is lost if we fasten on his denominations, since nothing Christian (in 1814) could be more liberal than the ethics of Quakers or more natural than the emotions of Methodists" (Johnston 1984 286, Lamb 166). Some Unitarians believed that Wordsworth's personal religion reflected the heresies "that Nature and the human mind are divine" (Gill 236).

Darwin's religious beliefs also have attracted much speculation. I agree with Kohn and many others that Darwin, too, was intentionally ambiguous, both to protect himself from the kind of public backlash suffered by his Grandfather, Erasmus, and to shield the devout Emma from personal anguish (Kohn 1985b, Browne 1995 321-2). In *Origin*, Darwin presented a world that strictly followed natural laws as designed by a creator. He may have believed profoundly throughout his theorizing, or he may have presented that idea for protection from the harshest forms of religious criticism. Browne suggests the latter: "Darwin was then, and always remained, sensitive to the ultimate aims and beliefs of certain broad-church clergymen, especially Henslow's and to some extent Sedgwick's, and to the devotions of his wife and family, without feeling any need later on to subscribe to the same views himself" (Browne 1995 321-2).

Darwin's religious thoughts have been the focus of voluminous speculation and are too large a discussion to be undertaken here. Since there is no substantive evidence of Darwin's true feelings on religion, I will refrain to engage this controversy. More important to this study are views that informed his scientific thinking. Kohn suggests that

Darwin's scientific agenda aligned with "the liberal reformers of natural theology. . . . God operates by natural laws. Science must be free to embrace the skeptical ethos of scientific naturalism" (Kohn 1985b 223).

While I agree that Darwin embraced skeptical scientific naturalism during his post-*Beagle* theorizing, when Darwin embarked on that journey he still accepted more conservative religious beliefs, which slowly eroded over the next few years:

> Whilst on board the 'Beagle' I was quite orthodox, and I remember being heartily laughed at by several of the officers (though themselves orthodox) for quoting the Bible as an unanswerable authority on some point of morality. I suppose it was the novelty of the argument that amused them. But I had gradually come by this time, i.e. 1836 to 1839, to see that the Old Testament was no more to be trusted than the sacred books of the Hindoos. (*Autobiography* 71)

Darwin asserted that he discarded some part of his religious orthodoxy between 1836 and 1839, the years under consideration in this study. Darwin read *The Excursion* in the latter part of that time span. He found value in Wordsworth's view of nature, even while realizing that its underpinnings of natural theology were not to be trusted. When Charles Darwin compartmentalized God and replaced Him with scientific laws to explain the everyday workings of life, he was rewarded with a powerful and humbling vision.

By the 1830s, religion was being pushed slowly toward the margins but was certainly not eliminated from scientific explanations of nature. "It was a time of flux and of undigested eclecticism – a time when old notions concerning God and human responsibility were being subjected to fundamental criticism and reformulation" (Manier

15). These were heady days for scientists uncovering natural laws that governed the sky, the earth and all living matter.

Darwin was aware that stubborn religious thinking was still hanging on, more so in the biological sciences than the physical. He noted that new laws of astronomy and geology generally received fair hearings, even when they proposed an age for the earth several orders of magnitudes beyond Biblical assumptions. In his notebooks, Darwin lamented the fact that when it came to laws governing origins of species, the religious explanations of natural theology held sway. The following notebook entry from October 1838, actually written soon *after* his breakthrough insight of natural selection:

> We can allow «satellites», planets, suns, universe, nay whole systems of universe ‹of man› to be governed by laws,, but the smallest insect, we wish to be created at once by special act, provided with its instincts its place in nature. [. . .] <u>yet we placidly</u> believe the Astronomer, when he tells us satellites &c &c «<u>The Savage admires not a steam engine, but a piece</u> of coloured glass ‹~~&admires~~› is lost in astonishment at the artificer.—» [. . .] Our faculties are more fitted to recognize the wonderful structure of a beetle than a Universe. (N 36)

There was an editor's note to the comment about savages not admiring steam engines that traced this idea to Humphry Davy, who was still in Darwin's reading and thoughts (N 36-1). The comment about savages being lost in astonishment at the artificer of a shiny piece of glass seems to be a reference to William Paley's famous "watchmaker" proof a deity (Paley 6). Darwin was observing that people were content to allow astronomers to

explain the operation of the planets to natural laws. But they still insisted on crediting a Creator with the design of even the tiniest “wonderful” animal structures.

Gillian Beer suggests that this notebook entry shows Darwin engaging with the question of who controls scientific authority (2009 8). She believes that it also points to Darwin’s “refusal to allow astronomers to have all the visionary authority. Law to him is not in opposition to wonder, but is rather the energy of the wonderful” (Beer 2009 8). Beer notes Darwin’s ability to fold romantic wonder into science. While I agree with Beer as far as she goes, I think that Darwin was also speaking about the resistance of applying nature’s laws to living things in a scientific culture dominated by old paradigms of thought.

Savages saw a piece of glass and rather than wonder how it was made were in awe of the maker. Darwin may have been testing a rebuttal to Paley’s proof, by using Davy’s steam engine idea to hint that only a savage could be more focused on laws of inanimate matter, rather on the laws of life. Similarly, many eminent naturalists, and much of the public, mimicked that illogic when they looked at all life on the planet without considering how it came to be, but instead were lost in awe of its Creator. More than just competing for authority with astronomers, Darwin may have realized that his developing laws of nature would have to compete with religious (and even poetic) assertions of authority over nature.

Darwin seemed aware of this shifting landscape of authority, and he also appreciated poetic insights into nature’s cycles. But he opposed religious authority over science root and branch. In this private notebook entry, comparing natural theological thinkers to savages, his true feelings seemed evident.

Darwin was not the first to question religious authority over nature and over the mind of man. At the forefront of such post-religious theorizing were some atheistic French "philosophes." Darwin referred to a few of them in his notebooks, including Denis Diderot, Etienne Condillac and Auguste Comte. Many liberal English thinkers admired and even mimicked these philosophes' avant-garde approach. Darwin's own grandfather, Erasmus Darwin, was one such English liberal, both politically and religiously, as reflected in his popular scientific poetry.

Both of Darwin's grandfathers played parts in the advancement of Enlightenment thinking. Josiah Wedgwood, founder of the famous pottery works, was also politically and religiously liberal. Wedgwood played a major role in Britain's industrial revolution, while British scientists (some on his payroll) helped Wedgwood Pottery maintain a competitive advantage in glazes, materials and processes. Wedgwood and his family followed what could be called a Romantic ideal, and also supported Coleridge for his poetic genius.

Erasmus Darwin was a doctor, poet, scientist and what today would be called a Renaissance man. He was a consummate intellectual with a large social circle of prominent people in many fields. They included important industrialists like Wedgwood, poets like Robert Southey, and some of the leading scientists of his day like James Watt. Coleridge was introduced to this circle by Southey and Thomas Beddoes (King-Hele 1986 91-2). The older Darwin teasingly debated a younger and more serious Coleridge about religion, but not surprisingly neither changed the other's mind while each continued to respect the intellectual attributes of the other (King-Hele 1999 301-2).

Erasmus Darwin's achievements may not have influenced posterity as much as his grandson's, but in his own time his writing was both widely respected and exceedingly popular. He presaged Charles Darwin with an attempt at a unified theory of natural laws, including an interesting view of evolution (which was called "transmutation" at that time). While the lynchpin idea of natural selection eluded Erasmus Darwin, as it did all other evolutionary thinkers until Charles Darwin cracked the code, the elder Darwin did correctly envisage a remarkable number of details.

Much of Erasmus' writing used poetry to describe science in a popular genre of his day, "philosophical poetry." The marriage of science and poetry would soon be dissolved, but perhaps something was lost in that operation. There are advantages in tempering an objective scientific view with subjective poetic insights. Erasmus Darwin was a master of this craft, "inarguably the most popular British 'philosophical Poet' of the late eighteenth century" (Jackson 2009 172).

As Erasmus stated in the Advertisement to *The Botanic Garden* in 1791: ". . .the general design of the following sheets is to inlist Imagination under the banner of science and to lead her votaries from the loose analogies, which dress out the image of poetry, to the stricter ones which form the ratiocination of philosophy" (E. Darwin 1798). By insisting on strict science in his poetry, Erasmus aided the movement toward empirical science—and also, inadvertently, sped the demise of philosophical poetry. It was a literary form that most critics, including Coleridge and Wordsworth, would not mourn (Jackson 2009 171).

In his Advertisement, Erasmus Darwin explicitly placed imagination "under" science. That is, he wanted poetry to follow science more strictly. Imagination, of course,

would be a central theme for Wordsworth and Coleridge who placed it *above* science and staked it out as the domain of poetry. While they respected science and made a serious effort to keep up with ongoing discoveries about the laws of nature, they championed the preeminence of poetry. They asserted that only poetry could communicate nature's deepest, most universal truths. Poetry had been a serious vocation for millennia, while the professionalization of science was a work in progress.

The background of Charles Darwin's ideas about imagination, and the human mind, were founded on a variety of sources that can be traced back (at least) to Hume's empiricism: that all knowledge is grounded in experience. Darwin had read Erasmus Darwin's speculations on the mind, which were mostly based on David Hartley's eighteenth-century associationism, a belief system which was "ubiquitous" at the time (Hayden 96).

Basically, Hartley argued that all thoughts begin with sensations that the brain associates into ideas. John Locke "was the first to use the term 'association of ideas' (in *Essay Concerning Human Understanding;* 4th ed. 1700)," influencing Hartley and leading to the English associationist belief that knowledge can be traced to the senses (Hayden 96). According to John Hayden, "it is appropriate to compare late eighteenth-century associationism with late twentieth-century Freudian-Jungian psychology: it is found on everyone's lips, even those who know little or nothing of Freud and Jung" (Hayden 96).

Hartley's writing was so influential that Samuel Taylor Coleridge named his first son Hartley more than a half century after the philosopher's death. Joseph Priestley wrote a book to explain Hartley's ideas to the general public. Priestley was a member of the

same Lunar Society as both of Charles Darwin's grandfathers. Darwin's "Notebook M contains references indicating that the associationist psychology of Hartley, with its accompanying empiricism, remained an oral tradition within the Darwin household" (Barrett in *Notebooks* 518).

Erasmus Darwin's associationist beliefs inclined strongly toward materialism—that the human mind was a product of the *material* of the brain, not of an immaterial spirit or soul. Charles Darwin reflected specifically on many of his grandfather's thoughts in his *Notebooks*, particularly in the private M Notebook on man and metaphysics. In fact, Charles noted Erasmus from the very beginning of his speculations, such as pages 7, 9 and 11, when he contemplated how the brain's train of thought was interrupted by disease. Even Charles Darwin's use of the term "train of thought" might be traced to Erasmus's regular use of a similar phrase, "train of ideas" (M 9 fn1 252). Charles repeatedly pondered the implications of "trains of thought" in his efforts to unravel the source of imagination, as I will discuss in a later chapter on material roots of creativity.

Erasmus Darwin's associationist and materialist views framed his *Temple of Nature* (published posthumously), which was originally called *Origin of Society*. That title seems a serendipitous foreshadowing of the title of his grandson's famous book. Charles Darwin may even have named his own landmark work, at least partially, as an homage to Erasmus Darwin.

The following quote elucidates Erasmus' inclusive view of the material underpinnings of all life, his associationist bent, and his singular style of philosophical poetry.

Next the long nerves unite their silver train
And young SENSATION permeates the brain;
Through each new sense the keen emotions dart,
Flush the young cheek, and swell the throbbing heart.
From pain and pleasure quick VOLITIONS rise,
Lift the strong arm, or point the inquiring eyes;
With Reason's light bewilder'd man direct,
And right and wrong with balance nice detect.
(E. Darwin 1803 II: 269-76)

He cast a wide net, connecting sensations to emotions to actions, thinking to choices to morality.

Last in thick swarms Associations spring,
Thoughts join to thoughts, to motions cling;
Whence in long trains of catenations flow
Imagined joy, and voluntary wo.
(E. Darwin 1803 II: 277-80)

Erasmus traced physical nerves through sensations to associations of thought, sweeping from lyrical feelings to an almost heretical (in that day) argument for mental and emotional materialism. Erasmus was suggesting that sensations caused *physical* actions in the brain, which formed the basis even of creative reasoning. He forwarded the materialistic view that mental attributes can be traced to material causes that physically course through our bodies on the motions of nerves. Charles Darwin read Erasmus' work and considered many of these same themes.

British thinkers had differing reactions to Erasmus' poetry. They were intrigued by his provocative insights into nature, even as his increasingly materialistic rhetoric eventually contributed to his dramatic fall from public favor. The young Wordsworth and Coleridge shared those conflicted reactions. They were impressed by many of Darwin's formulations but disturbed by his materialist sympathies. The fact that Darwin's writing provoked such passions suggests that his materialist ideas were discussed, dissected and challenged. Even when he was haughtily dismissed, he was not forgotten. "Erasmus Darwin, whose *Zoonomia* provided Wordsworth with material for *Lyrical Ballads,* was one of the most important theorists of the 'new' materialist psychology" (Richardson 67).

Erasmus Darwin's widespread fame and influence in England, at least before he fell out of favor, cannot be overstated. Horace Walpole called Erasmus' *The Loves of Plants* "the most delicious poem upon earth. . . . How strange is it that a man should have been inspired with such an enthusiasm of poetry by poring through a microscope, and peeping through the keyholes of all the seraglios of all the flowers in the universe!" (Cunningham 178-9, in Browne 2002 40). That was a time when poetry, science, imagination, nature and even 'seraglios' could be combined unabashedly. That "strange" combination of botany, science, poetry and sex, would also prove important in Charles Darwin's work.

Erasmus Darwin's standing was shaken by criticism of his anti-religious inferences, and his public following evaporated in British nationalistic passions ignited by the French Revolution. His liberal and materialistic views were attacked and his poetry mocked, most famously in the highly influential *Anti-Jacobin* magazine. Erasmus actually escaped the brunt of the nationalistic fervor. His good friend (and even more

outspoken liberal), the chemist and philosopher Joseph Priestley, had his home attacked and burned by an angry mob. Such virulent public criticism reversed a long run of popularity for Erasmus Darwin's writing.

The young Wordsworth and Coleridge were briefly impressed both by Erasmus Darwin's poetry and his support of French aspirations for liberty (King-Hele 1986 64-8). King-Hele's *Erasmus Darwin and the Romantic Poets* argues that Erasmus' writing strongly influenced these two great poets. Wordsworth and Coleridge seemed to share with Erasmus a long list of similarities of themes, language and style (King-Hele 71-79). Wordsworth himself noted that his 1798 "Goody Blake and Harry Gill" was based on an incident reported in Darwin's *Zoonomia* (*LB* 325).

King-Hele pointed to several authoritative Wordsworth biographers, including Emile Legouis, H. W. Garrod and Francis Glingender, who also noted Erasmus' influence on the young Wordsworth (65-68). One representative summation comes from Garrod: "Wordsworth's poetic theory and practice in this period are derived from Erasmus Darwin. . . . It is, I think, more than likely that . . . he was in part responsible for the revolutionary and free-thinking turn given to Wordsworth's mind in 1791 and the following years" (Garrod 55-56, from King-Hele 67). While Wordsworth and Coleridge appreciated Erasmus' free thinking and mix of philosophy and science, they soon tired of his ponderous rhymes.

King-Hele believes that Wordsworth was aiming directly at Darwin in his Advertisement for *Lyrical Ballads*, when he criticized the "gaudiness and inane phraseology of many modern writers" (King-Hele 1999 316, Wordsworth 2005 49). If even half of King-Hele's assertions of influence are correct, considering the long list of

specific connections he notes from the works of Darwin to Wordsworth, Erasmus was quite an inspiration for Wordsworth. Although Wordsworth quickly broke from the restrictions of Erasmus' heavy couplets, he was permanently affected by Darwin's views of nature (King-Hele 66-70).

Coleridge had his own complex associations and history with Erasmus Darwin. The young Coleridge first met the elder Darwin in 1796. When Coleridge suffered a financial setback later that same year, a friend of Darwin's offered him 100 pounds a year to start a school ("probably on Darwin's recommendation") and Darwin also offered him a job as a research assistant (King-Hele 1999 302). Coincidentally, in that same fortuitous year, Erasmus Darwin's son, Robert, married Susannah Wedgwood. The two would become Charles Darwin's parents.

There were other financial and even religious connections among Coleridge, Erasmus Darwin and the Wedgwoods. The Wedgwoods were Unitarians like Coleridge. The religiously passionate Coleridge enjoyed giving guest sermons in the local Shrewsbury Unitarian Church often attended by the Wedgwoods and Darwins. That was the church of Reverend George Case, who later tutored Charles Darwin when he was eight years old. "It was in Case's parsonage that Samuel Taylor Coleridge received an offer from the Wedgwood brothers of financial assistance if he would refrain from sermonizing and devote himself entirely to poetry" (Browne 2002 12). The offer was accepted.

Coleridge may not have approved of Erasmus Darwin's cumbersome poetic phrasing or religious views, but in several letters he spoke glowingly of Darwin's intelligence and his scientific knowledge: "Dr. Darwin possesses, perhaps, a greater range

of knowledge than any other man in Europe, and is the most inventive of philosophical men. He thinks in a *new* train on all subjects except religion" (King-Hele 1988 149, Coleridge *Letters* I:152). That compliment was "a double distinction in science and literature that no subsequent scientist-poet has deserved," certainly not in Coleridge's eyes (King-Hele 1988, 149).

In May 1796, only four months after that complimentary reference to Erasmus, Coleridge reversed course and said about *The Botanic Garden:* "I absolutely nauseate Darwin's Poem" (Coleridge 1895 I:164, in King-Hele 1988 149). However, Coleridge stood mostly alone in his criticism at that time. "Everybody else seemed to like Darwin's poem, 'The Botanic Garden' well enough, since it was widely regarded as a literary classic, inspiring stylistic echoes and influences in the work of other poets (including Coleridge himself) for years to come" (Day 1). Horace Walpole's admiration for *The Botanic Garden* has been noted. Walpole also argued about that poem: "you will find glorious similes about everything in the world, and I defy you to discover three bad verses in the whole stack" (Cunningham 178).

Coleridge's intense interest in science was fanned by Erasmus Darwin. Coleridge was impressed that Darwin had spent twenty years studying the latest science, starting in 1770, as part of a strategy to write "a poem of epic length" about nature—his *Zoonomia* (King-Hele 1999 302). Coleridge actually announced a similar project to Darwin's, to study science for his own sweeping "philosophical poem" (Coleridge 1817b 2:254). Coleridge never wrote that poem, but it was that project which he urged Wordsworth to fulfill, and which eventually became *The Excursion* (Jackson 2009 171-2, 194).

Although Wordsworth and Coleridge "had been much influenced by Darwin," by the time they wrote *Lyrical Ballads* in 1798 they were "in revolt against his style and blazing a new trail for English poetry" (King-Hele 1999 316). Yet they still shared some of Erasmus' liberal views of man and his passion for nature poetry. "Wordsworth had been attracted to Darwin because he supported the French Revolution, relished mountain scenery, and provided the authority of science (or so it seemed) for the ideas that plants experience emotions and that all nature, however humble, is to be valued" (King-Hele 1999 318). Wordsworth's poetry often lamented the shattered hopes of British supporters of the French Revolution, notably recreating many of the disheartened and conflicted feelings of his own younger self in *The Excursion's* character, the Solitary.

Despite the debt that Wordsworth and Coleridge owed Erasmus Darwin, they soon left him in their poetic wake. It was not so much that they attacked him as that their project made his poetry look archaic. King-Hele asserted that the most damaging attack on Erasmus Darwin "in the long run, was a little book called *Lyrical Ballads*" (1999 316). Wordsworth and Coleridge had absorbed what they needed from Darwin; in making a clean break from his style they sped his demise. They then attempted to woo his audience with their own poetic "experiment." But a large proportion of Erasmus Darwin's public soon flocked to men of science rather than to the poets.

Charles Darwin was very aware of both the successes and the trials of his grandfather, at least by late in his own life. In 1879, at the age of seventy, Charles wrote *The Life of Erasmus Darwin* in which he outlined why his grandfather fell from favor:

> No doubt public taste was at this time changing, and becoming more simple and natural. . . under the guidance of Wordsworth and Coleridge. . .

> [who said] that poetry was chiefly concerned with the feelings and deeper workings of the mind, whereas, Darwin maintained that poetry ought chiefly to confine itself to the word-painting of visible objects. (34)

Charles Darwin's short summation of Wordsworth and Coleridge's poetic concerns are worth noting. Part of the reason Darwin read *The Excursion* twice may have been due to its concerns about feelings and the workings of the mind, which were also major foci of Darwin's M and N notebooks.

Or perhaps Wordsworth and Coleridge's insistence that the 'correct' use of poetry was in the service of feelings was partially in reaction to Erasmus Darwin's use of poetry to support his science. As Wordsworth famously wrote in his *Preface* to *Lyrical Ballads*: "all good poetry is the spontaneous overflow of powerful feelings" (King- Hele 1986 70, *Preface* 290).

Erasmus Darwin's work was a step on the path to Romanticism, if a sideways one. Noel Jackson believes that Darwin was the godfather of the Romantic Movement: "The fire from which 'Romanticism' sprang to life as an alternative to cold reason was kindled not so much at the urging of Wordsworth and Coleridge but from the funeral pyre of Darwin's legacy" (2009 193). Erasmus Darwin used poetry to support objective science. Wordsworth and Coleridge nodded to science while focusing poetry on subjective feelings. Charles Darwin's science productively infused subjective insights into his objective search for a scientific breakthrough and opened subjectivity to scientific exploration by making feelings part of human substance.

Charles Darwin's awareness of the story of Erasmus' ideas, his popularity and his sharp decline, could partially explain his reticence to publish his own controversial

discoveries. Erasmus also had a second impact on Charles since the Romantic poets would, in their turn, affect the younger Darwin.

The *Preface* to *Lyrical Ballads* announced that Wordsworth and Coleridge were staking out new territory. But they did not discard science. They only made it secondary to imagination. In fact, they continued to be very interested in the latest discoveries that men of science were making in all areas of nature. The two poets needed to keep up with the latest scientific discoveries, in part to justify their claim of poetry's superiority in its understanding of nature. Their descriptions of nature, while imbued with passion, endeavored to reflect the latest science. Having claimed that their poetry had broken with the past, they were careful to avoid allusions to antiquated scientific ideas.

Unexpectedly, soon after the demise of poetry *about* science it was science not poetry that won the hearts and pocketbooks of the English reading public. Young scientism was born at the turn of the nineteenth century, in the optimism of the Industrial Revolution and the triumphs of the British Empire, as young Wordsworth and Coleridge found themselves losing the competition for readership to the rising stars of geology, astronomy, botany and chemistry. Scientists were inspiring enthusiastic audiences with new discoveries and breakthroughs.

Wordsworth and Coleridge probably did not help their popularity by declaring a major shift in the poetic aesthetic. They moved away from comfortable old tropes into creative new territory, writing about ordinary people in common language, a position Wordsworth brazenly outlined in the *Preface* to *Lyrical Ballads*. For more than twenty years after that landmark publication, much of the public (and notable critics) simply did not understand what they were attempting. Wordsworth called his poetry "an experiment"

in using “the real language of men in a state of vivid sensation” to make “the incidents of common life interesting” (*LB* 287, 289).

If it had been a scientific “experiment” it may have drawn larger audiences, as did the young chemist, Humphry Davy. Davy’s ideas, language and fame “helped to clarify why Wordsworth emphasized experiment, expertise, reason and ‘system’ in his poetics” (Ross 24). Maybe Wordsworth even chose to use the word “experiment” to define Romantic poetry because of competition with scientists for public attention. After all, audiences and money were flowing to scientific experiments, and Wordsworth coveted both.

The sciences delivered measurable results along with excitement and optimism. Science writing was outselling poetry as homegrown scientists were making important new discoveries whose impact was visible in material improvements for the common man (Herringman, Ross, Sharrock and Wyatt). So while the Romantic poets proposed that their writing improved the lot of real Englishmen, it was the scientists who were actually delivering on that promise. Scientists were the new heroes.

More than just a developing rivalry between poets and scientists, there was a shift taking place in who was perceived to speak with authority about the natural world. Philosophers had once been considered the arbiters of nature’s truths, like Plato’s perfect forms and Descartes’ “cogito.” Religious authorities also demanded their share of reverence, as such thinkers as Galileo and Descartes came to realize. Newton’s discoveries in the seventeenth century had set a new standard by positing that nature followed scientific laws. Modern men of science were teasing out more of those laws through careful observation and experiment.

By the early 1800s, when Wordsworth and Coleridge were beginning their own poetic experiment, the public was enthralled by the experiments of scientists who were uncovering nature's secrets through observation, categorization, experiment and careful theorizing. Poets often moved in the same intellectual circles as the scientists, and were not immune themselves to the allure of these new public heroes. Today's accepted separation of poetry and science "is not a natural, but rather a constructed estrangement that was necessitated by the changing market for the products of these intellectual laborers during the Romantic Age" (Ross 24).

The defection of audiences from poets to scientists was aided, unwittingly, by Wordsworth and Coleridge when they hired a young Humphry Davy to help them review the proofs of the second edition of *Lyrical Ballads* (Sharrock 57). It seemed natural for the poets to hire a bright young scientist, since "Wordsworth understood the relationship between poets and scientists to be one of personal and professional kinship" (Ross 24). Davy was an aspiring poet, as well as a brilliant young scientist about to become celebrated in the world of chemistry.

Coleridge was introduced to Davy (perhaps facilitated by Erasmus Darwin) and shared his new protégé with Wordsworth (King-Hele 1986 82). They asked Davy's proofreading help because his "native brilliance and his lack of formal scientific training appealed to their romantic belief in the superiority of the natural genius. Here was Humphry Davy, who according to romantic theory had all the potentialities of the genius or the seer" (Sharrock 63). They were correct about Davy's promise. He was soon recognized in the British scientific establishment as "a national hero" (Ross 30).

Davy's own poetry was considered quite good, yet it lacked that spark of genius which burned so brightly in his scientific endeavors (Sharrock 58). But his poetic attempts arguably aided the creativity that fed his science. "Like many of his contemporaries, his literary and philosophical thinking was far from peripheral to his scientific interests" (Wyatt 9).

I would like to highlight this point, that early nineteenth-century men of science, including Charles Darwin, felt comfortable and found creative value by integrating literature, philosophy and poetry into their scientific endeavors.

Humphry Davy's fame soared not only from his scientific discoveries but also from his ability to share his passion with his audiences. His scientific vocabulary and descriptions were shaped by his close association with Wordsworth and Coleridge. Davy's lectures used "a language that was so similar to that of the Romantic poets that many members of their public noted the kinship" (Ross 24). Davy's lyrical idioms and metaphors enthralled the public with images of nature yielding its secrets to this new generation of scientists and industrialists. He soon eclipsed the popularity of the Romantic poets.

Wordsworth and Coleridge were sympathetic to the work being done in the sciences, while they disapproved when it was too narrowly focused and mechanistic (Wyatt 8). But the simplistic critique that poets disliked scientists persists. One line often used to show Wordsworth's disdain of scientific experiment is: "We murder to dissect," from "The Tables Turned" in *Lyrical Ballads* (*LB* 149). Susan F. Cannon asserts that while "it is easy enough to find passages in almost any serious writer of the early 19th century which seems to be an attack on science in general," what they are attacking is

eighteenth-century 'mechanistic' science, not "the more modern 19th century position" (S. Cannon 1978 18).

In the case of his "murder" comment, Wordsworth himself noted that the poem being quoted, "The Tables Turned," "arose out of conversation with a friend (probably William Hazlitt) who was somewhat unreasonably attached to modern books of moral philosophy" (S. Cannon 1978 50). This was certainly a criticism of those, like Wordsworth's friend, who were too narrowly focused and did not experience the fullness of nature in its own environs. But it is overreaching to pick an occasional line of Wordsworth's to prove his dislike of all science. His views were more complex.

In the next (final) section of that same poem, Wordsworth put his thoughts in better context and offered a suggested cure, as well as an expansion of the targets of his criticism to include all artists who were similarly myopic:

> Enough of science and of art,
> Close up these barren leaves;
> Come forth, and bring with you a heart
> That watches and receives. (*LB* 150)

The leaves (written pages) were barren only if from narrowly-focused books, not Wordsworth's own writing as in this poem. A wise scientist, like a wise artist or poet, was one who studied nature as did Wordsworth, with an inquiring "heart / That watches and receives." Composing poetry without "a heart" also would be a "murder to dissect." Wordsworth and Coleridge undoubtedly knew that the better scientists had moved away from solely writing shallow books and contemplating forms in solitude. Professional

scientists, like professional poets, also appreciated the necessity to study nature in her own laboratory.

Science and poetry fed into each other, often with powerful synergy and remarkable results. “If Davy was to some extent a poet. . . Coleridge and Wordsworth were keenly interested in science themselves and particularly in chemistry” (Sharrock 60). Far from being at odds with each other (a simplistically dualistic view of their tension), there was a well-documented cross-pollination between Romantic poets and their peers in science (Nichols 305). That synergy would continue to infuse science into Charles Darwin’s day. Fifty years later, in his 1859 *Origin*, Darwin’s arguments still rang with allusion, metaphor and scientific poetry (Beer, Kohn, Nichols).

While “Davy was writing and publishing numerous lyric poems in imitation of Wordsworth and Coleridge . . . Coleridge was attending almost every lecture on physiology being offered at the time in London” (Nichols 305). When asked what interested him in Davy’s lectures, Coleridge is reported to have replied: “I attend Davy's lectures. . . to increase my stock of metaphors” (Coleridge 1854 468, in Nichols 305).

That glib response by Coleridge hints at a deeper issue—the difficulty of tracing entangled influences. The meanings of comments in letters, lines of poetry and even private notebook entries were necessarily obscured (at least partially) by layers of personal stories, not to mention the history of poetry and literature. As Salmon Rushdie said: “To understand just one life, you have to swallow the world” (Rushdie 1991 121). Influences are necessarily nuanced and tantalizingly speculative.

When King-Hele presents many examples of Wordsworth and Coleridge incorporating Erasmus Darwin’s themes, topics, science and style in their writing, many

of his assertions can only be well-educated guesses. The same is true when Roger Sharrock notes influences of Davy's science on the two Romantic poets, and Wyatt asserts cross-fertilization between Wordsworth and several Cambridge professors—most notably Sedgwick and Whewell. In most cases, one cannot affirm direct intellectual ties with any certainty.

But it is just as true to say that all writers are influenced more or less by what they read. Wordsworth offered insight into the slippery problem of influence in these lines from his *Prelude*: "Who that shall point as with a wand and say / 'This portion of the river of my mind / Came from yon fountain?" (*Prel.* II, 214-215).

Erasmus Darwin certainly affected the developing ideas of Wordsworth and Coleridge. These poets' interest in accurate science may point back to Erasmus, as when Wordsworth asserted that the poet's job was to communicate even scientific information to the public through his unique insight into nature, history and man. But by the early nineteenth century, much of the public was no longer listening to poets for scientific insights into nature. The mantle of authority over the workings of world had shifted to the scientists. This trend left many poets barely heard, hence the anxiety in Wordsworth's *Preface*.

English audiences for science and poetry were drawn from the same group of well-to-do, financially secure gentry and upper-class intellectuals (Ross 32). Humphry Davy's success at packing lecture halls meant a loss for the poets. "At no time during the early days of Davy's career did the poets of his acquaintance enjoy a fraction of the public acclaim showered on the young natural philosopher" (Ross 31).

As Davy gathered accolades, reviews of Wordsworth's poetry "were so bad that during the period from 1807 to 1814, which were the years of Davy's greatest scientific achievement, Wordsworth gave up publishing poetry altogether" and took a job to supplement his income (Ross 31). Charles Darwin was born during this time, on February12th, 1809, when the popularity of Wordsworth's poetry was at its ebb.

Darwin had a childhood interest in natural history and geology. He loved collecting even then. As a young teen, chemistry became his first serious scientific pursuit. Darwin earned the nickname "Gas" from his schoolmates, because both he and his brother Erasmus were intrigued by chemistry (Browne 32-3). They spent much of their pocket money on basic chemical paraphernalia and performed experiments in their makeshift home laboratory (Browne 30-4). "They had not, however, the apparatus to follow in Humphry Davy's heroic footsteps" (Browne 30). While there is no hard evidence that young Darwin was aware of Davy's science at that time, since Davy was publicly celebrated the assumption is plausible.

With chemistry as Darwin's hobby at that time, Davy may have been a hero. The Darwins were an intellectual family, from Erasmus's noted Lunar Society to the Wedgwoods' vested interest in supporting the latest chemistry. Young Darwin's thinking might have been colored by Davy's writing, which powered science with Romantic words, thoughts and metaphors. Davy, and much science of that day, blended a complex narrative of objective facts with subjective insights. Davy's Romantic science, directly or indirectly, could have been an early portal for Darwin's Romantic thought.

Charles Darwin knew through family lore that his grandfather Erasmus, who had passed away seven years before Charles was born, had similar interests to Davy's

"theatrical scientific investigation" (Browne 1995 29). Charles read his grandfather's writing carefully and fruitfully. One could say that Charles Darwin's nature *and* his nurture suited him for a future role of making scientific discoveries and describing them with feeling. Both his grandfathers were interested in science *and* poetry. Charles inherited strong character traits from both sides of his family, and was also a child of his time whose heroes were not only scientists like Humphry Davy, but also poets (Browne 1995 28-34).

Humphry Davy's popularity was already shooting up by 1802, when he delivered the lecture "A Discourse Introductory to a Course of Lectures on Chemistry" at the Royal Institution. It was so successful that it was quickly published as a pamphlet (Sharrock 69). In this "Discourse" Davy's captivated audience heard him declare science's preeminent authority over nature. This was only a few years after Davy helped Wordsworth edit the *Preface* which asserted the reverse—the supremacy of poetic insight into nature's truths.

The skirmish between scientists and poets was entering a new phase. Roger Sharrock detailed this story in "The Chemist and the Poet," explaining how, in his popularity, Davy "does not forget the great poets of his age . . . and their message concerning the freedom and nobility of the human mind. . . . He does not slavishly defer to their opinions but stands up with firmness and originality for his own subject and its true place in the scheme of human knowledge" (Sharrock 65). Davy spoke about science with reverence, in an emotive language quite different from today's scientific vocabulary. His words invoked spiritual visions to describe the progress and grandeur of chemistry and the other practical sciences of his day.

Much of Darwin's writing would similarly reflect Romantic language and themes, as in this section from his *Beagle Diary*. "The atmosphere so resplendently clear, the sky an intense blue, the profound valleys, the wild broken forms, the heaps of ruins piled up during the lapse of ages, the bright coloured rocks, contrasted with the quiet mountains of Snow, together produced a scene I never could have imagined" (309). Gillian Beer referred to this passage to demonstrate Darwin's visual and emotive writing style: "Extremes of scale; extremes of silence; extremes of time; ruins and drifts; but no mist: everything clear, intense, profound; and culture and nature equally called in to express that intensity: . . . The sublime here is natural, unpeopled, with a hint of the sacred" (Beer 2009 9).

Wordsworth and Coleridge asserted that imaginative insight was superior to the narrow view taken by many experimental scientists, whose vision lacked depth of creativity and was "superficial. . . the work of an inferior faculty, the understanding rather than the pure reason" (Sharrock 61, 66). In reply, Davy extolled the virtues of the chemist's "active" engagement with nature, while taking swipes at any poet who wrote "simply as a scholar, passive" (Sharrock 66, Davy 319).

Davy asserted that science was the "master" of poetry, arguing that chemistry gave man: "powers which may be almost called creative" (Davy 319). To Davy, scientists had inherited the imagination and spirit of the age, and proved it by delivering practical results as they expanded the boundaries of human knowledge. "He thus directly controverts the argument of Coleridge according to which the pursuit of the exact sciences was bound to be dead and spiritless" (Sharrock 69). Davy argued that scientists were better authorities over the truths of nature than were poets (Ross 39).

Davy used emotive language and metaphors to extol the benefits of scientific study. For example, his "Discourse" promised abundant progress in a scientific future in which "the germs of improvement are sown in minds even where they are not perceived, and sooner or later the spring-time of their growth must arrive," because science would bring "a bright day of which we already behold the dawn" (Davy 322-3). Davy was no Wordsworth, but he used the power of his prose to communicate an expansive vision of natural laws. Wordsworth, in his turn, clearly valued science both to understand the physical workings of nature and to improve the lot of the common man.

During Darwin's key theorizing years of 1838 through 1839, he noted that he read Davy's last book—the posthumously published *Consolations in Travel: or, the last days of a philosopher* (*Notebooks* C:269). There is no definitive record of whether Darwin also read Davy's famous 1802 "Discourse." That work contained several sections which would have interested Darwin in their apparent support for his own project: "Science has done much for man, but it is capable of doing still more. . . and in considering the progressiveness of our nature, we may reasonably look forward to a state of greater cultivation and happiness than that we at present enjoy" (Davy 319).

Davy argued that science would make us "acquainted with the most profound secrets of nature," while he hinted at future discoveries of "general laws" governing both our "physical and moral constitution" (Davy 320). If Darwin read those lines, he might have been inspired. Similarly, the way Davy envisioned scientific laws applying not only to our physical bodies but also to morality could have resonated with Darwin.

"What impresses any reader of Davy's Introductory Discourse is its imaginative breadth, its visionary insight into the potentialities of the new science, and the generous

sweep of its view of human progress" (Sharrock 68). Davy even asserted scientific authority to explain the imagination, in another passage that might have resonated with Darwin:

> The germ of power indeed is native; but it can only be nourished by the forms of the external world. The food of the imagination is supplied by the senses, and all ideas existing in the human mind are representations of parts of nature accurately delineated by memory, or tinged with the glow of passion and formed into new combinations by fancy. (Davy 324-5)

A poet might have a "native" "germ of power," but that germ "can only" grow if planted in "the external world"—Davy's world, and Darwin's world, governed by science (Davy 324-5). To Wordsworth, imagination came from the heart, from inside poets. This was a higher process than the fancy of scientists, which he considered the mere gathering and recombining of bits of information to reach tidy, usually unimaginative, scientific results.

Davy framed the conclusion of his Discourse by asserting the importance of science to his specific public: "to persons of powerful minds, who are connected with society by literary, political, or moral relations, an acquaintance with the science that represents the operations of nature cannot be wholly useless" (Davy 326). This was a contemporaneous description of the audience for which both poets and scientists were competing. As well as forwarding his argument, Davy was making a not-too-subtle appeal to the vanity of his audience, since those who put themselves in the auditorium must believe they have "powerful minds." To these intellectuals, science should seem as important as it did to Davy, or as he put it: "science. . . cannot be wholly useless" (Davy 326).

In Davy's almost fawning compliments to his audience I hear a parallel to past times when a philosopher, writer or artist had to flatter his financial patron in an obsequious dedication. It still took money to do research, but how was one to address an audience of sponsors in this new era when a paying upper-class public had replaced a single royal patron? What seems to modern ears like overblown, obvious, transparently manipulative flattery probably sounded like believable and well-deserved compliments to Davy's self-selected audience. Davy was following the money, while Wordsworth was failing to make the sale. Charles Darwin did not have that same concern about money. One important reason that he was able to spend almost his full time thinking and writing was the unusual financial independence offered by his father.

Much of Davy's "Discourse" had advocated scientism, extolling science's practical role in improving man's lot in the world—from inventing new metals for machines to creating fertilizers for farmers. Without saying it in so many words, Davy trumped the claim of Romantic poets that *they* held the authority to improve man's life. Davy ended his lecture with an optimistic view of the scientist's respect for, and authority over, all facets of nature moving into the future: "From observing in the relations of inanimate things fitness and utility, he will reason with deeper reverence concerning beings possessing life" (Davy 326). Davy's words, about reverent scientists breathing animate existence into life, seemed to foreshadow Darwin's mission. The scientific laws governing the "relations" of the "fitness and utility" of living things were Darwin's focus.

Coleridge was in the audience for that 1802 lecture and certainly informed Wordsworth of his impressions long before the Discourse was printed (Sharrock 65, 69). Wordsworth took note. Sharrock argues that much of Wordsworth's revised *Preface* to

the third edition of *Lyrical Ballads,* published later in that same year, was a direct response to Davy's ideas and most probably aimed at this Discourse (Sharrock 69). "Davy had painted a picture, striking because unexpected and unfamiliar, of a world transformed by a scientist who was an imaginative and humane being, not in the old terminology a mere 'artisan'" (Sharrock 69).

Davy had opened a whole new set of possibilities for men of science in all fields of study and set the tone of a conversation challenging them to rise to a new level of professionalism, soon to be reflected in the name "scientist." Wordsworth too was swayed by his brilliant ex-protégé. Wordsworth's revised *Preface*, while still asserting the preeminence of poetry, "achieves a compromise which is more favourable to the claims of science than any previous pronouncement by him or Coleridge" (Sharrock 69).

Wordsworth now seemed to accept scientists as an important element in the intellectual constellation of the day. But he still asserted a higher priority to poets. In his revised *Preface*, "Wordsworth countered Davy's own remarks about the cultural importance of science by emphasizing the scientist's subordinate position in relation to the poet" (Keen 144). While still placing poetic insights above mere mechanistic science, Wordsworth's response to Davy hinted at a new respect for science. "Their writings form an intriguing dialogue in an important moment in the evolution of the intellectual disciplines" (Keen 144).

While it is impossible to pinpoint the exact reasons that Wordsworth now welcomed scientists into his intellectual company, Davy was more than a facilitator. Sharrock offers this insight into why Wordsworth was attracted to the young chemist: "Davy described nature in terms of active principles: the action of acids, the interchange

of elements in compounds, the electrolysis demonstrated by the galvanic pile of Volta. . . all these demonstrations of energy would appeal to Wordsworth's loving discovery of an 'active principle' in the universe" (Sharrock 75). Catherine E. Ross describes their mutual affinity: "Both Wordsworth and Davy dedicated themselves to searching for and explaining the deep and permanent truths about human nature and the natural world. They shared the conviction that their twin labors could bring pleasure and benefit to all mankind" (Ross 32).

I suggest at least three other factors that might have interested Wordsworth in Davy's writing. Wordsworth may have found himself sympathetic to Davy's arguments that scientists and poets could, indeed, be synergistic partners moving into the future. Wordsworth's personal respect for Davy and his genius may have encouraged a supportive response. And Wordsworth may have deemed it pragmatically unwise to attack Davy and his fellow scientists after they had achieved high public esteem—so a better strategy was to join them.

I would like to draw attention to a section of Wordsworth's famous revisions to his *Preface* that (at least partly) was a reply to Davy—where Wordsworth suggested that poets and scientists shared a similar intellectual *pleasure* from their creative efforts.

> And thus the Poet, prompted by this feeling of pleasure, which accompanies him through the whole course of his studies, converses with general nature with affections akin to those, which, through labour and length of time, the Man of Science has raised up in himself, by conversing with those particular parts of nature which are the objects of his studies. (*LB* 301-2)

This idea of pleasure generated by creative thinking instigated a response from Charles Darwin in his *M Notebook*. Darwin's note will be discussed in a later chapter. It was the interrogation of nature that raised men of science to a level of pleasure close to that of the poets.

> The knowledge both of the Poet and of the Man of Science is pleasure; but the knowledge of the one cleaves to us as a necessary part of our existence, our natural and unalienable inheritance; the other is a personal and individual acquisition, slow to come to us, and by no habitual and direct sympathy connecting us with our fellow-beings. The Man of Science seeks truth as a remote and unknown benefactor; . . . Poetry is the breath and finer spirit of all knowledge. (*LB* 301-2)

Wordsworth laid out the terms of his opposition to science. Scientific knowledge comes slowly and is a personal acquisition, while the finer knowledge of poets is part of their very being.

While Wordsworth still afforded poets a higher position than scientists, he did allow men of science a small share of creativity, nature and truth. Both earn pleasure in their work, but according to Wordsworth the scientist's pleasure is selfishly framed in personal discovery, while the poet finds pleasure in "connecting us with our fellow-beings," a social goal. Poets would welcome the discoveries of scientists and applaud their efforts to make life easier for a "suffering" humanity, but Wordsworth still reserved for poets the "finer spirit of all knowledge" (302).

I mention this section of Wordsworth's revised *Preface* only in its relation to Davy and the changing status of science in the British intellectual landscape. Parts of this

Preface will be discussed further in the next two chapters, specifically in relation to Darwin's project. The *Preface* reflected nineteenth-century anxiety about the place of poetry in a material culture, and was loaded and layered with Wordsworth's claims about poets and scientists.

Wordsworth's famous *Preface* thus seems, in significant part, a response to Davy. The poets' protégé had made some strong assertions about science overriding poetry's authority over nature. It might have been Davy who inspired Coleridge in his desire for Wordsworth to write "the *first* and *only* true philosophical poem in existence" (Coleridge 1817b 254). Coleridge believed that it would take a great poet, like Wordsworth, to develop insights so deeply into nature as to explain man's moral foundation. Coleridge also had a second reason for his request, asking Wordsworth to address the political despair of many Englishmen whose hopes in the rights of man and progressive freedoms were dashed after the French Revolution devolved into Empire. Wordsworth responded to Coleridge by writing *The Excursion*.

When *The Excursion* was first published in 1814, Francis Jeffrey famously began his review with the line: "This will never do!" (Jeffrey). He went on to criticize almost everything about Wordsworth's poem including its length, which was unwieldy even by the standards of its day. I will not repeat the entire history of Wordsworth's ensuing lack of commercial success and eventual climb to popularity.

I will note one section of a contemporary letter from 1817 reflecting the public's conflicted view of Wordsworth, since a young Charles Darwin may have been exposed to conversations similar to its contents. The letter was written by Sarah Wedgwood, an aunt

of both Charles and Emma, and addressed to her sister-in-law Jessie Allen (Emma's favorite aunt).

> We have been reading the new edition of Wordsworth's poetry, in which there are several new things. I like some of them very much, yet I don't know if we . . . have not admired Wordsworth rather above his merits. My present notion is (how surprised he would be to hear that any human being could have such a notion) that he has not understanding enough to be a very fine poet. (Emma Darwin I 109)

While not a favorable letter, it does suggest that Wordsworth was an "admired" topic of conversation among the Wedgwoods. Charles might have heard talk of Wordsworth from his family or the Wedgwood circle, encouraging his reading of that poet. Perhaps he thought the poet was a safe non-scientific topic to discuss with Emma when he courted her during their private fireside "geese" (chats).

At an 1832 meeting of the British Association for the Advancement of Science, Samuel Taylor Coleridge stood up to make a request. He argued that a new title was needed to distinguish serious men of science from amateur naturalists in order to "underline the common enterprise in which astronomers, chemists, geologists, and botanists were engaged" (Yeo 1986 273). The name "philosopher" had worked well when the gathering of knowledge, including natural laws, was mostly a process of reading, contemplation and assumption. By the turn of the nineteenth century, armchair speculators about nature's truths were being superseded by more hands-on practitioners of the sciences.

This new breed of natural philosophers was probing nature's secrets through microscopes, telescopes and experiments, while circling the globe in journeys of discovery. A professional imprimatur was missing to tie together all the scientific disciplines. Also, there was a perceived need to counteract criticism, put forward by Wordsworth among others, aimed at supposed-amateur naturalists and hobbyists who spent their time too narrowly focused, such as on classifying rocks instead of investigating the workings of nature (Yeo 1986 273).

Coleridge's suggestion led to William Whewell dubbing a new word: "by analogy with *artist*, they might form *scientist*" (Whewell 1834 59). Whewell did not make his suggestion at a meeting of a scientific association, but ventured it anonymously in the "Quarterly Review," perhaps pointing to a reticence to take sides in the growing skirmish over authority between philosophical thinkers and experimental naturalists. In that same 1833 article in the "Quarterly Review," Whewell actually asserted the beginnings of a schism already existed between the humanities and sciences: "If a moralist, like Hobbes, ventures into the domain of mathematics, or a poet, like Goethe, wanders into the fields of experimental science, he is received with contradiction and contempt" (Whewell 1834 59).

In Germany, Goethe had struck up a productive friendship with one of Darwin's heroes, Alexander von Humboldt, and the two discussed science and philosophy:

> Goethe was also grappling with [Kant's] ideas of the Self and nature, of the subjective and the objective, of science and imagination. . . . Humboldt had long believed in the importance of close observation and of rigorous measurements—firmly embracing Enlightenment methods—but now he

> also began to appreciate individual perception and subjectivity. Only a few years previously, he had admitted that 'vivid phantasy confuses me,' but now he came to believe that imagination was as necessary as rational thought in order to understand the natural world. (Wulf 36)

Reading of Humboldt while at Cambridge is credited with being an important reason Darwin became inspired with the idea of taking his own journey of discovery (Desmond 1991 91). Darwin took Humboldt's *Personal Narrative* on the *Beagle* and wrote in his diary "Humboldts glorious descriptions are & ever will be unparalleled" and about the "rare union of poetry with science which he so strongly displays" (C. Darwin 1988 41). Humboldt's writing was infused by with German Romantic visions of nature, in something of a parallel with Davy and Wordsworth. That was a time when poets and scientists learned from each other.

It is not incidental that Coleridge, a poet (and serious amateur chemist), had received a fair hearing at a meeting of a scientific association (albeit one that was open to all). It was Whewell, a Cambridge professor and scientist, who responded. This suggests that although a split between the sciences and the humanities may have already begun, the schism was not yet wide. That is, even after Darwin returned from the *Beagle* in October 1836, science and poetry still enjoyed a richer and more complementary relationship than they do today. The fact that it was Coleridge who bemoaned the lack of a separate classification for a "scientist" argues that the thoughts of such poetical chemists were still considered seriously by most men of science.

Not all "scientists" approved of the new name, or what it implied. Adam Sedgwick was still disturbed in 1840 when he wrote of the title: "better die of this want

than bestialise our tongue by such barbarisms" (Wyatt 6). Perhaps Sedgwick thought that such a radical split between the intellectual pursuits of the humanities and sciences would diminish them both. "There is a message for succeeding historians: our assumption of two separate worlds of science and philosophy was far from commonly accepted" (Wyatt 6). My point is that in Darwin's era a serious scientist would not frown at poetic insights, and would not believe that "the creative procedures of art . . . are absolutely different from, alien to, those of science" (Dale 7).

The creation of the word "scientist" occurred in 1833, while Darwin was on the *Beagle*. So when Darwin set out on that voyage in December 1831 the word scientist was yet to be dubbed, yet when he returned he *was* one. Darwin may have noted this as one of many important transitions marked by his trip. There was more than a new name at stake here. There was the question of acknowledged authority over nature—and the money and respect that came with such authority. Whewell's dubbing of the term "scientist" may actually have accelerated the developing schism by putting a fine point on it.

Adam Sedgwick played another part in this story. During the summers of 1823 and 1824, Sedgwick brought Wordsworth up to date on the latest geological theories while they walked together around the Lake District. Sedgwick was 37 in 1823 when he first hiked with Wordsworth, who was then 54. Sedgwick's stature in geology was similar to Humphry Davy's in chemistry. Sedgwick was brilliant, young, loquacious, eminently respected, and deeply religious. He was a rising star at Cambridge, where he had been appointed Woodwardian Professor of geology in 1818. He later served as President of the Geological Society of London, from 1829-31. Wordsworth had published *The Excursion* about nine years before the two men went on their walks.

Sedgwick's field notes and letters about his hikes with Wordsworth mentioned long, friendly, wide-ranging discussions (Wyatt 76). Later in Sedgwick's life he reminisced in a letter to Wordsworth: "Some of the happiest summers of my life were passed among the Cumbrian mountains, and some of the brightest days of those summers were spent in your society and guidance" (Clark I 247-8). Wordsworth's hikes with Sedgwick not only point to the poet's interest in the latest scientific ideas but also offer a possible link to Darwin.

Charles Darwin walked with Sedgwick too, while getting a crash course in geology during a tour of Wales in 1831. This was just before Darwin's excursion on the H.M.S. *Beagle*. Darwin later wrote about this time with Sedgwick in a letter to Henslow from the *Beagle* in Rio de Janeiro in 1832: "Tell Professor Sedgwick he does not know how much I am indebted to him for the Welsh Expedition.—it has given me an interest in Geology which I would not give up for any consideration" (*Correspondence* I 238).

At least one Wordsworth scholar, Marilyn Gaull, believes that Sedgwick recommended that Darwin read *The Excursion* (Gaull 37). Based on the time Sedgwick spent with Wordsworth and Darwin, Gaull asserts that "Sedgwick encouraged [Darwin] to read Shakespeare, Milton, and Wordsworth, in the years from 1837-1839, the years Darwin was . . . searching for a synthesis that was to be published as the *Origin of Species*" (Gaull 37). But there is no hard evidence to back up such an assertion. Darwin hiked with Sedgwick in 1831 and probably did not read *The Excursion* until July 1838, seven years later. That is, Darwin hiked with Sedgwick *before* the *Beagle* voyage but did not read *The Excursion* until *after* his return.

Wordsworth's rising popularity could have been reason enough for Darwin's initial reading. By 1836, when Darwin returned to England from the *Beagle* voyage, Wordsworth's fame was in ascendance. That year *The Excursion* was re-published, not only in a one volume edition but also as part of a six-volume compendium of Wordsworth's poetry (Wordsworth 2007 26). During Darwin's two busy theorizing years after the *Beagle*, Wordsworth was finally receiving the acclaim he merited. For example, the 1837 and 1838 editions of *Blackwood's Magazine* contained numerous mentions of Wordsworth, including the following from January of 1837—an edition Darwin might have read at the Athenaeum during one of his first visits to that revered club.

> We remember the time when Wordsworth was an obscure man. The world knew not of him—nor would listen to his voice.
>
> "*Now are his brows bound with victorious wreaths*;"
>
> . . .
>
> Of all poets that ever lived he has been at once the most truthful and the most idolizing; external nature from him has received a soul.
>
> (*Blackwood's* 1837 120, quoting Shakespeare *R3* 1.1 5)

By 1837 Wordsworth's poetry, with its soulful insights into nature, was receiving critical and public acclaim. (Gill 18, Desmond and Moore 1994 94).

Magazine articles mentioned Wordsworth in the same breath as Shakespeare and Milton, while *The Excursion* was considered a classic that one should be able to quote from memory, as in this somewhat tongue-in-cheek accolade: "for with shut eyes we can read *in to ourselves* the Paradise Lost, and *The Excursion*, and the Fairy Queen, and the Tempest, in editions out of print, and that we never saw" (*Blackwood's* 1837 276). Of

course, not all critics believed that Wordsworth had surpassed Milton. In 1840, Leigh Hunt wrote of him: “Compared to Milton he is but a dreamer in the grass, though a divine one” (1840 54).

By that point in time, Hunt seemed to be in the minority. In an 1838 edition of *Blackwood’s*, *The Excursion* was mentioned more than a dozen times. A Darwin notebook entry suggested that he had read at least part of that exact magazine. In September 1838, Darwin cited an article on animal consciousness from that very issue: “Paper on consciousness in Brutes & Animals. In Blackwood’s Magazine June. 1838” (M 155). As well as being another possible recommendation for Darwin to read *The Excursion* (the first or second time), this article points to Darwin’s interest in tracing the material roots of the human consciousness (perhaps the basis of creativity) to lower animals.

The M Notebook reference to *Blackwood’s Magazine* came immediately after several pages of Darwin’s speculation on topics that were also at the heart of *The Excursion*, including the mind, morality and the Creator. Although as already noted, Wordsworth’s strong spirituality would have made him disagree with Darwin’s materialistic conclusions. Darwin conjectured:

> May not moral sense arise from our enlarged [thinking] capacity [. . .] giving rise to ‘do unto others as yourself [. . .] ? May not idea of God arise from our confused idea of “ought.” joined with necessary notion of “causation”, in reference to this “ought,” as well as the works of the whole world. (M 150-1)

Here Darwin was considering that God-thoughts arose in man as an idea born of our need to posit causes in the world. Darwin turned around the normal view that conscience was a creation of God, to the possibility that God was a creation of conscience, our "ought."

This was another demonstration of one of the values of Darwin's notebooks, especially the "Private" M-N series. Darwin's jottings were as close as one could get to his unguarded thoughts, although the fact he started dating them may suggest (among other reasons) that he suspected that they might be read one day.

One should be careful not to read too much into Darwin's materialist speculations. They do not necessarily mean that Darwin was an atheist at that time, but that he felt it imperative to follow *all* lines of speculation, wherever they led, without letting any preconceived ideas stand in his way. Almost in the style attributed to Descartes, Darwin doubted everything until he arrived at what he thought was the truth. He followed each stream to its conclusion, some to peter out and some to deliver rich possibilities.

More important to this study than why Darwin first picked up *The Excursion* is why he gave that long poem a second reading. "Why such Englishmen like Sedgwick, Darwin and Ruskin were impressed by *The Excursion* is still a mystery to me; but they were" (S. Cannon 8). This modern discounting of the importance of *The Excursion* seems to parallel a similar difficulty to understand the way science and poetry were so closely related in the 1830s. Today's almost complete separation of serious science from poetic art did not exist during the two years of Darwin's post-*Beagle* theorizing. Wordsworth's "poetry became a remarkable source of authority among intellectuals who contributed to the formation of a literature of science. . . . [T]he dominant view of Wordsworth among

the emergent profession of scientists in the 1820s and 1830s was that his poetry re-inforced science's support for Christian revelation" (Amigoni 58).

Darwin's interest in *The Excursion* may have been for more than just entertainment. Men of science still saw themselves as drawing upon comparable imagination as did philosophers, artists, and poets. Charles Darwin's grandfather, Erasmus, may have been one of the last intellectuals to achieve public success while merging all those disciplines. The fact that Erasmus Darwin was purported to be an early hero to Wordsworth and Coleridge is not incidental to my argument. As a man of his time and place, Charles Darwin may have expected to find value (including scientific value) in Wordsworth's poetry. Gillian Beer points out that the scientists of Darwin's era "were reluctant to allow writing on scientific issues to remain on the linguistic periphery. They thus claimed congruity with poetry, perceived as the authoritative utterance within the current language" (Beer 1990 83).

In *Leviathan and the Air-Pump,* Steven Shapin and Simon Shaffer trace the tension around scientific authority back in time, beyond even the founding of the Royal Society in 1660. They argue that in its early days, even the vaunted Royal Society often bestowed legitimacy on questionable science, more by Royal fiat than by repeatable experiment. It took many years of struggle before scientific authority became something that was earned by careful observation, research and repeatable experiment, rather than by thought experiments of armchair natural philosophers in the style of Plato. The history of accepted scientific theorizing is important to help frame Darwin's concerns while he developed his own theory.

The implications of the new professional category, scientist, did not immediately change the culture of the practitioners of scientific inquiry. “The position of the aesthetic continued, in the immediate aftermath of the romantic movement, to be a matter of immense concern to scientific thinkers” (Dale 7). Poets and men of science often enjoyed an uneasy truce, but some achieved a truly symbiotic relationship—as perhaps it was for Darwin with Wordsworth. One could say that Darwin left on the *Beagle* as a natural philosopher, and returned a scientist.

This chapter has examined the rich history of poets and scientists working together and in competition during the era into which Charles Darwin was born. It has also noted the diminishing but still potent authority of natural theology. The right to interrogate and report the truths of nature and man was not always in the hands of professional men of science. Darwin lived during a time of transition from a view of nature defined by philosophy, religion and poetry, to one ostensibly based on objective science. The rival views of nature still permeated Darwin’s upbringing, and the way he thought, worked and wrote. It was a time of poet-scientists, like his grandfather Erasmus and Humphry Davy, and of scientist-poets like Coleridge, and to a certain extent Wordsworth.

While much has been written about the shift of authority over nature from philosophers and poets to scientists, little has been said about the effect that transition may have had on Darwin’s effort to unravel the species problem. The way science and poetry were entangled was more than just an influence on Darwin’s creativity, it was part of the fabric of how he viewed the world. We have seen that Charles Darwin was born when Wordsworth’s poetry was at a low point of popularity, while the importance of

science was ascending. Darwin was the son of a doctor and grandson of a poet-scientist-doctor, and became enthralled with science as a youth while still revering Milton. Science and poetry were not yet the distinct disciplines they are today.

During that time of transition, Wordsworth still talked about poetry as a necessary adjunct of science, or more often of science as an accepted accessory of poetry. The way science was viewed and pursued at that time, as both partner and rival with poetry, was woven into Darwin's culture and upbringing. The dynamic interplay between science and poetry infused his thinking as he worked toward a solution to the species problem.

Chapter III

The Excursion, Wordsworth's Poetry and Science:

On Man, On Nature, and On Human Life

Our Origin, What Matters It?

This chapter will look at some similar themes in Wordsworth and Darwin. No unambiguous evidence exists to prove Wordsworth's influence on Darwin. But Darwin's boast of twice reading *The Excursion*, and the two mentions of Wordsworth in Darwin's notebooks, suggest that intriguing hints and parallels exist. I will note possible resonances with Wordsworth in Darwin's writing. I will focus on themes that concerned both the poet and the scientist.

[1] Darwin was considering the emotion of pleasure in notebook musings both times that Wordsworth's name appeared (M 40, N 57). Wordsworth wrote about the importance of pleasure in his *Preface* to *Lyrical Ballads* as well as in *The Excursion*.

[2] Wordsworth's verses sometimes hinted at the scientific concerns on which Darwin was theorizing, from extinction to adaptation, offering interesting parallels.

[3] The sublime and the beautiful formed a duality and a tension considered by both men.

[4] The meanings behind life's inexorable trials and tragedies were important for different reasons to the poet and the scientist.

[5] Wordsworth introduced *The Excursion* as a study "*On Man, on Nature, and on Human Life*," which were at the core of Darwin's concerns (emphasis his, *Excursion* Prospectus 1).

[6] Wordsworth repeatedly explored morality and emotionality (including despondency), character traits that Darwin often interrogated in his notebooks.

[7] Origins held an ambiguous place in Wordsworth's poem, which might have suggested to Darwin a different frame for that important subject.

The previous chapter argued that in Darwin's time, science and poetry were not the distinct disciplines that they are today. It was not surprising to find poets, philosophers, novelists and theologians speculating into the science of nature. It was also not surprising that their language for science seems less precise and more literary or metaphorical. Darwin was accustomed to the language used by diverse asserted experts of nature. He searched for information in all his reading, in the seeming minutia of nature, and under metaphorical rocks where others might not have ventured to look.

Darwin's writing, from his *Beagle* diaries through his notebooks and books, was both informed by his voluminous reading and sounded more like literature than what we now consider science (Beer 1983 46, 1985 546-9, 2009 9-10). Metaphors can do more than just describe what is going on, they can open new perspectives for understanding the world and deliver valuable insights. Darwin's literary style, in his notebooks and early writing, offers intriguing insights into his method of theorizing. Wordsworth was just one piece of Darwin's cultural immersion, but important enough to receive mention in his notebooks and *Autobiography*.

Many people think of Wordsworth only as the poet of the daffodils. But that happy springtime image was the exception. Most of his poetry was brooding, fascinated by suffering, decay and death. Wordsworth was the poet of being, of existence. He was

also the poet of non-being, the non-being that surrounds being as life is surrounded by death.

The previous chapter touched on Darwin and Wordsworth's untraditional views of religion. Wordsworth's unconventional faith may have been one reason why he delayed publishing his great work, the *Prelude*. Wordsworth wrote the *Prelude* between 1799 and 1805, but it was not published until 1850.He might have delayed publication to avoid more charges of atheism, an accusation he had faced both publicly, from critics like Jeffrey, and privately from friends like Coleridge (Gill 170). In *The Excursion*, Wordsworth's writing reflected the skepticism and doubts of a deeply religious man, conflicting sentiments to which Darwin was exposed.

In the Preface to *The Excursion*, Wordsworth informed his readers that it was planned as the middle of three parts of a longer work, the *Recluse*. He also noted that he had already completed the first part, a biographical "preparatory Poem," which was the *Prelude* (Preface 29). The *Prelude* and *The Excursion* "have the same kind of relation to each other . . . as the Ante-chapel has to the body of a Gothic Church" (Preface 32-4).

One important insight into man and nature in the *Prelude* occurs during Wordsworth's hiking trip to the Alps, when he eagerly anticipates reaching the highest point on Mont Blanc. Falling behind, with the guide out of sight, he reaches a stream: "The only track now visible was one / That from the torrent's further brink held forth / Conspicuous invitation to ascend A lofty mountain" (*Prel.* VI 157-8). But he soon realizes that it is the wrong path and asks directions of a peasant, only to be told that he has missed the mountain's peak and is now on his way down. He has passed his goal unnoticed.

Wordsworth takes great pride in his insightful vision of nature, and has an epiphany realizing that even while looking most carefully, he cannot see. In the grip of powerful emotions, in a "gloomy state," his imagination looses a revelation of nature's impenetrable truths, vicious power and organic change (VI 161).

> . . . . . The immeasurable height
> Of woods decaying, never to be decayed,
> The stationary blasts of waterfalls,
> And in the narrow rent at every turn
> Winds thwarting winds, bewildered and forlorn. . . (VI 161)

His plans are thwarted by his own insufficiencies, reflecting a vision of nature's mysterious decay and bewildering blasts. He then hints at tensions in oppositions, creation in destruction:

> Tumult and peace, the darkness and the light—
> Were all like workings of one mind, the features
> Of the same face, blossoms upon one tree;
> Characters of the great Apocalypse,
> The types and symbols of Eternity,
> Of first, and last, and midst, and without end. (VI 161)

From apocalypse to eternity, "blossoms upon one tree" offers an encompassing ecological vision that includes first and lasts (origins and extinctions), but no end to nature's evolving cycles of life.

Wordsworth's ideas from the unpublished *Prelude* informed *The Excursion*. Alison Hickey notes that Wordsworth wove a questioning of the foundation of reality

into the background of *The Excursion*, intending it to unsettle, disturb and surprise (Hickey 25-8).

> At stake, the poem intimates, is nothing less than 'life' and 'death. ' . . . What is 'life?' Where does it reside, on which side of the grave? Is it to be found in the wandering narrative, or in eternal repose? . . . These are rhetorical questions about how to read the forms of things in *The Excursion's* figurative landscape. (Hickey 28)

Milton's unsettling landscapes also figured large in *The Excursion* (Hickey 27-8). *Paradise Lost* was one of the few books Darwin took on the *Beagle*, carrying his well-worn copy on land excursions. Darwin would have noticed Wordsworth's Miltonian allusions.

Milton was one more link between Wordsworth and Darwin. Wordsworth's ambition to be Milton's heir was widely noted even in his own day, for instance by Coleridge and Hazlitt, and has been the subject of much scholarship in the years since (Bloom, Harman, Lyon, Crawford). It was an ongoing trope of British literature that every exciting new poet aimed and claimed to be Milton's heir (Crawford). Wordsworth stands out in that tribe, upsetting many critics as well as (eventually) garnering a growing number of supporters to his Miltonian claim (Crawford). "Wordsworth's Prospectus [to *The* Excursion] declared his intention to surpass Milton" (Crawford 118).

Harold Bloom suggests that the prospectus to *The Excursion* is "as much a reduction of Milton as it is of Wordsworth" (Crawford 125). There is intentional Miltonian ambiguity in the first few pages of *The Excursion,* as shifting shadows intersperse with solidly fixed points of view intended to disrupt the reader's confidence in

conclusions about the author's meaning, foreshadowing more disturbance to come (Hickey 25-7). "Even before the outlines of character come into focus, this rapid proliferation of perspective inaugurates the decentering impulse that motivates the poem as a whole" (Hickey 26). The poem was complex and destabilizing, offering no simple answers—just like nature.

If Darwin knew little about *The Excursion* when he first picked it up, Wordsworth explained in the Preface that he planned that work as a major "philosophical poem, containing views of Man, Nature and Society" (*Excursion* Preface 26-7). As noted in the last chapter, at that time the word "philosophical" included much of what today is called science, as well as philosophy. Wordsworth was proposing that he, a poet, could offer deep insights into all areas of knowledge about the workings of the world. Explaining the workings of the world was also Darwin's project.

There is some question if Darwin had read any Wordsworth before *The Excursion*. Darwin kept extensive lists, sometimes called his reading notebooks, in which he recorded reading a six volume edition of Wordsworth in 1840 to 1841—which is after the time frame under consideration (*Correspondence* IV 463-4). But as Gillian Beer points out about Darwin's reading lists: "It is important to emphasize that they do not provide a complete record of Darwin's reading, though they are very extensive and impressively polymathic" (Beer 2009 19). For instance, Darwin's reading notebooks do not specifically mention *Lyrical Ballads* or its famous *Preface* until 1840, a year in which "Wordsworth is a persistent presence" (Beer 2009 21). But Darwin's two notebook references, ostensibly to the *Preface*, predate those readings.

Beer points out that based on several bits of evidence, including a notebook entry quoting Coleridge's *Zapoyla*, Darwin probably read an 1829 compilation of poetry by Coleridge, Shelley and Keats (Beer 2009 19-20, M 88). Neither that book, nor any Wordsworth, was mentioned in Darwin's reading lists of that time. As secondary proof of Darwin reading Keats, Beer cites a letter received on the *Beagle* from Darwin's Cambridge friend Herbert, which quotes a verse from Keats as one of Darwin's favorites: "Heard melodies are sweet, But those unheard are sweeter" (Beer 2009 20, *Correspondence* I 223, Keats 461 11-2).

Sweet unheard melodies hint at Keats's idea of "Negative Capability, that is when man is capable of being in uncertainties, Mysteries, doubts, without any irritable reaching after fact & reason" (Keats 109). Such written uncertainties force readers to work, speculate and use their own minds' excursive powers. If truly among Darwin's favorites, the possible implications to his thinking style are intriguing. Those lines from "Ode to a Grecian Urn" are offered by a speaker looking at the design on a piece of pottery. Among many themes, that poem speaks of life and death, of life suspended in a moment of unconsummated love in tension with beauty that will never die, offering a promise frozen on a vase. "She cannot fade, though thou hast not thy bliss, / For ever wilt thou love, and she be fair!" (Keats 461 19-20).

Keats wrote about negative capability in a letter of December 1817, using Coleridge as an opposite example (109). A month later, Keats noted that he heartily approved of *The Excursion*, calling it one of the "three things to rejoice at in this Age" (Gill 2003 13, letter to Haydon 11 January 1818). *The Excursion* certainly rewarded

listening for sweet, unheard melodies. In fact, unheard melodies make a good metaphor for the suggestions of influence that I will be offering between Wordsworth and Darwin.

The question of influence is at the heart of my project, yet it is hard to establish. Without proof, such a copy of Wordsworth with Darwin's margin notes, the best we can do is look for parallel interests and resonances of themes. We do know that Darwin was a sophisticated reader, a lover of Milton, and a devourer of all types of writing. In Wordsworth, Darwin found reflections on nature with layers of meaning, cultural references and innuendos—perhaps including mysterious uncertainties. Darwin may even have noticed resonances of his scientific concerns that were unintended by the author.

When Wordsworth spoke, for instance, about the natural theological idea of adaptation, or used an argument from theodicy to sooth the despondent Solitary about a life tragedy, Darwin would not have been restricted even to Wordsworth's meanings. Darwin's own thoughts were ranging in different areas than Wordsworth's about the possibilities of adaptation, and the forces behind nature's unfathomable destruction. As Michel Foucault pointed out in "What Is an Author," once words are published they are free to take on other meanings that may not have been intended by the author (Foucault).

In looking for parallel thoughts and hints of possible influence from the poet to the scientist, I am also following the leads of Desmond King-Hele, Gillian Beer and David Amigoni (among others). King-Hele cites specific passages in asserting that Erasmus Darwin's work influenced Wordsworth, Coleridge, and many other writers (1986, 1988). Gillian Beer suggests connections from particular verses of Wordsworth's to Charles Darwin's writing, but bases her arguments on thematic similarities and parallels more than on assertions of the direct influence of specific words and ideas

(1983, 1985, 2009). David Amigoni presents many cultural forces working on Darwin, and also argues for the possibility of Darwin's "counter-reading" of Wordsworth (91). For instance, he suggests that some of Wordsworth's religious arguments might have encouraged contrary reactions in Darwin, such as to look for materialistic explanations.

King-Hele offers substantive evidence of the influence of Erasmus Darwin on Wordsworth, whose relationship was quite different from the situation between Wordsworth and Charles Darwin. Wordsworth had often mentioned his interest in Erasmus Darwin's writing. Wordsworth asked a friend for a copy of *Zoonomia,* which he received while writing *Lyrical Ballads* (King-Hele 1999 318). King-Hele links nine of Wordsworth's poems in *Lyrical Ballads* directly to Darwin, persuasively showing overlap in many similar words, phrasings, and themes (1999 318). Wordsworth even noted that "Goody Blake" was based on a story in Darwin's *Zoonomia* (*LB* 325).

King-Hele states that some of Wordsworth's belief in the importance of pleasure can be traced to Darwin's poetry (1986 104, 278). Darwin had formulated the idea of an increasing sum of pleasure over time throughout nature, suggesting that when happy plants die they increase the sum of happiness by pleasing worms. "Shout round the globe, how Reproduction strives / With vanquish'd Death,—and Happiness survives" (*Temple of Nature* 1803 IV 451-2). While Wordsworth may have been encouraged by Darwin, pleasure was a ubiquitous topic in the era of Jeremy Bentham's Utilitarian principal of "the greatest happiness of the greatest number" (Bentham 32).

King-Hele asserts connections in other poems that seem more tenuous, such as when he traced Wordsworth's idea of the sublime to Darwin: "A less obvious example is 'Tintern Abbey.' It is from the section 'Of Reverie' in *Zoonomia* that Wordsworth took

his central idea of uniting animal pleasure in nature (the ‘glad animal movements’) with the tranquil recollection of images of natural objects, to create ‘a sense sublime’" (1999 318). King-Hele suggests other similarly fragile associations. For instance, he writes: “The ‘message’ in ‘The Tables Turned was ‘to 'quit your books' and 'let Nature be your teacher.' Darwin had, in a sense, already taken this advice ten years before: the word book does not appear in . . . The Botanic Garden; instead he tries to teach us all about Nature" (1986 75). The fact that Erasmus Darwin did not use the word “book” in *The Botanic Garden* is far from proof that Wordsworth’s “Tabled Turns” was influenced by Darwin.

Perhaps King-Hele is on somewhat firmer ground when he suggests that: "Wordsworth drew confidence from Darwin's great success with a poem about nature and adopted Darwin's idea that plants feel” (75). Suggesting that plants can feel would have resonated with Wordsworth’s view of nature, while Charles Darwin pursued this further in his considerations of phototropism and insectivorous plants.

Many of King-Hele’s arguments connecting Wordsworth to Erasmus Darwin appear quite strong. Others seem unsubstantiated, such as the roots of Wordsworth belief in the importance of pleasure, his sense of the sublime, or his disdain of over-bookishness. I agree that there are hints of influence, but am skeptical of several of King-Hele’s assertions of direct connection—although there is no way to negate them. The examples in the last few paragraphs point to the difficulty of attempting to make such linkages.

Influence is hard to define, and often harder to prove. Gillian Beer does not speak of influence as much as note how Darwin: “ransacks his reading and explores even

seemingly absurd possibilities in the adventure of mental exploration" (2009 8). Instead of asserting influence, Beer took great care to point out the wide variety of ideas to which Darwin was exposed: "His reading gave him access to a range of alternative understandings; these ranging alternatives were particularly needed by an imagination that thrived on abundance and diversity, and which was to make abundance and diversity essential constituents of his theory" (1985 544).

The very diversity of Darwin's reading makes it harder to assign influence to any one source. Beer's more figurative approach allows her to suggest a parallel between the range and diversity of Darwin's reading, and the importance of "abundancy and diversity" in his theory (1985 544). Here Beer may be taking liberties with different definitions of the word "diversity"

Beer notices parallel ideas in the writings of Wordsworth and Darwin, suggesting inspiration without asserting influence. She looks at *The Excursion* and points to some themes that Darwin shared—leaving the question of influence to the reader's judgment:

> In the Preface to the poem, Wordsworth said that he sought to convey 'to the mind clear thoughts, lively images, and strong feelings.' Darwin's enjoyment of extreme experience was tempered by his feelings also for the particular, the humdrum, and by his recognition—crucial to his theory—of ordinary diversity. . . . This emphasis on the sheer availability of enlarged insight through the medium of the ordinary is shared by Wordsworth and Darwin. (2009 22)

Beer notes that they "shared" certain interests, such as the importance of ethics. "Much of what drew Darwin to the poem, and the reason that he read it more than once, may well

have been that he there found confirmation for the ethical character of his explorations, in quite another form" (22). The possibility of sharing interests and finding confirmation are less emphatic than assertions of direct influence.

Beer also suggests that when Darwin read something he did not like, he sometimes reacted with contradictory thoughts: "Indeed, difficulty, distaste and even boredom . . . may lead to a more sustained brooding on the problem" (1985 547). That is, Darwin could respond with "alert skepticism," in a style that Beer characterizes as "dialectical reading" (547). "His own style is full of questions and exclamations, enthusiastic rebuttals and problem-raising queries" (547). David Amigoni similarly proposes that Darwin found value in "counter-reading" of some of Wordsworth's passages (91).

In that vein, some of Wordsworth's imaginative representations of a theologically influenced nature could have provoked productive rebuttals from Darwin. Many of Darwin's margin notes show him reacting with unguarded anger to flagrant examples of natural theology masquerading as science, such as in his abstract on Macculloch (*Notebooks)*. Darwin did not have to agree with what he was reading to be moved to think. Some of his most important conclusions may have been initiated by strong disagreement. While he did not expect Wordsworth's poetry to take a scientific view of nature, some of the religious underpinnings of *The Excursion* might have stimulated the dialectical energy for productive counter-readings.

While Darwin read *The Excursion* twice during the two years after the *Beagle* voyage, proving *exactly* when he was reading it is more problematic. Darwin kept extensive and detailed reading lists, but that Wordsworth poem is tantalizingly absent

during that period. Thus, it is impossible to compare specific sections of Darwin's notebooks to Wordsworth's poem, beyond two direct mentions.

The first was between the 15th and 22nd of July 1838, in a notebook entry Darwin made while visiting his father before an anticipated call on Emma Wedgwood (M 40). In his diary, Darwin confessed that he was "Very idle" during this visit, perhaps pointing to the fact that he "Opened note book connected with metaphysical enquiries" (Darwin in de Beer 1959 8). But perhaps he would have considered the time spent on poetry to be idleness, since probably he was still at Shrewsbury when he referred to Wordsworth. The M notebook was the one he "opened" there, and the pages leading up to that mention of Wordsworth cover a diversity of ideas surrounding pleasure, one of Wordsworth's recurring themes.

The second reference of Wordsworth was in the N notebook, dated the 27th of December 1838 (N 57). Immediately before mentioning Wordsworth, Darwin had been considering fear in man and animals, as well as "joy & OTHER EMOTION" (N 57). Darwin then suggested: "there are some notes" in "Wordsworth's dissertation on Poetry," which seem to suggest his *Preface* to *Lyrical Ballads* (N 57, fn 2, *Preface*).

That was written approximately two months *after* Darwin had excitedly penned his discovery of natural selection on the 28th of September in his "Malthusian epiphany" (Kohn 1975 136, D 134-5). Malthus's *Principle of Population* is generally believed to have given Darwin an insight into the enormous pressures of nature's competition for scarce resources, which only allowed the fittest individuals to survive. Darwin, searching for the powerful mechanism behind species change, now framed it as nature's selection, similar to how breeders select the best cattle. Reading Malthus's book on political

economy and nature's many checks to overpopulation inspired Darwin's metaphor of "a force like a hundred thousand wedges [. . .] thrusting out the weaker ones" (D 135).

Darwin's focus on an unremitting nature was tied into origins, including the origins of man's intellectual and mental attributes, morality, faith and beauty. The notebook entry with Darwin's December 1838 mention of Wordsworth included a reference to: "Burke's essay on the sublime & Beautiful" (N 57). Nature's distresses and beauty figured large in those notebooks.

As already mentioned, Darwin read omnivorously and eclectically. Books used for his science were considered "tools for use" while those "not used for work were read for relaxation or amusement" (Secord 2000 427-8). Amigoni proposes that reading "Wordsworth was neither exclusively pleasure, nor exclusively work," but perhaps a little of both" (Amigoni 90). He also suggests that Darwin read parts of *The Excursion* "in the way that he might have read notes and glosses by a naturalist or ethnographer," enjoying the writing while open for insights (Amigoni 90).

I agree that Darwin did not read Wordsworth purely for pleasure, as he might have read Dickens. But I doubt that Darwin read Wordsworth quite as earnestly as he did the naturalist Humboldt. While it is impossible to tell exactly how seriously Darwin took Wordsworth's insights into man and nature, there are enough parallel interests to make speculation worthwhile.

Wordsworth asserted that in *The Excursion* readers could find a "system," something akin to a unified poetic/scientific vision (*Excursion* Preface 51). That system would help them better understand the world and their place in it by "conveying to the mind clear thoughts, lively images and strong feelings" (*Excursion* Preface 53-4). To a

man of science, the idea of "clear thoughts" may have pointed to a scientific view, while "lively images" hinted at poetry. The origins of "strong feelings" were repeatedly investigated by Darwin in his notebooks, as well as being at the heart of Wordsworth's declared poetic goals in his revised *Preface* to *Lyrical Ballads*.

The Excursion repeatedly presents Wordsworth's view of man facing a world of unremitting pressures both physical and emotional. Wordsworth declares his sensitivity to human suffering, how he: "*Must hear Humanity in fields and groves / Pipe solitary anguish; or must hang / Brooding above the fierce confederate storm / of sorrow . . .*" (emphasis his, *Excursion* Preface 78). Wordsworth hoped that *The Excursion* would offer solace:

> *—Of Truth, of Grandeur, Beauty, Love, and Hope—*
> *And melancholy Fear subdued by Faith;*
> *Of blessed consolations in distress;*
> *Of moral strength, and intellectual power;*
> *Of joy in widest commonalty spread . . .*
> (emphasis his, *Excursion* Preface 14-8)

Wordsworth offered Faith as one of five ways to subdue life's upsets and unremitting devastation. He also called on "blessed consolations . . . moral strength . . . intellectual power, [and] . . . joy" (15-8). The faith could be religious, or faith in man's intellectual power, or faith in beauty and love. The characters in *The Excursion* often called on faith to deal with nature's challenges. While some seemed to represent doctrinaire religious beliefs there usually appeared to be undercurrents of religious doubt, either explicit or implicit.

One could argue that Wordsworth's frequent mentions of the importance of faith and moral strength could have stimulated Darwin to Amigoni-like counter-readings of lines like "melancholy Fear subdued by Faith" *Excursion* Preface 15, 17). Wordsworth's repeated undermining of traditional doctrinaire religious explanations might have encouraged secular scientific responses. While I think it is probable that verses in Wordsworth occasionally encouraged counter-readings from Darwin, I find it impossible to assert any specific instances. One cannot identify exactly what instigated Darwin's several speculations on the roots of human fear, such as: "Fear must be simple instinctive feeling" (M 53).

While reading Wordsworth, Darwin was theorizing about the mechanisms behind species transmutation, of both the physical and mental attributes of all living forms. He was searching for specific natural forces that could explain and connect sexual variation, adaptation, heredity of changing traits, species extinctions and origins, and geographic distribution of flora and fauna. Wordsworth sometimes touched on topics parallel to those at the heart of Darwin's scientific theorizing, although for very different reasons, as in these verses about the emigration of British colonists.

> The will, the instincts, and appointed needs
> Of Britain, do invite her to cast off
> Her swarms, and in succession send them forth;
> Bound to establish new communities
> On every shore whose aspect favours hope
> Or bold adventure; promising to skill
> And perseverance their deserved reward.

. . . . . .

Even ‘till the smallest habitable Rock,

Beaten by lonely billows, hear the songs

Of Humanized Society. (*Excursion* IX 378-84, 389-91)

The emigrants were driven by their “appointed needs” to encroach on territories of less-endowed competitors, until every habitable niche, even the “the smallest habitable Rock.” was exploited in their diaspora (IX 378, 389). These verses touched on several topics that would also be of interest to Darwin, including instincts, needs, population pressures, competitive advantage and geographic distribution.

Thoughts about geographic distribution abound in Darwin’s notebooks, with references to Buffon among others (B 81, 192, C 24, 268, D 40, etc.). At the beginning of 1838, Darwin considered that geographic distribution might be based on the idea of “centers of creation,” a theory Lyell credited to Linnaeus (*Notebooks* B 155 fn1 quoting Lyell 1837 81, Lyell 1853 612-29). Lyell suggested that species originally were created in antiquity at particularly fertile spots, and then moved out from there as the earth became more habitable.

Darwin tried to match this idea to some of his own speculations that isolation (as on islands) somehow encouraged the generation of new species: “If species made by isolation; then their distribution (after physical changes) would be in rays— from certain spots. — Agrees with old Linnaean doctrine & Lyells. to certain extent” (C 188, probably written between 10/1837 and 2/1838). Wordsworth’s verses about British emigrants posited some parallel thoughts of English swarms distributing in rays. Wordsworth continued that such emigration was “a grateful tribute to all-ruling Heaven. / From

Culture, universally bestowed / On Britain's noble Race in freedom born" (IX 393-5). Wordsworth's tribute to heaven may have only been a gesture to counteract his more naturalistic humanism, but it was hard to avoid the natural theological beliefs that underpinned many culturally accepted beliefs, either in reading or in writing.

Wordsworth talked about adaptation from the culturally predominant view of natural theology, as did many writers of that day. The fact that different species survived in so many harsh environments around the globe was considered a proof of the perfection of God's plan of creating species perfect to each location. "Used in this way, the idea of perfect adaptation constitutes teleological explanation—explanation, that is, in terms of purposes, final causes or 'conditions of existence'" (Ospovat 7). Each species was designed for a purpose, its final cause.

As late as 1835 Darwin still shared the prevailing belief in perfect adaptation (Kohn 1980 68). This belief was reflected in his notes from the *Beagle* that conformed to Lyell's certainty in the immutability of species all perfectly adapted to their environments (Kohn 1980 68). But among other proofs, fossils pointing to multiple extinctions challenged the idea of perfect adaptation. Soon after Darwin's return to England he changed his views on adaptation: "not only from his experience on the *Beagle* but also from the data he received from the scientists who were describing his collection" (Kohn 1980 73). They "reinforced Darwin's questioning the immutability of species . . . and to doubt the hallowed belief in the perfection of adaptation" (Kohn et al 2005). The exact trajectory of Darwin's evolving ideas on adaptation has been explored in depth by Sulloway 1966, Herbert 1971, Kohn 1975, 1980, 1985, Schweber 1977, 1978, Ospovat

1981, H. Gruber 1985, Hodge and Kohn 1985, Richards 1987 and others, but is not the focus of this study.

In 1837 and 1838, the years when Darwin asserted that he read *The Excursion*, his views of adaptation were changing in complex and subtle ways. Darwin was not alone in questioning the idea of perfect adaptation, wondering about such things as the useless wings on flightless beetles and Galapagos cormorants, and other rudimentary organs like nipples on men. "From the 1830s on a growing number of biologists repudiated teleological explanation in favor of alternative approaches to the problems of the structure, distribution and succession of organisms" (Ospovat 9). These biologists included Geoffrey and Lamarck, although their views were certainly not generally accepted (Ospovat 238).

At times, Darwin might have been bemused by the theological arguments infusing Wordsworth's poetry. But he was not so sanguine when religious explanations masqueraded as science. In his notebooks and marginalia, Darwin often lost patience with weak science and natural theological explanations. Darwin made extensive derogatory notes about the attempted theological reasoning in Macculloch's *Proofs and Illustrations of the Attributes of God*. Two of Darwin's margin notes that succinctly captured his disgust stated only: "What trash" and "What bosch!!" (58r, 54v). Darwin was even more dismissive of some theological arguments by Macculloch, calling them "empty virgins"—ideas that were devoid of productive offspring (*Notebooks* Macculoch 58).

When Macculoch asserted that God's will was behind certain anomalous physical attributes of certain species, Darwin commented: "explanation [. . .] as resulting from the *will* of the deity . . . is not explanation—*it has not the character of a physical law,* «& is

therefore utterly useless—it foretells nothing»" (55r). To Darwin, using the authority of God's fancies to solve a scientific problem was worse than weak thinking and demeaned science. A real scientific law should predict outcomes.

When reading natural theology asserted as science, Darwin's heated reactions may have sometimes instigated attempts to prove the opposite. Darwin's notes on Macculloch were replete with examples of thoughtful reactions to empty theological reasoning, such as these short conjectures about specific adaptations: "greyhound to hare. – waterdog hair to water – bull dog to bulls. – primrose to banks – cowslip to fields . . . The non-absorbing Camel's stomach is puzzler" (Macculloch 57v). Here we may be seeing a rejoinder to Macculloch's natural theology, with Darwin encouraged to think productively through considerations of adaptations linking species to their environments, from dogs, to flowers to puzzling camels.

The theological view of adaptation was woven into Wordsworth's poetry. For instance, in the *Preface* to *Lyrical Ballads* Wordsworth introduced a theme that was repeated in *The Excursion*. He asserted that the poet "considers man and nature as essentially adapted to each other, and the mind of man as naturally the mirror of the fairest and most interesting qualities of nature" (*Preface* 301). Whether this reflected a religious belief or the cultural incarnation of the same, Wordsworth seemed to be placing man and his mind at the pinnacle of creation.

In the Prospectus to *The Excursion* Wordsworth reprised and extended this idea of man's mind being perfectly adapted, or fitted, to the world. Man's mind was his assumed connection to God, and thus to perfection.

How exquisitely the individual Mind

(And the progressive powers perhaps no less

Of the whole species) to the external World

Is fitted: —and how exquisitely, too –

Theme this but little heard of among men –

The external World is fitted to the mind. . . (*Excursion* Prospectus 63-8)

Wordsworth's use of the word "fitted" about the mind, twice, perhaps points to his belief in the importance of man's mental attributes being in harmony with the natural world.

These verses could be read as hinting at a designed world, and thus a designer, in talk of mind and world fitting so exquisitely. Or conversely, Wordsworth's fitting mind could point to a secular view of a balanced nature, with all of life and man's mind being fit to deal with nature. Beer suggests about this Wordsworth passage that: "The notions of just proportions, exact craftsmanship, sexual harmony, healthful mutuality, are all poised within the repeated 'fitted'" (Beer 1983 44). Darwin was considering the reasons behind man's physical and mental fitness to the world. Wordsworth framed an intentionally ambiguous image of a world designed to fit man's mind.

The common religious belief was that God was behind all of this fitting. Man's "fitted" mind, linked to his soul, was considered his connection to a perfect God, which belief reinforced the preeminence of man. The reason for all of creation, all the plants, animals and even the earth's majestic beauty, was to benefit man. "Darwin found the constant placing of man at the center of explanation probably the most exasperating characteristic of providential and natural theological writing" (Beer 1983 45). When

Darwin discarded the theological view that perfect adaptation created the exquisite mind of man, he left a vacuum begging explanation.

Darwin wanted to understand how the mind could have adapted over time, a transmutation of the brains of man's animal ancestors in the tree of life. In his notebooks he repeatedly argued against thinking that man's mind was special, or part of a created design (e.g. B 2, 207-8, C 198-9, 218, 244).

> If I be asked by what power the creator has added thought to ‹~~an~~› so many animals of different types. I will confess my profound ignorance.— [. . .] I will never allow that because there is a chasm between Man [. . .] and animals that man has different origin. (C 222-3)

Darwin had beliefs, but exercised them with some circumspection.

Darwin rebutted many questionable natural theological arguments in his notebooks, some of which have been linked in footnotes to particular works he had just read. Whether or not specific remarks of Wordsworth's elicited reactions, negative or positive, is impossible to say. Certainly the mind and emotions were important to both men.

We know that Darwin made a note about Wordsworth sometime between July 15th and 22nd, 1838, as reflected in comments about pleasure that ended in a mention of the poet on notebook page M 40. It is difficult to tell exactly when Darwin started his stream of thoughts leading to that reference. From pages M 26-7, Darwin mentioned a comment by Sir Walter Scott that led him to speculate that the way the mind is materially organized might prevent free will. He then noted that his sister "remarks that pleasure received from works of imagination very different from the inventive power" (M 28). He

continued with a wide range of thoughts on the mind, instincts, imagination and pleasure. "Music & poetry opposite ends of one scale," both bring pleasure (M 33). Darwin soon launched into an "Analysis of pleasures of scenery" (M 36).

He then noted four types of pleasure in nature's scenery:

> (1) harmony of colurs [. . .] (2^{d}) the pleasure of perspective [. . .]
>
> 3^{rd} pleasure association warmth, exercise, birds singings.—
>
> 4^{th}. Pleasure of imagination [. . .] connection with poetry, abundance, fertility, rustic life, virtuous happiness—recall scraps of poetry [. . .] recall pictures and therefore imagining pleasure . . . (M 37-9)

One interesting note here was the analytic nature of Darwin's speculations on pleasure. In a way he was confirming some of Wordsworth's critiques of scientists. But Darwin's goals were quite different than Wordsworth's. Darwin was looking for hints of the natural laws that led to a mind which experiences pleasure. Wordsworth asserted that deep pleasure was accessible only through pure creative imagination of the natural world, while he believed that scientists demeaned their joy by looking too narrowly at details.

Darwin's next notebook page, M 40, considers an agriculturalist and a geologist experiencing pleasure from pursuing their disciplines, before mentioning Wordsworth. Darwin seems to point to the famous *Preface* comment that: "Poetry is the first and last of all knowledge" (1802 1:xxxvii). If scientists ever "create any material revolution, . . .the Poet . . . will be at his side, carrying sensation into the midst of the objects of the Science itself" (1802 1:xxxvii-xxxviii).

But perhaps also there was a resonance of Wordsworth lines from *The Excursion* in which he talked about an herbalist and a geologist. Wordsworth's "Herbalist" was

searching myopically “For some rare Floweret of the hills . . . By soul-engrossing instinct driven along” (*Excursion* III 165, 169, 174). Wordsworth had framed this type of natural philosopher as “Fraught rather with depression than delight,” as if he lacked the joy of poetry (III 160). And a few lines later Wordsworth wrote his famous criticism of the pocket-hammerer (III 182).

> He, who with pocket hammer smites the edge
> Of every luckless rock or stone that stands
> Before his sight,
> . . . . . detaching by the stroke
> A chip, or splinter,– to resolve his doubts;
> And, with that ready answer satisfied,
> Doth to the substance give some barbarous name,
> Then hurries on;
> . . . . . – and thinks himself enriched,
> Wealthier, and doubtless wiser, than before! (III 182-4, 186-90, 193-4)

Wordsworth’s pocket hammerer and herbalist took narrow views of nature, and experienced a similarly shallow pleasure.

Darwin’s notebook speculation on four types of pleasure (quoted above) was immediately followed by these thoughts:

> therefore imagining pleasure of imitation come into play.— the train of thoughts vary no doubt in different people., an agriculturist, in whose mind supply of food was evasive [. . .] would receive pleasure from thinking of the fertility.— I a geologist have illdefined notion of land

> covered with ocean, former animals, slow force cracking surface &c truly poetical. (V. Wordsworth about science being sufficiently habitual to become poetical) the botanist might so view plants & trees. (M 39-41)

Darwin used examples of an agriculturalist and a geologist, as had Wordsworth in *The Excursion*. Where Wordsworth wrote about the shallow pleasure of those naturalists, Darwin seemed to be justifying his own deep pleasure in his "truly poetical" science.

The dozen pages of Darwin's notebook leading up to the mention of Wordsworth on M 40 appear loaded with speculative trains of thought that he may have been testing, trying to link and resolve. Darwin's agriculturist feeling pleasure in fecundity was considering natural forces whose harsh downsides Darwin would later link to some of the Malthusian pressures driving natural selection. The "slow force cracking the surface" could have been a precursor to Darwin's later wedging metaphor (M 40, D 135). The "former animals" hinted at extinction, and Darwin may have been experiencing pleasure from his productively struggling imagination, the kind of intellectual pleasure described by Wordsworth in his *Preface* (M 40, *Preface* 302).

There is no way to be certain exactly what lines Darwin was pointing to in Wordsworth. Pleasure appeared near both of Darwin's notebook mentions. Perhaps, in a small part, Darwin may have been rebutting the romantic critique of science that often appeared in Wordsworth's poetry, that scientific knowledge was less pleasurable than poetic. Wordsworth's critique of science was presented in his 1802 *Preface*, and also appeared often in *The Excursion*. Simply put, creating poetry bought deep pleasure while discovering scientific knowledge was somehow accompanied by shallower feelings.

Wordsworth's view of pleasure was complex and deeply rooted in what he called "the sentiment of being" (*Prel.* II 49). "Through all his poetic life Wordsworth was preoccupied by the idea, by the sentiment, by the problem, of being. All experience, all emotions lead to it. He was haunted by the mysterious fact that he existed" (Trilling 192). The life force that kept him this side of the border between life and death was a question of that sentiment of being. The pleasures of the imaginative experience and appreciation of nature were proofs of his 'beingness' and reflected the depth of existence.

At the end of *The Excursion's* Preface, Wordsworth proffered "a kind of 'Prospectus' of the design and scope of the whole poem" (*Excursion* Preface 56-7).

> *On Man, on Nature, and on Human Life,*
>
> *Musing in solitude, I oft perceive*
>
> *Fair trains of imagery before me rise,*
>
> *Accompanied by feelings of delight*
>
> *Pure, . . .* (emphasis his, Prospectus 1-5)

The first line was a repetition from barely a page previously that this poem would explain "Man, Nature and Society" (*Excursion* Preface 27). It was not an accident that Wordsworth's repeated "On Man, On Nature" (Prospectus 1). Wordsworth may have meant for his readers to take note of the monumental scope of his poem by repeating that it was, essentially, nothing less than a unified theory of life.

Darwin's own expansive project also encompassed man, nature and human life. Similarly, "Musing in solitude" reflected the way Darwin used his notebooks, in which he frequently used the phrase "trains of thought," sometimes in the context of trying to understand the origins of creative thought. Both men asserted that they experienced deep

pleasure from their creativity. Both men also communicated their insights into nature, while Darwin drew on the literary style of his culture as he endeavored to create convincing scientific arguments. “Darwin’s struggle to realize the theoretical potentiality of his work was a struggle also with the particular language he inherited and with the multiple readerships implied in that language. His insights were to some extent determined by the narrative patterns already taken for granted in his culture” (Beer 1985 544).

Darwin’s language struggles are seen in his first attempt to codify his young theory, his “1842 Pencil Sketch,” in which he repeatedly used what today looks like a literary style for his science. His argument moved in small steps, perhaps to mitigate the great leap from natural theology (and other existing ideas of species creation and stability) to his own theory of transmutation. For instance, after listing some anomalous facts that begged better scientific explanation, he stated:

> I repeat these wondrous facts [. . .] all can by my theory receive simple explanation, or they receive none & we must be content with such empty metaphors, as that of Decandoelle, who compares creation to a well covered table, & says «abortive organs»«may be compared to» ‹~~the symmetry of the~~› dishes (some sh^{d} be empty) placed symmetrically! (DMP CUL DAR6: 45v)

Darwin resented empty metaphors, and instead would develop packed metaphors of his own.

Darwin tried different ways to present his ideas, and even consciously considered the literary style that would best make his argument: “Give sketch [. . .] beginning— with

facts appearing hostile, under present knowledge — then proceed" with the argument, using "Metaphor of net" to help visualize the point (DAR6: 32r). He then planned how to shift his arguments from loose metaphors to stronger assertions, to "cease" being "metaphorical expressions & become intelligible facts" (DAR6: 48r). These examples point to Darwin's concern with a persuasive writing style in planning how to present his theory.

Darwin often encouraged his readers to step above their normal thinking, to open their minds to his sometimes uncomfortable (and occasionally heretical) ideas: It "transcends our humble powers, to conceive laws capable of creating individual organisms, each characterized by the most exquisite workmanship" (DAR6: 50r). Here he was gently asking his readers to consider natural causes behind the same "exquisite workmanship" that figured in one of Paley's most powerful arguments for a creator. In *The Excursion*, Wordsworth similarly suggested to his readers the importance of transcending their humble ways when he quoted the poet Samuel Daniel: *And that unless above himself he can / Erect himself, how poor a thing is man!* (IV 333-4).

Feelings were at the heart of Wordsworth's poem, both pleasure and despondency, many elicited in eulogistic stories. Most were an attempt by Wordsworth to address life's harshest realities through his personal belief system. The world of *The Excursion* was harsh and impartial. Even good, honest and moral people, people who did nothing wrong in Wordsworth's eyes, faced tragic lives in inexorable cycles of birth, decay and death.

An early example was a story told by the Wanderer about the virtuous, blameless Margaret, "a Woman of a steady mind, / Tender and deep in her excess of love," and her

husband who was “Frugal, affectionate, sober and . . . keenly industrious” (I 545-5, 553-4). But an unforgiving nature irrevocably shattered the optimistic image, taking just “Two blighting seasons when the fields were left / With half a harvest” (I 568-9). Death came even to the blameless children, as to so many children, as the family’s perfectly-kept cottage deteriorated to oblivion. It was the story of an unstoppable slide to death.

Wordsworth knew that while men yearn for lives of peace, security and happiness, nature was ruthless and unforgiving. The story of Margaret was but “a common Tale, / An ordinary sorrow of Man’s life” (I 667-8). After Wordsworth spend about four hundred sad lines on Margaret’s tale, the Wanderer revisited what little was left of his dear friend’s earthly footprint:

> At length towards the Cottage I returned
> Fondly,– and traced, with interest more mild,
> That secret spirit of humanity
> Which, mid the calm oblivious tendencies
> Of Nature, mid her plants, and weeds, and flowers,
> And silent overgrowings, still survived. (I 960-5)

Even the way the Wanderer told the story mirrored the “calm” ordinariness of nature’s “oblivious tendencies,” as time had turned his grief to “interest more mild” (963, 961). He saw a “secret spirit of humanity” surviving, as life continued in “weeds” and “silent overgrowings” (I 963, 965).

Wordsworth seemed content that new life would always overgrow the dead. Margaret and her family were gone, not strong enough to survive the extraordinary harshness. Nature’s unstoppable ruin eventually overcomes all, as living things devolve

into non-existence. All that lived to memorialize Margaret, her family and cottage were "those very plumes, / Those weeds, and the high spear-grass on that wall, / By mist and silent rain-drops silver'd o'er" (I 972-4). In the image of life-giving raindrops lurked their opposite, silent silver tears of mourning. The only monuments that remained were flowering plumes of weeds, tough weeds that won nature's competition. Wordsworth appeared to hint that nature was a war by using images like "plumes" for weeds and "spear-grass . . . silver'd o'er" mounting "walls" to describe survival through the mist of nature's battles (I 972-3).

When he first described Margaret's' cottage, knowing how that story ended, the Wanderer had opined: "Happier far / Could they have lived as do the little birds / That peck along the hedges" (I 592-4). Darwin's own view of a harsh nature did not even spare the little birds in the hedges. In the *Origin* Darwin wrote: "we forget, that the birds which are idly singing around us . . . or their eggs, or their nestlings, are destroyed by birds and beasts of prey; we do not always bear in mind, that though food may be now superabundant, it is not so at all seasons of each recurring year" (*Origin* 62). Darwin soberly examined the overwhelming pressures, the "war of nature" that lurk behind "the contended face of nature" (*DMP CUL* DAR6: 20r). Losing at competition to peers, predators or to the mere vagaries of nature became a key part of Darwin's discovery of natural selection, as well as of Wordsworth's image of nature.

Throughout *The Excursion* Wordsworth repeated the vision of nature's unrelenting and uncaring devastation overcoming the best efforts of man. Though the human spirit lived on, life's cycles inexorably led to death in the unfathomable plan of a Deity. Wordsworth often used the tension between nature's contrasting harshness and

bounty, the sublime and the beautiful, in developing the complex characters and themes of *The Excursion.* Both sides of nature were often cunningly implicit: ". . . see / How Nature hems you in with friendly arms!" (III 14). Couched in the warm expansiveness of a friendly hug was an intimation of menacing enclosure hemming them in.

The sublime and the beautiful also were important to Darwin's thinking. Kohn argues "that Darwin's understanding of nature was conditioned by a particular aesthetic framework, namely: the aesthetic categories the *sublime* and the *beautiful*. . . . The relationship between the *sublime* and the *beautiful* is present in Darwin's thought from at least as early as the Beagle voyage through to the writing of the *Origin of Species.*" (Kohn 1996 13). In his *Beagle Diary*, Darwin often reflected those contrasts while trying to describe expansive views: "How opposite are the sensations . . . the one for a time may be very sublime, the other is all gayety & happy life" (249).

The word "sublime" appears ten times in that diary. The name of Humboldt appears fourteen times. Humboldt's writing was infused with Goethe's German Romantic view of nature, and perhaps Darwin's was infused with Humboldt, as in this comment from early in the voyage at St. Jago: "During the first week every object was new & full of uncommon interest & as Humboldt remarks the vividness of an impression gives it the effect of duration" (34). Even his sister Caroline commented in a letter to Darwin: "that you had, probably from reading so much of Humboldt, got his phraseology & occasionly made use of the kind of flowery French expressions which he uses, instead of your own simple straight forward and more agreeable style" (DCP Lett-224). Darwin's writing style may have been similarly influenced by Wordsworth's.

Wordsworth's vision of life's sublimity was woven into his writing about beginnings, ends, and harsh cycles repeating themselves in the shadow of death's mystery. ". . . Man grows old, and dwindles, and decays; / And countless generations of Mankind / Depart; and leave no vestige where they trod" (IV 757-9). Wordsworth was not talking about fossil vestiges of past generations, but about the relentlessness of death and decay that eventually leaves no trace of any past lives.

In Darwin's notebooks he extrapolated from extinct generations of mankind to countless extinct generations of departed species. While most left no hint of ever having lived, some did leave physical vestiges. Relics, strange bones and fossils proved past life by announcing its present lack, its extinction. Darwin began with a similar idea to Wordsworth's decaying families of man, but went in a different direction.

> [I]n looking at two fine families one with successors «for» centuries, the other will become extinct.— Who can alalyze causes, dislike to marriage, hereditary disease, effects of contagions & accidents: yet some causes are evident, as for instance one man killing another [. . .] whole races act towards each other, and are acted on, just like the two fine families [. . .] May this not be extended to all animals . . . (B147-8)

These pages were written between or somewhat after October 1837, and February 1838 (dated by *DMP*). They may have initiated from further considerations of the implications of his tree of life, which Darwin had sketched in the same notebook about a hundred pages previously—between July and October of 1837 (*DMP*). This still was almost a year

before Darwin discovered natural selection, but he was thinking about Malthusian-like pressures such as disease and accidents in relation to extinction.

Darwin, like Wordsworth, saw nature as both calm and relentless, evolving through harsh oblivion, while Darwin's nature acted according to laws. Even the most diligent and virtuous of lives, families and species were commemorated with no vestiges but the strongest of weeds. Malthusian pressures seemed to help Darwin tie together the myriad forces behind death and extinction, as when Malthus wrote: "If we multiply too fast, we die miserably of poverty and contagious diseases" (484). Wordsworth presented a similarly cruel, if less scientific view: "I see around me here / Things which you cannot see: we die, my Friend, / Nor we alone" (I 501-3).

Eulogistic stories are common in literature. Wordsworth uses many sad stories, such as Margaret's, to commemorate different types of lives and to point to the inevitability of death. One such eulogistic story ended with the death and "unelaborate" burial of a "lowly, great, good Man" (VII 369-70).

> . . . . . perchance,
> A century shall hear his name pronounced,
> With images attendant on the sound;
> Then, shall the slowly-gathering twilight close
> In utter night; and of his course remain
> No cognizable vestiges, no more
> Than of this breath, which frames itself in words
> To speak of him, and instantly dissolves. (VII 372-79)

Individuals die, species become extinct, and soon all remnants dissolve.

Darwin reflected similar ideas in his speculations on death and extinction. “There is nothing stranger in death of species, than individuals” (B 22). In fact, Darwin even believed that the human species eventually would become extinct. “Man— — wonderful Man” was not an “exception.— He is Mammalian.— his ‹~~has~~› origin has not been indefinite— he is not a deity, his end «under present form» will come, (or how dredfully we are deceived)” (C 77). Again we see him avoid the anthropocentric fallacy, even satirizing it with a comment perhaps reflecting Hamlet’s: “What a piece of work is a man! How noble in reason! how infinite in faculty!” (Ham. 2.2.302-3). Seeing man as part of the inevitable cycle of extinctions and transmutation of species demonstrates the power of Darwin’s sublime vision.

The power of satire is not lost on Wordsworth. He introduces Voltaire’s *Candide* into *The Excursion* at the same time that we first meet the Solitary, whose almost unbreakable despondency could be called sublime. The Solitary represents the type of despairing supporter of the French Revolution that Coleridge had called on Wordsworth to make one focus of that great unfinished poem, *The Recluse*. Coleridge had requested that poem to help those who “have thrown up all hopes of the amelioration of mankind . . . disguising the same under the soft titles of domestic attachment and contempt for visionary *philosophes*” (Coleridge in C. Wordsworth 159). The Solitary “is frequently called the ‘pale’ or ‘shy’ Recluse, thus apparently becoming the title character, or hero, of the whole magnum opus, but in sickly shape” (Johnston 1984 268). I am not so sure that he is more “sickly” than Wordsworth intended for the unfinished *Recluse*.

The Wanderer finds the Solitary’s copy of Voltaire’s *Candide* before he even meets its owner. Wordsworth only mentions a few other authors in this poem, thus

highlighting the importance of this book of social, political and religious satire. The Wanderer is openly disgusted by: “this dull product of a Scoffer’s pen” (II 510). Kenneth Johnston argues that Wordsworth was harshly criticizing Voltaire’s “caustic rationalism” and the “benign necessitarianism of the eighteenth century . . . which, in its more abstract Godwinian form, Wordsworth had temporarily embraced in his own moral despondency of the mid-1790s” (Johnston 1984 268-9).

But perhaps Wordsworth’s intent was more complex. Wordsworth’s Solitary is a foil, a character who asserts disturbingly agnostic and even heretical observations, raising challenging questions and destabilizing thoughts. The Solitary seems to be a version of Wordsworth’s liberal acquaintances and his younger self, who had wrestled with similar despondent questions and misgiving. The rehashing of answers could be more than just offering solutions that work, but perhaps also a glimpse at some lingering areas of uncertainty.

After a long introduction to the Solitary’s life, Wordsworth presents an unsettling plot twist pointing toward questions of life, death and afterlife—and also perhaps paying homage to Voltaire. As the Wanderer and Narrator are approaching the Solitary’s home, they hear a funeral dirge and suspect that they are too late. It is in that moment of shocked mourning that the Wanderer notices a soiled book on the ground. “‘Gracious Heaven!’ / The Wanderer cried, ‘it cannot but be his, / And he is gone!’” (II459-61). It is “a Novel of Voltaire, / His famous Optimist,” and it is a “surprize, to find / Such Book in such a place!” (II 466-7, 481-2). There follows about sixty lines of angry reproach and criticisms of the maligned Voltaire, such as: “Impure conceits discharging from a heart / Hardened by impious pride!” (II 511-12).

Then the Solitary appears, alive, in a plot twist that mimics *Candide*: "Behold the Man whom he had fancied dead!" (II 523). The fact that Wordsworth's storyline takes such an implausible turn exactly when discussing Voltaire questions the depth of Wordsworth's disdain for that Deistic French philosophe, who once said: "If God made us in his own image, we have well returned him the compliment" (Voltaire in Wheeler 88). All of the angry criticisms of *Candide* may be tinted with Voltaire's own style of satire, as characters lambast an author whom Wordsworth secretly admires.

The Solitary revealed to be alive, Wordsworth offers more details of his life, describing his home as disheveled and littered: "With books, maps, fossils, withered plants and flowers, / And tufts of mountain moss" (II 689). The artifacts of man are mixed with withered samples of a collector, as well as:

> . . . . . mechanic tools,
> And scraps of paper,—some I could perceive
> Scribbled with verse: a broken angling-rod
> And shattered telescope, together linked
> By cobwebs. . . (II 691-5)

There are also "instruments of music . . . Some in disgrace" (696-7).

The Solitary dabbled in botany, geology, poetry, music, and even astronomy. But in his despondency and religious doubt, all those pursuits seemed to have failed him. "Underneath the Solitary's messy housekeeping we are meant to see the decay of a highly civilized mind in neglect of all the arts and sciences, his self-indulgent depression ruining all that makes man humane" (Johnston 1984 269). Perhaps also we were meant to see Wordsworth's disdain of sterile science, as opposed to the richly contrasting locations he

described: “Far and near / We have an image of the pristine earth, / The planet in its nakedness” (II 379-81). The broken tools suggest that “the Solitary can no longer use science reliably to see” (Amigoni 66).

Lush nature returns, as the Wanderer and Narrator follow the Solitary while he chooses between several paths to go on a quest for the origin of a nearby stream.

> Or let us trace this Streamlet to its source;
> Feebly it tinkles with an earthly sound,
> And a few steps may bring us to the spot
> Where, haply, crowned with flowerets and green herbs,
> The mountain Infant to the sun comes forth,
> Like human Life from Darkness. (III 30-35)

Streams symbolize various topics, from imagination and creativity to the ebb and flow of life. The Solitary’s feeble stream, emerging from darkness into nature’s green abundance, hints at life, death and origins.

Book III of *The Excursion* bears a title aimed at the Solidary: “Despondency.” Keeping with that mood, the Solitary quickly fails in his pursuit of the stream’s origin. He is stopped by “an ample Crag” from which a little water was “Descending, disembodied, and diffused” (III 41-2). Wordsworth places the secret of origins out of reach, diffused, and originating from a crag— figuratively from some unknown and unknowable source.

Wordsworth wants nature to keep its secrets and stymie discovery. The Solitary gives up at this “Barrier of steep rock,” allowing the flow of his imagination to stall: “at the foot of that moist precipice . . . no breeze did now / Find entrance” (III 54, 72, 69-70).

The Solitary's search halts at the foot of a moistly fecund hill where no man could find entrance, nor could any breeze of imagination uncover the disembodied truth of origins.

Darwin demonstrated more resolve, both metaphorically in overcoming many obstacles in his theorizing, and physically on the *Beagle*. Recounting one land excursion:

> Finding it nearly hopeless to push my way through the wood, I followed the course of a mountain torrent. At first, from the waterfalls and number of dead trees, I could hardly crawl along; but the bed of the stream soon became a little more open, from the floods having swept the sides. I continued slowly to advance for an hour along the broken and rocky banks; and was amply repaid by the grandeur of the scene.
>
> (Darwin 1839, in 1846 269)

Darwin studied the barriers he encountered, looking for the natural truths behind the difficulties. Nature's fecundity, its remorseless challenges and its seeming grandeur were pieces of a complex puzzle.

When the Solitary fails to reach the origin of the stream, he becomes despondent. He moves his focus to a holly bush struggling to grow from an impossibly small crack in a rock: "As if inserted by some human hand, / In mockery, to wither in the sun" (III 67-8). He views this shrub as a metaphor for man's harsh destiny and a sign of nature's malice. The Solitary's Creator is willful, mockingly placing the shrub in such an unforgiving spot.

The Wanderer quickly rebuts the Solitary's negativity, invoking a conscientious Creator whose plan is beyond human understanding. He sees that lonely holly as "A semblance strange of power intelligent, / and of design" (III 86-7). This invocation of

intelligent design is reminiscent of Paley's famous use of a watchmaker. The Wanderer sees divine strategy behind nature's struggles, a theodicy, extrapolating mankind's purpose as analogous to the plight of that plant:

> Boldest of plants that ever faced the wind,
> How gracefully that slender Shrub looks forth
> From its fantastic birth-place! And I own
> Some shadowy intimations haunt me here,
> That in these shows a chronicle survives
> Of purposes akin to those of Man . . . (III 88-90, 92-44)

The Wanderer's rebuttal of the Solitary's despondent view hints at faith in greater purposes woven into life's sad challenges.

There are some interesting implications in the shrub struggling to grow out of the rock, reflections of problems Darwin was addressing in his theorizing. The plant could be seen as either withering to its extinction, or boldly originating from a fantastic birth-place. There are hints of competition for resources that might have sunk roots into Darwin's memory, hints that he would not grasp fully until his Malthusian insight. Similarly, endurance in the face of great natural pressures might suggest stronger competitive skills being selected—the natural selection of survival traits. Not only are the rocks pressuring the plant but also the roots of the plant are cracking the rock, like wedges doing their slow but inexorable work. In their struggle for existence, such graceful plants are literally breaking apart mountains.

"One may say there is a force like a hundred thousand wedges trying force ‹into› every kind of adapted structure into the gaps ‹of› in the oeconomy of Nature,

or rather forming gaps by thrusting out weaker ones" (D134−5). Darwin's wedging metaphor in his October 1838 insight into the power of natural selection seems to parallel the image of roots thrusting aside rocks and cracking mountains.

As Kohn points out, Darwin's "wedging" and "entangled bank" metaphors were not just "ornamental . . . ancillary decoration" but they helped him conceptualize his scientific thesis of natural selection (Kohn 1996 14). "Their ontogeny is intertwined with and constitutive to the developmental process by which Darwin came to formulate natural selection" (Kohn 1996 14). Not just literary props, these metaphors enabled his mind to be receptive and imaginative as he focused on solving nature's species problem. Immersing himself in Wordsworth's poetry can be seen as supportive of that "development process."

A little later in the Solitary's excursion he returns to considerations about origins, only to discount their importance.

> Here are we, in a bright and breathing World!
>
> Our origin, what matters it? (III 232-3)

As Beer wonders: "What must Darwin have felt in response to lines such as these?" (Beer 2009 23). The Solitary may be mouthing the naive idea that just being alive in this sunny world is enough, so why waste time worrying about our unknowable origins? Wordsworth could be using the Solitary as a foil, to question the Panglossian view of life being always bright.

Wordsworth knew that origins matter. The origins in Genesis formed the foundation of traditional Judeo-Christian belief, even though Wordsworth and most educated people had abandoned strictly literal readings of the Bible by 1814.

Wordsworth's *The Excursion* "is only nominally Christian—pious evangelicals were fiercely indignant about the poem's lax representation of faith" (Johnston 1984 286). Wordsworth's decidedly "natural piety" was unconventional, potentially subversive to organized religious beliefs (III 272). In that context, many of his characters utter lines that seem intentionally destabilizing.

After the Solitary demeans the importance of origins, he then recounts a confusion of myths about life's beginnings that were foundations of different cultures. He relates a Native American belief that "the first Parents of Mankind . . . Leapt out together from a rocky Cave" (III 247-8). Athenians "wore . . . Golden Grasshoppers, in sign that they / Had sprung from out the soil whereon they dwelt," while the "Hindoos draw / Their holy Ganges from a skiey fount" (III 255-6, 260-1). He hints that one might as well invent any story of man's origins: "In lack / Of worthier explanation" (III 243-4).

The Solitary punctuates his own speculations: "But stop—these theoretic fancies jar / On serious minds" (III 257-8). All of these non-Christian belief systems draw heavily on metaphors of nature, and they agree when they "deduce the Stream of human Life" descending "From seats of Power divine" (III 261-2). While Wordsworth never questions the existence of a divine power, he does question strictly doctrinaire belief systems. Divinity here mingles with human lives, serious minds and nature.

After listing those myths of different past cultures, the Solitary challenges acquiescence to any system that stakes claim to truths, either religious *or* secular. He questions all origin myths and philosophic (including scientific) theories:

> . . . . . Not of myself I speak;
> Such acquiescence neither doth imply,

> In me, a meekly bending spirit—soothed
> By natural piety; nor a lofty mind,
> By philosophic discipline prepared
> For calm subjection to acknowledged law. . . (III 269-74)

The Solitary's lack of faith moves the other characters to action. They next offer a variety of arguments in an attempt to return him to religious faith, and to correct his despondency, but never quite succeed.

In a way, Darwin was developing his own origin story, like those myths of cultures past. Coincidentally, Darwin's own religious skepticism grew during the time he read *The Excursion*, as noted in his *Autobiography* and seen in many notebook entries (*Autobiography* 72). As early as 1837, perhaps still "very unwilling to give up my belief," Darwin was considering a way to compartmentalize a Creator as the original lawmaker while shifting focus to nature's laws: Cuvier "says grand idea god giving laws & & then leaving all to follow consequences" (*Autobiography* 72, B 114, between 07-10 1837).

This framework separating science and religion reflects the principle of subsidiarity, that once God established natural laws their outcomes were separate and subsidiary effects. Darwin uses a similar argument near the conclusion of the *Origin*: "To my mind it accords better with what we know of the laws impressed on matter by the Creator, that the production and extinction of the past and present inhabitants of the world should have been due to secondary causes . . ." (488). But it is hard to tell how much of Darwin's Creator was still a true belief, as opposed to a religious patina shielding his materialistic theory.

Even if Darwin envisioned God's hand behind nature's laws, he repeatedly railed against the idea of miraculous intervention through actual creation, or saltation, of each species. In February 1838, while considering variation of structures in diverse species, Darwin exclaimed: "Does not require fresh creation!" (B 227). When speculating on geographic distribution based on climactic changes, he argued: "Now this is difficult to explain by creation" (B 243, February to March of 1838). In April of 1838 he commented on a Whewell statement implying the miraculous creation of man: ". . . man may be a miracle, but induction leads to other view" (C 77).

Darwin was looking for answers in a rational nature while sidestepping religion. His theorizing looked for laws while discounting spirits and biblical explanations. In a note on a speculative assertion about species by MacLeay, Darwin suggested: "is it founded on Genesis or observation —if latter it bears on my theory" (C 103 fn1). Origins mattered to Darwin.

Whatever Darwin's true feelings about religion, by early 1838 he showed his eagerness to sidestep theology and focus on nature's laws: "The Grand Question, which every naturalist ought to have before him [. . .] is 'What are the laws of life'" (C 229). He was productively mining the inconsistencies in empty creationist assertions long before reading Malthus, although after Malthus he certainly increased his attacks on natural theology. This can be seen, for instance, in his critiques of Macculloch and Abercromie.

Wordsworth wants to leave his readers uneasy, pondering origin mysteries and questioning their own beliefs. "Despite being an apologia for order and divine governance, the dialogic, symposium-like structure of the poem [*The Excursion*] rehearses discourses that ask questions about the origins of human life" (Amigoni 66-7).

The effect of Wordsworth's text is to unsettle the discourse on origins, to encourage thinking beyond the safe boundaries of dogmatic surety.

Wordsworth puts his faith in nature's processes and man's sentiment of being, questioning both scriptural laws and current scientific orthodoxy. He often echoes the uncertainty and doubt of the profoundly religious through the characters of *The Excursion*. About *The Excursion's* section on origin myths, Beer suggests that Wordsworth is "poised between human handiwork and divine design for explanation" (2009 23).

Wordsworth sees God's work reflected in nature and in the mind of man, and sometimes easiest to discern in the simple and the common.

> *For the discerning intellect of Man,*
> *When wedded to this goodly universe*
> *In love and holy passion, shall find these*
> *A simple produce of the common day.* (*Excursion* Preface 51-5)

Wordsworth proposes that the common man's close connection to nature brings him a deeper understanding of its rhythms. This allows such ordinary people, through their often coarse, common language, to better expose the honest humanity of their emotions. Wordsworth has already made that point in his *Preface* to *Lyrical Ballads,* saying that he uses common people as his characters because their "elementary feelings exist in a state of greater simplicity" (*LB Preface* 290).

Although most critics rebuked Wordsworth for his use of common 'idiot' children and peddlers as heroes, using common people helped explicate life's ongoing hardships and quotidian challenges. "The principal object then which I proposed to myself in these

Poems was to make the incidents of common life interesting by tracing in them ... the primary laws of our nature" (*LB* 289-90). Wordsworth gave clues in common details, hints of an expansive view of man, nature and society that lay behind the stories. Darwin's focus on common details and anomalies gave him an uncommon and powerful perspective on nature's laws. Understanding many little facts helped uncover bigger patterns.

> To him nothing is trivial, because he is studying slight changes that over time produce great transformations. He is concerned to uncover the differences within apparent conformity and to argue against normalisation. So Wordsworth's combining of passion, intellect, and the 'simple produce of the common day' affirms kindred values. (Beer 2009 22)

Both Wordsworth and Darwin used the smallest, seemingly mundane details of life to help frame and give insights into the expansive cycles of nature.

Darwin examined people's simplicities, incongruities and even abnormal mental states to point out larger truths. In the first twenty pages of the M notebook alone, he researched many details about sanity and insanity: "My F[ather] says there is perfect gradation between sound people and insane. . . . There seems no distinction between enthusiasm passion & Madness" (M 13, 18). In studying the mind when it failed to work properly, Darwin looked for clues to the physical underpinning of how it should work. "People in old age. exceedingly sharp in some things, thou so confused on others" (M 22).

From incongruous little details he extrapolated larger ideas: "It is an argument for materialism. that cold water brings on suddenly in head, a frame of mind, analogous to

those feelings. which may be considered as truly spiritual" (M 19). People put great stock in personal feelings of spiritualism, evidence on which Darwin literally pours cold water. Darwin even noted that he used a strategy of looking for important answers in "multiplication of littles means & bringing the mind to grapple with the great effect produced" (C 75).

One of Darwin's unusual abilities was to examine overlooked minutiae in search of overarching patterns. As one of many possible examples of this method, Darwin speculated on the causes of speciation by considering geographic distribution of tiny mouse species that were almost too similar to tell apart: "It was most curious to observe, that all the species of mice in S. America. which were hard to distinguish came from closely neighbouring localities" (B 250). Darwin collected the minutest details about seemingly common seeds, bugs and finches as underpinnings to explaining nature's largest extremes of grandeur. Wordsworth had been criticized for focusing on the trivial, while Darwin benefited from a similar propensity.

While Wordsworth did not want common country people to work in dehumanizing factories, he did want them to be educated—especially in strong ethical virtues. Several sections of *The Excursion* touch on this interest. In Book IX, the final section of the poem, Wordsworth wonders if education could improve ethical standards.

> For the whole people to be taught and trained,
> So shall licentiousness and black resolve
> Be rooted out, and virtuous habits take
> Their place; and genuine piety descend,

Like an inheritance, from age to age. (IX 361-4)

These lines resonate with a hint of Lamarck's idea of heritability of learned traits, as Wordsworth is hoping that taught piety will be inherited.

Darwin made speculations from his materialistic perspective about how morality might be taught and inherited, as I quoted in the chapter about his humility. He examined his own temperament, wondering if such improved morality might be heritable (M 73-4). He speculated that if learned morality were heritable, a man would want to "improve . . . for his children's sake," in a sense making the child father to the man (M 74). "Much of what drew Darwin to the poem, and the reason that he read it more than once, may well have been that he there found confirmation for the ethical character of his explorations, in a quite other form" (Beer 2009 22). The importance of morality was a shared focus of the poet and the scientist. On the inside front cover of the M notebook, Darwin's description was: "This Book full of Metaphysics on Morals [. . .]" (M ifc).

Wordsworth's suggestion that piety informed virtue, with its opposition of piety to Darwin's ideas of material nature, might have stimulated a counter-reading. Darwin's notebooks repeatedly linked emotional responses, morality, and even the thought that religious belief was the product of the brain's physical structure. As important a place as morality and endurance held in Wordsworth's poetry, mechanical materialism and rationalism were similarly major problems—while to Darwin they were tools as important as a geologist's hammer and wedge. As Lyon notes: "Antimechanism, personal fortitude, and antirationalism – were all operative . . . while Wordsworth was composing *The Excursion*, but they may also be found fused together into one great

effort: to find unity in diversity, eternity in time, infinity in space, good in evil" (Lyon 66).

Darwin also noticed unity in nature's diversity. Accepting contradictions and ambiguity helped him reach his theory, not just explain it, as Kohn describes in "Darwin's Ambiguity" (1985). Darwin saw contrasting tensions between nature's peaceful beauty and relentless terror, while his relentless questioning of complex diversity led him to the unified simplicity of natural selection. Darwin also employed ambiguity throughout his writing, both to raise doubts about existing beliefs and to obfuscate his "metaphysical stance" in a somewhat futile attempt to sidestep charges of materialism (Kohn 1989 215). Wordsworth's intense disapprobation of materialistic and mechanistic science might have served as a caution to Darwin.

Science and faith are the subjects of a long monologue by the Wanderer in which he hints at meanings behind the title of *The Excursion*. Science holds an important place in his world view, one that is: "Subservient still to moral purposes, / Auxiliar to divine" (IV 1243-5).

> . . . . . Science then
> Shall be a precious Visitant; and then
> And only then, be worthy of her name
> . . . . . .
> . . . . . its most noble use,
> Its most illustrious province, must be found
> In furnishing clear guidance, a support
> Not treacherous, to the Mind's *excursive* Power. (IV 1247-9, 1256-9)

It is science that here guides the "Mind's *excursive* Power," its ability to roam freely in creative imagination. Wordsworth's ideal of science would be "taught with patient interest to watch / The processes of things," a style which "beautifully describes one aspect of Darwin's endeavor" (IV 1253-4, Beer 2009 24).

There is a parallel between Wordsworth's "excursive Power" and his "sentiment of being," the vital life force that he posits at the core of man (IV 1259, *Prel.* II 49). Manier suggests that Wordsworth envisions a synergy between science and his own poetic ambitions, arguing that it might aid in science's creative journey, "by *lending guidance to the mind's own excursion*, helping to build up the Being we are, thus taking science beyond itself" (emphasis his, Manier 1978 91). Darwin's search for the source of the imagination has resonances of Wordsworth's literary excursion. The creativity of a free excursive mind was central to the work of both men.

In Darwin's reading in Milton, Wordsworth and many others, he thrived on the mental stimulation of untangling references, metaphors and ambivalent thoughts. In his notebooks, Darwin entertained and interrogated contradictory details, speculating on the roots of creativity while demonstrating that very trait, and reflecting on his own writing style while engaged in authorship.

Near the end of the *Journal of Researches*, Darwin whimsically noted his struggle to describe nature. "When quietly walking along the shady pathways, and admiring each successive view, one wishes to find language to express one's ideas. Epithet after epithet is found too weak to convey to those, who have not visited the intertropical regions, the sensation of delight which the mind experiences" (Darwin 1839 367). "Sensations of delight" were at the heart of Wordsworth's writing, and arguably appeared in Darwin's

notebooks both times Wordsworth's name was mentioned. "The relationships between science and aesthetics may be elusive . . . in Darwin's case they do indeed form a demonstrable synthesis" (Kohn 1996 14).

Darwin was a scientist of nature, Wordsworth was a poet of nature. *The Excursion* was by Darwin's bedside, figuratively if not literally, during the two years of his most heated theorizing leading up to his discovery of natural selection. Both the scientist and the poet were intrigued by the forces of nature and man. There was more than dry science in Darwin's writing. Even in his raw notebook musings, his feelings informed his scientific focus, and the reader is drawn into his passion. Perhaps it was partly by blending what today would be separated as science and poetry that Darwin achieved his prescient results.

Chapter IV

The Origin of Mind:

Attacking the Citadel Itself

My central goal in this chapter is to show that Darwin's thinking about the nature of creativity may have stimulated his own. I suggest that his creativity was encouraged by repeated considerations of the workings of a material mind. During the two years after his return from the *Beagle*, Darwin spent many notebook pages trying to understand how free will, imagination, and all human mental attributes originated and continued to flourish, solely in the material of the brain with nothing supernatural involved. He developed a tentative theory of how the brain generated original thought, and may have tried applying it to his developing theory.

Certainly the majority of Darwin's notebook speculations during this time frame were directed at scientific issues surrounding his developing species theory. His core concerns, including variation, heredity, transportation and distribution, are well documented in much of the literature (Gruber, Herbert, Kohn, Ospovot, Schweber, among others). Yet during Darwin's focused assault on the species puzzle, his notebook entries kept returning to questions about the mind.

Darwin wondered how a thinking mind could have arisen from our animal ancestors by the transmutation of the material of the brain over a long expanse of time. He was coming to see the origin of mind as an entangled and parallel process to the transmutation of species. "During the few months after he returned from his journey, Darwin did become convinced that species were not stable; and with this conviction, he quickly began to explore questions of instinct, mind, and, as he termed it, the 'whole

metaphysics'" (Richards 2005 168 quoting B 228). His many conjectures about mental habits and instincts, wondering how they developed from simpler animal brains to man's mind, point to the importance Darwin placed on understanding the mind, free will and creativity.

Stephen Pinker is quoted as saying that "creativity is a perversely difficult thing to study," while Daniel Dennett opines that "creativity and free will [are] the two most treacherous topics I know" (Zimmer, Dennett 150). Darwin seemed to realize the complexity of this problem, as he suggested in this notebook entry: "Experience shows the problem of the mind cannot be solved by attacking the citadel itself.— the mind is function of body.— we must bring some *stable* foundation to argue from" (N 5). The stable foundation Darwin proposed was to view mind processes as consonant with the body's other physical processes. All of them were subject to the same laws of nature. That is, the forces behind the development of man's complex mind from animal ancestors were identical to the forces that had generated all other physical attributes.

Darwin's investigation of the implications of a material mind took place right in the middle of his most concentrated theorizing on species, as he was closing in on the solution of natural selection—and beyond. His notebook assertion, about needing a stable foundation from which to attack the citadel of the mind, was written a week *after* his Malthusian breakthrough. So even then, he continued to gnaw on the mind problem.

While the mind was only one of many areas on which Darwin focused, it was more than peripheral to his developing the species theory. Unless Darwin could show that his theory of transmutation applied to the material origins of creativity, then sublime

music, art and poetry could become difficulties for his developing theory. Darwin took quite seriously all such potential problems, he would title Chapter VI of the *Origin*: "Difficulties on Theory" (*Origin* 171-206).

The organization of this chapter will follow several of Darwin's trains of thought that related to the idea of a material mind, such as the possibilities of free will, creativity, and even morality. Darwin wondered how such a mind could generate creative ideas, and considered some thinking devices that he might have used to stimulate his own creativity, although perhaps unintentionally. I will interrogate Darwin's thoughts on diverse mental functions, and how they could become heritable, mostly in the M notebook. He saw heritability as a key to transmutation of all mental traits over generations, since to him mental traits were imbued in the brain's material. Thus Darwin contemplated the origins of complex emotional issues, like feelings of pleasure and poignancy generated by poetry, and even the origins of morality. He seemed to want a plausible framework to explain how all mental attributes could be caused by a brain that evolved like any other physical body part. That framework would have to include creativity.

Darwin considered how thinking might work, starting with the origins of useful ideas that may come in dreams, to the dialectic comparison of ideas in parallel trains of thought. Very early in his theorizing, he developed a habit of framing his developing ideas as "my theory," a practice that may have helped him focus his thoughts or otherwise sharpen his thinking.

I will discuss many notebook entries that demonstrate the depth and breadth of Darwin's thoughts about a mind that could produce creativity. One example, both of his

beliefs in this area and of his own thinking process, appears in four sets of notebook speculations all dated on the same day—two each in notebooks D and M. Darwin realized that creative thinking was a lot harder than just repeating and considering existing facts and ideas, although sometimes it started there.

For Darwin to propose a purely material mind he may not have needed absolute proof, but he did require a reasonable explanation for the appearance of free will, imagination, creativity, emotions and even morality. He knew that he would be facing strong existing dogmas that were quite contrary to his developing ideas about mental materialism. Even Alfred Russell Wallace, whose theory of evolution was jointly published with Darwin's, would later become intrigued with spiritualism and say that the mind was not evolved, but given by a creator.). Most people believed that the mind was an immaterial, spiritual artifact, some kind of spark implanted by a supreme power that needed no physical explanation.

The idea of the brain being the physical source of the mind began long before Darwin. But in Darwin's day it was still risky (if not outright dangerous) to make public such materialist speculations. Darwin saw examples during his formative university years at Edinburgh, where several of his professors and fellow students met rebuke or worse for publicly declaring their materialistic views. Among them were William Browne, Grant, Jameson and Duncan (Desmond 1991 39-43).

Darwin's own grandfather, Erasmus, had been attacked for his materialistic and evolutionary speculations, as well as for his liberal political leanings (King-Hele 89). Erasmus had "added the motto *E cochis omnia*, or 'everything from shells'" to the family

coat of arms, but the local Canon of Litchfield Cathedral excoriated the motto as "renouncing his Creator" and "Erasmus had to paint out the motto" on his carriage (C. Darwin 1879 xiii). But Erasmus kept the motto on his bookplates, perhaps setting a family precedent not only for having evolutionary beliefs, but also for keeping them private (C. Darwin 1879 xiii).

Materialism was still a scandalous subject in 1819. William Lawrence expounded such radically materialistic views of man and mind in his *Lectures on Man* and in his book, *Natural History of Man,* that he was made to resign from the College of Surgeons while The Chancery Court revoked his book's copyright. Paradoxically, this revocation allowed any publisher to print the book for free and caused it to end up "on every dissident's bookshelf" (Desmond 1991 253). Darwin was not ready to declare himself a dissident.

The writings of the outspokenly liberal William Godwin were a possible influence on Darwin's thinking. Godwin offered his own "visions of utopian progress" in his radical 1793 treatise, *An Enquiry Concerning Political Justice* (Desmond 1991 265). Godwin's progressive vision was extremely influential in many arenas, from politics to poetry to literature. Arguably his thinking affected (among others) his daughter, Mary Shelley, and her husband, Percy Bysshe Shelley, as well as Coleridge and Wordsworth, and through them to Darwin. Godwin's work so upset the establishment that Thomas Malthus felt compelled to write a rebuttal with his bleak vision in *Essay on the Principle of Population.* Most scholars agree with Darwin's assertion in his *Autobiography* that reading Malthus was a key catalyst in the breakthrough insight of natural selection.

When Darwin returned home from the *Beagle* in the autumn of 1837, he noted that: "all England appears changed" (*Correspondence* 1:506-7, in Desmond and Moore 1991 196). Although “Darwin himself actually encountered a deceptive calm . . . a recession was already setting in, with massive unemployment in prospect” (Desmond 1991 197). The Reform Act of 1832 was a first, small step toward election reform. But the Malthusian poor laws were causing riots in the south with their draconian workhouses: his name “was on everybody’s lips, as either Satan or Savior” (Desmond 1991 197).

Darwin grew up in a family with skeptical religious beliefs, a skepticism he shared. His father, Robert, and both grandfathers, Erasmus Darwin and Josiah Wedgwood, professed to be Unitarians. “Not all Unitarians went so far as to deny a soul. . . . Freethinkers like Erasmus went much further” (Desmond 1991 9). Erasmus wittily “defined Unitarianism as a featherbed to catch a falling Christian” (Foote 1895 58; Desmond 1991 5).

During his childhood, schooling and later research, Darwin was exposed to diverse philosophies and theories about the mind, some of which he reconsidered in his notebooks. Darwin’s family was politically engaged, as well as progressive. He had been raised as a freethinker in an era that had swung back to conservatism after the French Revolution and Napoleon. But Darwin seemed much more focused on his science than on politics after the *Beagle*.

Darwin’s upbringing and empiricism led him to appreciate the writings of some of the more radical French thinkers, several of whom are cited in his notebooks. These

"Philosophes" addressed questions that anticipated many of Darwin's concerns. Pierre Gassendi (1592-1655) thought that animals reacted to sensations just as did man (Richards 1987 23). La Mettrie (1709-1751) argued that both animals and man were not only the same, but both were just instinctual "machines, though not composed of inert matter"—and both lacked free will (Richards 1987 25). La Mettrie's form of materialism intriguingly argued that living "matter harbored active properties of motion and sensation" (Richards 1987 25). The Abbé de Condillac (1715-1780) attacked the idea that "animals were unthinking, instinctive" machines (Richards 1987 24).

Darwin tested a wide spectrum of similar ideas in his notebooks. He agreed with the Marquis de Condorcet (1743-1794) that modern rational analysis would release men from superstition (Richards 1987 23). Condorcet was targeted by French Revolutionary terror, but was safely hidden by his friend, Pierre-Jean Cabanis (1757-1808).

Cabanis argued for the evolving *perfectibility* of man. He saw species transmutation as a stairway with a preordained direction going ever upward, suggesting that: "If we are able usefully to modify each temperament, one at a time, then we can influence, extensively and profoundly, the character of the species, and can produce an effect, systematically and continuously, on succeeding generations" (Richards 1987 28, citing Cabanis 1802). Cabanis "found empirical support for his plan of perfecting the human species in the experience of stockbreeders" (Richards 1987 29). Darwin similarly drew on the artificial selection of animal breeders as he developed his own ideas.

Darwin may have been aware that Cabanis, in his "Rapports," said that to understand how "thought arises, we must consider the brain as a particular organ,

destined specially to produce it in the same way as the stomach and the intestines are there to perform digestion, the liver to filter the bile" (Cabanis III:159-60 in Wenley 74). Cabinis was later misquoted, and was "understood to say that the brain secretes thought as the liver secretes bile," leading to "ridicule and disgust which . . . seriously damaged the dignity of the physiological method" (Lewes 375). Darwin read Cabinis, and may have seen this original paralleling of thought with bile, as the product of a material brain.

Frédéric Cuvier (1773-1838) went further into materialistic thinking than his more famous brother, Georges, arguing "that the rational abilities of the higher animals were comparable to man's; that habits became hereditary and . . . that moral conscience . . . was rooted in the animal instinct of sociability" (Richards 1987 65). Darwin also considered the link between heritable habits and man's rational abilities while developing his theory. But he disagreed with one belief insisted upon by some of the French thinkers, that there was a difference in kind between animal intelligence and human reason (Richards 1987 67-8). Darwin wanted to erase the idea of human exceptionalism.

Darwin's thoughts here ran counter to prevailing beliefs, and the ideas of most of his peers who held more traditional religious views. Even his close colleague and confidant, Charles Lyell, who Darwin knew was "was neither an atheist nor an infidel," shunned materialism (Manier 31). While Lyell's geology ostensibly followed material causes, he still believed that it had a metaphysical origin, or first cause. Many intellectuals still subscribed to similarly split reasoning. Even those who allowed nature's laws to explain geology, chemistry and astronomy, strongly resisted applying the same laws of nature to mankind.

For instance, the influential Cambridge professor William Whewell "was involved in an almost *continuous* effort to rescue science from those emotional connotations which might encourage religious infidelity" (Manier 31). Darwin's geology professor, Adam Sedgwick, was even *more* conservative. Known for his religiosity, he believed that scientific laws were proof of a creator and became one of Darwin's most outspoken critics after the publication of the *Origin*.

Darwin shunned religious proofs and even Cartesian dualism when considering the workings of the mind. Instead, he contemplated the meanings and possibilities of a mind that was solely a material manifestation of an evolved brain. This was an important foundation of Darwin's thinking. Edward Manier devotes almost ten pages of *The Young Darwin and His Cultural Circle* to a chapter titled "Refutations of Dualism" (1978). In his notebooks and letters, Darwin considered the ideas of many thinkers about materialism, discarding most and adding his own speculations in such areas as heritability and variation of mental traits.

Some of his notebook speculations on this subject interrogated ideas similar to those of the French materialists. Darwin compared human attributes to those of animals, as in these thoughts from April 1838, in Notebook C.

> [Man] possesses some of the same general instincts, ‹~~as~~› & ‹~~moral~~› feelings as animals.— they on other hand can reason— but Man has reasoning powers in excess. instead of definite instincts.— this is a replacements in mental machinery— so analogous to what we see in bodily. that ‹~~I~~› it does not stagger me.— (C 77-8)

Darwin was suggesting that man's thinking originated simply as an extension *in kind* of the instincts and reasoning of animals. He was not surprised by his conclusion that mental traits, as well as physical, were analogous in man and animals.

On the next notebook page, Darwin continued his speculations on similarities of the expressions of man and animals. He shifted to personal observations of a visit to the London Zoological Society. He spoke more favorably of animal behavior he observed than of brutal human savagery he witnessed on the *Beagle* voyage.

> Let man visit Ourang-outang in domestication, hear expressive whine, see its intelligence when spoken; as if it understood every word said— see its affection.— to those it knew.— see its passion & rage, sulkiness, & very actions of despair; «let him look at savage, roasting his parent, naked, artless, not improving yet improvable» & then let him dare to boast of his proud preeminence. (C 79)

Darwin was building a case for relatedness of human to animal by the similarity of their emotions and intelligence. He was also taking a swipe at human cruelty and man's undeserved conceit: "not improving yet improvable" (C 79). Darwin repeatedly compared animals and man in his notebook thinking, usually attempting to blur the lines of separation.

He revisited similar thoughts about five months later, between Sept. 23 and Nov. 2, late in his M notebook and within a few days of his September 28th Malthusian insight. I am guessing it was a few days *after* he isolated natural selection, but only because Darwin seemed to be rehearsing a defense of his newly discovered theory, imagining a

guardedly positive reception: "<~~All~~> Nearly all will exclaim, your arguments are good but look at the immense difference between man" and animals (M 153[e]). To narrow that gap, Darwin's next sentence proposed comparing orangutans to Fuegians (similar to his "roasting" in the April notebook entries), and then "dare to say difference so great" between animals and man (C 77-79, M 153[e]).

Darwin seemed to be reprising facts from earlier notebook entries and testing them for a defense of his new theory. Darwin again compared the mental capacities of apes in captivity to those of Fuegians he had observed. When Darwin was on the *Beagle*, several Fuegians who had been educated in England were returned to Patagonia and quickly reverted to the social mores of their upbringing. Darwin saw first-hand the similarities, the differences, the strong effects of culture—and how quickly those could be discarded.

His ideas about the place of "savages" in his worldview had percolated and matured over time. "By placing the Fuegians midway between apes and Englishmen, he gave himself a concrete observational basis for the analogical reconstruction of human origins; and at the same time, he tapped a powerful source of cultural imagery with which to convey his unorthodox views" (Durant 291, in Kohn 1985a). Visiting the orangutan at the zoo may have stimulated Darwin's memory of Fuegians, an association that seemed to bolster his argument in defense of his nascent theory.

Darwin did not consider the mind of the Fuegian to be very different from that of the Englishman, nor from the mind of other animals. All minds were generated by the material of the brain. But if minds were based totally in material, then their 'movements'

were predictable by the same natural laws that controlled all other matter. Such reasoning questioned the very possibility of free thinking, or free will. Without free thoughts there can be no real creativity or imagination. Considering free will many times in his notebooks, Darwin seemed to be looking for a defensible argument allowing for free will in a material mind, for otherwise the seeming existence of creativity would pose a problem for his developing theory.

In a passage written in mid-July 1838, he approached the free-will conundrum by contemplating how one can make a free choice when at the effect of urges ("appetites") that are based on natural laws: "appetites urge the man, but indefinitely, he chooses (but what makes him fix!? ‹)› [. . .] I verily believe that free-will & chance are synonymous.— { Shake ten thousand grains of sand together & one will be uppermost:— so in thoughts, one will rise according to law" (M 31). Darwin's last thought wondered whether, in a material mind subject to natural laws, what looks like free will might not be quite so free. One can use this quotation to argue both sides of the question: that Darwin did, or did not, believe in free will, or in chance (which itself is ultimately deterministic).

Darwin puzzled the free will question as a precursor for the possibility of creativity. He wondered if in practice, in a contingent world, so-called free will might resemble random chance. But he noted that a man eventually manages to choose among a large number of competing appetites and urges. Perhaps he saw imagination in a similar light, as a kind of competition of random thoughts and ideas.

Darwin conjectured that natural laws governing free will were comparable to those directing the movements of thousands of grains of sand, which could be considered

essentially random. This seems to point to Darwin's believing in a kind of practical free will. Both free will and imagination were ultimately governed by natural laws, but of enough interacting biological complexity that they were synonymous with chance, a tricky question in itself.

To avoid a very long detour here, I will intentionally sidestep lengthy deliberations on the nuances of philosophical free will. There is voluminous secondary literature on this topic, such as in Johnson, 2014 (*Darwin's Dice*). This is not an essay on free will, but on Darwin's concepts of the workings of the mind, while his own mind generated the imagination to discover the lynchpin of his theory.

In Darwin's next few notebook entries he may intentionally have been shaking almost unrelated ideas like those grains of sand, to see which combinations would rise to the surface. He shifted from free will, to wonder why men considered some birds' songs better than others (M 31-2). He commented on the idea that "Beauty is instinctive feeling," which "does not explain the *feeling* in any one man" (M 32). Looking at the mind generating aesthetic appreciation, he compared those feelings with instincts. Since it was common knowledge that animal instincts were heritable, perhaps he was considering how aesthetic feelings might have originated through many generations by transmutation. But explaining the feeling itself seemed a bigger problem.

He started a new page, continuing his thoughts on human aesthetics: "Music & poetry opposite ends of one scale" (M 33). He noted that both music and poetry generated "vivid flashes of images & thoughts," which feelings were biological reactions of mental material (M 32). He finished these short speculations with: "who has not had his blood

run cold by singing" (M 32). Darwin then switched tracks from speculations on aesthetics to how one generates original thoughts. He had considered free will, human feelings, and man's own sublime artistic achievements. Now, perhaps, he wondered how an artist could author a work that inspired bursts of emotions.

Continuing his conjectures on creativity, Darwin next focused on the approaches that people used to generate new ideas. It seems that he had interrogated his sisters about their own methods of being creative, and they pointed to something akin to speculative daydreaming or brainstorming. Darwin wrote that one sister "never builds castles in the air" while another "does so often, but not of the inventive class" (M 33). Building air castles sounds like mentally constructing imaginative edifices of ideas. Darwin's comment that not all such daydreaming is inventive, suggests his considering that some people *are* able to be inventive with their air castles. Darwin could have been considering one way that new ideas originate in a material mind, a natural history of imagination. Perhaps he was also looking for a working strategy to help understand and generate his own creative thoughts.

Commenting about two of his sisters and their experiences with inventive air castles begs the question of how and why he interviewed them. The ideas may have just come out in general conversation. But it seems possible that Darwin initiated questioning about their creative thinking strategies. If so, it suggests that he was intentionally gathering data about creativity from at least those two sisters, if not a wider group of people. He was directing his speculations squarely at the imagination and taking seriously ideas from many quarters.

He may have tried out “air castle” speculations, as his next comments suggest (somewhat lightheartedly). “Now that I have a test of hardness of thought, from weakness of my stomach I observe [that inventing] a long castle in the air, is as hard work [….] as the closest train of geological thought” (M 34). He had considered birdsong, music, poetry, beauty and inspirational feelings, and then proposed that there might be value to brainstorming metaphorical castles in the air. He seemed so pleased that he had isolated a structure to describe and possibly stimulate creativity (air castle to train of thought), that he was making light of the fact that pressure from focused concentration often exacerbated his physical ailments.

Returning to the same notebook page where Darwin mentioned the effort of initiating a train of thought, he then speculated: “The capability of such trains of thought makes a discoverer, and therefore [….] such castles in the air are highly advantageous, before real train of inventive thoughts are brought into play & then perhaps the sooner castles in the air are banished the better” (M 34). In a later notebook entry he extended the ‘air castle to train of thought’ metaphor by adding the notion of using “parallel trains of thought” to compare and critically scrutinize ideas (M 113). He pictured air castles to trains of thought, to parallel trains that complemented, supported, challenged or perhaps competed with each other.

Darwin probably read the “train of thought” metaphor previously when it was used by others. Darwin’s grandfather, Erasmus, used the phrase in a 1794 assertion about the origin of free will (with its mixed metaphors): “In respect to freewill, it is certain, that we cannot will to think of a new train of ideas without previously thinking of the

first link of it" (E. Darwin 1794 1:134). Charles Darwin had probably seen the phrase here, if not also elsewhere. Darwin did not simply mirror his grandfather's idea, but expanded on it.

It is possible that Darwin was both wondering how creative thinking might work in a material mind, and attempting to turn this metaphor into a working system to stimulate his own creativity. As Beer, Kohn and Young point out, metaphor can be a powerful tool of scientific understanding (Beer 1983 & 1986, Kohn 1985, Young 1985). Darwin repeated this metaphor several times in his notebooks, perhaps considering different pathways to move from air castles to more concrete theoretical thinking. But it is impossible to prove that Darwin was testing this air castle metaphor for its practical worth to his own thinking. Since he never acknowledged using the linguistic device in so many words, the best we can do is examine his notebook speculations and see if, at times, his thinking process mirrored the metaphor.

This metaphor was not the only linguistic device that may have encouraged Darwin's creativity. Another process of thinking I would like to highlight was Darwin's repeated framing of ideas with the phrase "my theory." The use of this phrase became something of a trope that I suggest aided Darwin's creativity and focus, even though he may not even have been conscious of its use. He could have received more value from this linguistic habit than he, or others, have recognized.

Darwin used the expression "my theory" quite often in his notebooks *before* he had a complete theory. Previous to his uncovering the mechanism of transmutation that was his goal, he knew that his theory was still a work in progress with success an

uncertain thing. Throughout the course of his notebooks, Darwin's developing theory (and thus what he meant by "my theory") kept changing, evolving, and gaining in depth, nuance, and even in degree of confidence. Perhaps sometimes he even considered his theory to include transmutation without a mechanism.

It was not that Darwin had any uncertainty that species evolved. "Transmutation was never in doubt" between July of 1837, when he opened his first notebook, and September 1838 when he formulated his theory (Kohn 1980 81). What was in doubt was whether he would discover what *caused* transmutation, the mechanisms behind species origin, change, and extinction. Darwin's practice of framing ideas with the phrase "my theory" may have acted like a scaffold and helped him succeed in his search for an original theory.

Writing "my theory" could have been a habit Darwin picked up from reading other authors who used the phrase. For instance, we know from a footnote by Kohn that Darwin had read Waterhouse's use of the phrase by October 1837: some facts had "compelled" Waterhouse "to give up my theory" (B 57 fn1, *Notebooks* 185). But that does not explain Darwin's reason for turning "my theory" into a regularly used device, or its value to his theorizing.

Darwin's first use may have been about a year before discovering his theory lynchpin of natural selection, in margin notes he made in a work by Lyell: "All this agrees perfectly with my theory" (B 155 fn1, Kohn in *Notebooks* 209). The term "my theory" appeared five times in the B notebook, fifteen times in C, five times in D, thirty-five times in E, fourteen times in N notebook (after he had discovered natural selection),

and nine times in OUN (it did not appear in the M notebooks). “My theory” also appeared often in the 1842 and 1844 essays, and almost fifty times in *Origin* (the exact number depends on edition), but by then he *had* his theory.

Several scholars have commented on Darwin’s use of this term. Gruber downplays the importance of the phrase: “the reader should bear in mind that Darwin uses the phrase ‘my theory’ liberally throughout the notebooks, to refer to whatever idea happens to have caught his enthusiasm at the moment, especially when he is thinking of his ideas in relation to those of others” (Gruber 1981 172). Perhaps it was only a linguistic habit as Gruber proposes, and not an intellectual tool. But nonetheless, the phrase seemed to aid Darwin’s focus. Writing “my theory” sometimes clarified where he had been or framed where he was going.

It appears that at times it helped him define problems he would have to overcome, as when he considered a particular fact that “appears to be a puzzle against my theory,” or when he noted that “My theory must encounter all these difficulties” (C 222, 199). Sometimes it was as if he was building theory-castles in the air to test, to see whether they could withstand deeper scrutiny. In other cases he used the device to challenge older theories which he believed to be wrong: “Great difference with my theory” (OUN 52).

He often used the phrase when his theory explained otherwise inconsistent facts, as if he were marking potential proofs to help make a compelling argument: “My theory thus explains a grand apparent anomaly in nature,” and “my theory explains this. but no other will” (C 135, 184e). Many times it seemed that he was summing up a list of details to see the big picture they implied: “Wonderful, partly explained on my theory” (C 200).

Saying “my theory” could have given Darwin a perspective on his various trains of thought.

The phrase may have encouraged his creativity, as when he imagined a completed theory and conjectured what else it might be able to prove: “If my theory [is] true, we get . . . ” (B 224). It is a powerful tool to contemplate that: ‘if this is true, then that would imply . . .’ Occasionally Darwin seemed to be using the phrase “my theory” as a sort of machine, an engine thrusting his ideas forward like wedges to break open problems: “my theory drives me to say . . .” and “my theory will make me deny . . .” (B 201, 219). Used these ways, it appeared to instill a motive power in Darwin’s conjectures, forcing him, pushing him, making him think.

Darwin knew that his theory was a work in progress, so when he said “my theory” he was talking about his changing theory *at that moment in time*. Kohn discusses how, before Darwin could get to the crux of his final theory, he had to overcome many nascent, premature explanations about transmutation (Kohn 1980 153). “My conclusion is that the formulation of these explanations gave him practice in the art of theory making. It is this process of constructing theory after theory that is important” (Kohn 1980 153-4). Darwin’s use of the phrase “my theory” seemed helpful in that process of theory progression.

As Darwin approached his Malthusian breakthrough, he used that same linguistic device to consider better and worse ways to describe his final theory. On August 9th 1838 he conjectured: “In comparing my theory with any other. it should be observed not what comparative difficulties (as long as not overwhelming) [but] What comparative solutions

& linking of facts" (D 71). Darwin was viewing existing theories against each other, and against his theory, analogously to parallel trains of thought. Still without his theory's lynchpin, Darwin here used this trope to remind himself to frame his finished theory in a positive fashion, on its scientific strengths. Intentionally or not, Darwin's use of the phrase "my theory" seemed to assist his thinking.

Desmond and Moore's comments on the repeated use of the phrase "my theory" return us to Darwin's consideration of instincts and heredity.

> Everywhere he left the prominent stamp – my theory – and he was in not two minds about its importance. He exuberantly claimed that 'my' theory 'would give zest to recent & Fossil Comparative Anatomy.' It would revolutionize the 'study of instincts, hereditary. [sic] & mind,' and transform the 'whole [of] metaphysics.' It would – but not yet. (Desmond 1991 237 [brackets his], B 228)

As noted, I think the phrase was more than just a marker or a "stamp" of the "importance" Darwin put on his developing theory. Here "my theory" seemed like an arrow pointing to an entire branch of sciences that his theory would help explicate in completely new ways.

Desmond and Moore's comment argues for Darwin's belief that his theory would revolutionize the study of mind by framing all mental functions as products of the material human brain—a brain that evolved from animals (Desmond 1991 237). Darwin repeatedly pondered the hereditary relationships among habits, instincts and thoughts, envisioning how all the operations of material mind might have originated. He wanted to

understand the workings of the human mind, including emotions and morality. “Since human mental traits were comparable to those of animals, differing only in degree, he felt assured that his theory of transmutation could indeed bring humans within its purview” (Richards 2005 171).

Now that I have discussed some of Darwin’s rhetorical devices that might have aided his thinking, like castles in the air, parallel trains of thought, and his “my theory” device, I will return to his considerations on the mind of man. Darwin began a private, parallel “M” notebook for speculations he thought should remain circumspect, such as the implications of a material mind. Ralph Colp comments about Darwin’s beginning that notebook: “With this commitment the character of his life changed, imperceptibly, yet dramatically, as he began leading two lives” (Colp 1980 10).

In July 1838, at about the same time he finished his C notebook and began Notebook D, he also started Notebook M, whose title page declared: "This Book full of Metaphysics on Morals & Speculations on Expression," and then: “Private” (Barrett in *Notebooks* 520). At that time the word ‘metaphysics’ not only had religious connotations. As Michael Ghiselin suggests, it also referred to the workings of the mind, roughly equivalent to what later would become psychology (Ghiselin 179). Certainly in this notebook, Darwin delved into concerns both psychological and religious.

The “M” titling for the notebook was not just a jump in the alphabet, but allowed for a jump in thinking. “Behavior and materialism become so important that upon completing Notebook C, Darwin establishes Notebooks M and N as a separate series of ‘metaphysical enquiries’” (Kohn in *Notebooks* 238). Layered onto metaphysics, the “M”

could simultaneously refer to materialism. The title "may have meant Man, or Morals, or Mind, or may have been merely mnemonic" (Gruber 178). Notebook M marks a shift in Darwin's focus: "He was now intent on extending his evolutionary investigations from areas of general natural history to areas involving the origin and transmission of human behavior" (Colp 1980 17). In these private notebooks Darwin often speculated on the mind, including its material origin, the heritability of emotions, and the similarities of man and animals through behavior and expression. He also had a few choice words for scientists who relied on religious explanations for natural occurrences.

Howard Gruber offers several suggestions why Darwin started *Notebook M*, first proposing that "the idleness of a vacation away from London may have provided a convenient setting, and the opportunity to question his father about various medical subjects related to mental processes may have served as a further invitation to embark on the study of man" (Gruber 1981 179). Gruber's second possibility is that the parallel M notebook allowed Darwin to separate man from his other evolutionary speculations, which "would have been entirely consonant with the thinking of most of his contemporaries. But . . . such a cleavage would have been quite un-Darwinian" (Gruber 179). Gruber's third possibility, to which he seems inclined, is "that Darwin began his systematic study of man and mind because he hoped to find in that direction answers to questions that went right to the heart of his search for a theory of evolution" (Gruber 179).

I disagree with Gruber's third suggestion, that Darwin believed focusing on man, specifically, would help him unravel evolution. Darwin did not prioritize man, but

included him in the evolutionary web. Darwin's belief in man's *similarity* to other animals could have led to the opening of "Private" notebooks as part of a cautionary strategy. He may have sensed danger in premature discussion of his speculations on man, so he established the habit of keeping such thoughts private in writing as well as conversation. It was almost as if he was quarantining thoughts he suspected to be dangerous.

Darwin might have hoped that focusing on man's mind, and its transmutation from simpler animals, could offer some parallel insights into species evolution, but I do not think that was a primary motive, nor that he thought the mind was the crux of the problem. I do think Darwin believed that explaining man's material mind could prove a difficulty for his developing theory. In the context of the transmutation of species, Darwin realized that he needed only a plausible explanation rather than a provable theory for the appearance of the mind of man. I suggest also that Darwin found untangling the origin of mind and emotions to be an intriguing intellectual challenge, the mind studying itself, and perhaps also he hoped that such inquiry into the material roots of thinking would aid his own efforts at original thought.

Of course, in opening the M notebook Darwin simply may have wanted to separate man and metaphysics from his speculations on nature, geology and natural history, purely as on organizational tool. At least, that would be the answer based on Occam's razor.

The M notebook is where Darwin did most of his thinking about creativity. His first words in that notebook were: "My father says…" and the page continued with some

thoughts about heredity: "people taking after their parents" (M 1). The many references to the opinions of his father and grandfather make sense not only because the notebook was started during a visit with his father, but also because both his father and grandfather were doctors and respected authorities on matters of body and mind central to Darwin's concerns in the Metaphysical notebooks. Darwin's modus operandi included testing as many ideas about each subject as possible from wide-ranging reading and from experts, both those within reach and far-away natural historians.

Early in the M notebook, Darwin listed facts and anecdotes while contemplating various mental disturbances including anger, mental instability, problems with aging brains, and insanity. He also considered the possibility of such traits being heritable, to underpin his theory that mental attributes were as transmutable as physical. If Darwin was interested in the basis of human reason, it made sense that he was "interested in the examples of unreason, of insanity, with which his father's practice had made him partially familiar" (Brent 311). At that time, it was commonly believed there was a relationship between imagination and insanity: "[In] the mid 1800s, Emily Dickinson stated that 'much madness is Divinest sense' and Edgar Allan Poe questioned 'whether madness is or is not the loftiest intelligence'" (Dickenson 24, Poe 310, in Hudson).

Darwin also questioned this association: "My F. says there is perfect gradation between sound people and insane.– that everybody is insane. at some time. [. . .] My Grand F. thought the feeling of anger, which rises almost involuntarily when a person is *tired* is akin to insanity" (M 13-4). After a bit more deliberation, Darwin suggested: "There seems no distinction between enthusiasm passion & madness" (M 18). Darwin

considered that “passion, ill-humour & depression, which comes on from bodily causes,” leads to “an argument for materialism” (M 19). He was considering various aspects of the mind and casting his thoughts in different directions, studying what he found and then connecting many of the ideas to materialism and heritability. In the case of mental functions he was pondering a gradation from insanity to sanity, and possibly to creativity.

Darwin believed that if mental qualities were heritable, and hence have an evolutionary basis like physical qualities, that would be strong evidence for the mind having a material basis. “My father says, [….] <<stammering in my Father family>> [….] are hereditary” (M 25). Grandfather Erasmus and Erasmus’ eldest son both stuttered, which was an argument for the inheritance of stuttering, which at that time was considered to be the physical manifestation of a psychological problem (M 25 fn1). Darwin’s speculating suggests his belief that heritable stammering provided more proof that other psychological attributes might also be heritable, like thinking.

Darwin had been speculating about materialism and hereditary brain structures a few months earlier in the C notebook: “it is difficult to imagine” that thought could be “anything but structure of brain” and thus “heredetary” (C 166). Darwin then cautioned himself: “oh you Materialist!” (C 166). But he ignored his own warning as he continued, seeming to be energized by his openly materialist speculations: “facts full of meaning.—Why is thought, being a secretion of brain, more wonderful than gravity a property of matter? It is our arrogance, it our admiration of ourselves” (C 166).

Manier notes that Darwin’s rationale in these notebook entries was that: “Any apparent implausibility in the materialistic explanation of mental activity was rooted in

human egocentricity" (Manier 1978 130). Darwin seemed upset by man's arrogant self-absorption, and perhaps the emotional energy of that upset, plus a more humble view of human thinking, helped fuel his creativity. Darwin continued digging into the idea of a material brain and concluded that notebook entry by suggesting that all thoughts are probably due to heritable brain structure, dryly commenting that even "love of the deity effect of organization" (C 166). That is, if all thoughts are generated by the material organization of the brain, then the same must be true of religious belief.

Privately skirting heresy in his notebook conjectures, Darwin here seemed to demonstrate how his uncompromising thinking process brought parallel trains of thought together in creative ways. He proffered his own description of this style of thinking in a notebook entry written less than two weeks before he discovered natural selection: "The line of argument «often» pursued throughout my theory is to establish a point as a probability by induction, & to apply it as hypothesis to other points. & see whether it will solve them" (D 117). Darwin used induction to shape an hypothesis, the traditional method of natural philosophy, then dialectically compared that hypothesis to other parallel thoughts in looking for solutions. He was considering both his thinking method and the possible *predictive* value of his theory at solving other problems.

Nothing was sacred or shielded from scrutiny by the process "pursued throughout my theory" (D 117). Darwin's open-mindedness was again on display in Notebook M, as he speculated on possible heritable mental qualities, including imagination and free will. Darwin seemed skeptical of some radical arguments, but perhaps he needed to challenge them before shelving or discarding.

> One is tempted to believe phrenologists are right about habitual exercise of the mind, altering form of head, & thus these qualities become heredetary.— When a man says I will improve my powers of imagination, & does so,— is not this free will,— he improves the faculty according to usual method, but what urges him,— absolute free will, motive may be anything ambition, avarice, &c &c (M 30-1).

Looking again at free will, Darwin speculated that it was often tainted by predilections, ambitions and other motives. Free will and imagination were connected here, in this hypothetical man—who could be Darwin speculating about himself—wanting to make "my" improved imagination heritable. Darwin certainly knew that improvement only came from effort, study and practice—"according to the usual method" (M 30).

Darwin may still have been testing a variation of Lamarck's theory of use and disuse, in considering if *intentional* improvement of the brain could be heritable. While Lamarck was considered the father of evolution throughout Europe, his ideas were mostly shunned in England due to Lyell's scathing critique in *Principles of Geology*. Lyell attacked Lamarck's entire theory primarily because of his assertions that heritable change in animals could occur from repeated use and disuse of an organ and from the *conscious willing* to change. Lamarck's views and their critique are well documented.

In response to Lyell's attacks, most English natural philosophers avoided the entirety of Lamarck's theories. But Darwin reconsidered many of Lamarck's ideas in his notebooks, *including* the possible heritability of traits caused by use-or-disuse—both physical and mental. Perhaps because of Lyell's critique, Darwin seemed extremely

careful to keep private any speculation of Lamarck's ideas, including the assertion that a man (or other animal) could improve the chances of a trait's heritability due to "intention" or "need." (Richards 92-4).

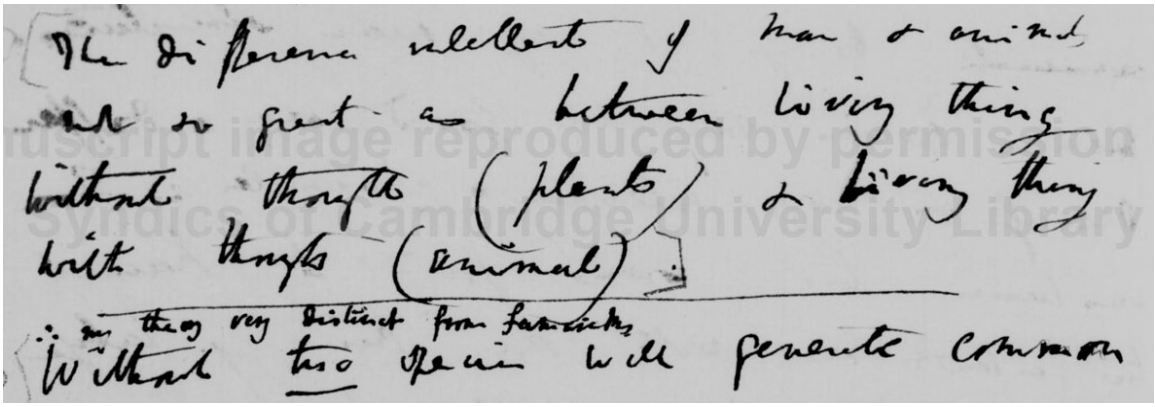
Lamarck had proposed that "*intention* is the key" and "need brings about change" (emphasis hers, Beer 1983 19). While Darwin seemed skeptical of such a direct effect from intention, Gillian Beer notes that "the language of intention is extraordinarily difficult to eradicate . . . from accounts of evolutionary development. Darwin himself never entirely succeeded. But for him there was a constant awareness that he must try to expunge from language the suggestion that will is a force for change" (Beer 1983 19-20).

A related language issue that Beer asserts was that Lamarck's theory shifted the power of creation from a deity to the intention of man (Beer 1983 20). Darwin seemed to consider three possibilities for the power that created species: that it was the intention of a deity, that the intention of animals brought heritable change, or that it was driven by laws of an unintentional nature.

Darwin quickly discarded the idea that a deity had authority over creation, and he was troubled by Lamarck's idea of intention playing a role in the inheritance of physical traits or behavior. Instead he settled on the premise that unintentional natural laws were the primary force behind species transmutation. Darwin believed that the laws behind the origin of new species, and ultimately behind the evolution of man and his creative mind, had no intention—either from the outside or the inside of mind. In April or May of 1838, a notebook entry discounted Lamarck's belief in the power of intention—in "willing" the inheritance of a desired trait: "Lamark's willing absurd, ∵ not applicable to plant" (C 63).

In an earlier note, probably written around February 1838 or a bit thereafter, Darwin also distanced himself from Lamarck: “my theory very distinct from Lamarcks” (B 214). The line leading into that Lamarck comment was: “The difference intellect of Man & animals not so great as between living thing without thought (plants) & living thing with thoughts (animal)” (B 214). The importance of plants to Darwin’s thinking will not be discussed here. Darwin disagreed with Lamarck in more than just the power of intention, as pointed out in the footnote to that page in the B notebook—there were “several other distinctions between their theories” (Kohn in *Notebooks* 224).

There are other points to make about this notebook entry. Possibly the comment



(Fig. 4. B 214, DMP, CUL DAR 121:214)

about his theory being “distinct from Lamarks” was added after, since it seemed to be written between lines and the handwriting was smaller than on the rest of the page, though it looks like the same ink (B 214). Also of interest, this notebook entry may mark the first time Darwin used the phrase “my theory” in his notebooks. It was while considering the nature of thinking, a major theme of this chapter, that Darwin initiated his

use of the phrase “my theory,” while he was once again noting his differences with Lamarck.

From here forward, this chapter will follow a mostly chronological path through Darwin’s notebook considerations surrounding creativity, mostly in the M and D notebooks. Sometime on or just after July 22nd 1838, Darwin began a wide-ranging entry of almost twenty pages. He queried the connections between creativity and insanity, wondering if delirium was “analogous to sleep” (M 45). It was a nineteenth-century belief that sleep, creativity and insanity were related, as I mentioned in discussions about the opening pages of the M notebook while citing Emily Dickinson and Edgar Allan Poe. There was a paradoxical belief that “the mental state called dreaming corresponds to madness, and is therefore the antithesis of reason and of beauty; nevertheless it may on occasion come to the aid of reason (problem solving) or help bring a work of art . . . into being” (James 2).

Darwin speculated about memories and thoughts, both voluntary and involuntary (as in sleep). “When a muscle is moved very often, the motion becomes habitual & involuntary.— when a thought is thought very often it becomes habitual & involuntary,— that is involuntary memory, as in sleep.— a new thought arises?? compounded of the involuntary thoughts” (M 46). Darwin was teasing out differences between voluntary and involuntary thoughts, between habitual ideas and new, creative thoughts. He wondered if new ideas could begin as a combination or permutation of existing thoughts. There are hints of Lamarck, who had proposed that we are born already stocked with memories, emotions and other mental habits.

Darwin continued: perhaps "an intentionally [sic] recollection" is a function of "association & association is probably a physical effect of brain" (M 46). Since the mind is material, and develops "the habit of producing a train of thought," the habit of associations could continue in sleep (M 46). Thus a brain practiced in thinking might generate productive ideas when dreaming. This seems similar to an idea Cabanis had written about in his 1802 *Rapports*, in describing Benjamin Franklin (James 1). Cabanis suggested that Franklin (a friend also of Erasmus Darwin's) was creative even in his sleep: "as one may frequently observe, even during delirium, of men with trained minds" (James 1, Cabanis IV:391).

In Darwin's notebook entry he was considering different ways the brain might generate original thought. He was teasing out the distinction between how the brain generated involuntary thoughts (habitual, imitation) versus original thoughts. He speculated that the practice of focused thinking produced an exercised brain, one that was in the habit of making associations leading to new ideas.

Darwin's process here was to scrutinize several trains of thought, including existing ideas about creativity, insanity and sleep, and see if they stayed on track when framed with his developing theory. It is never possible to have assurance that Darwin was intentionally using the metaphor for creative thinking that he had isolated, or if that metaphor was just a good definition of the style of thinking he already possessed.

Darwin continued contemplating ideas about various mental processes over the next ten pages. He began with memory and its lapses, switched to the feelings of sympathy and anger in children and adults, and finally contemplated how people and

animals both react similarly and involuntarily to unexpected shocks (M 50-3). “Fear must be simple instinctive feeling: I have awakened in the night [. . .] & felt so much afraid though my reason was laughing” (M 53-4).

John Bowlby comments about this passage on fearful dreams: “Perhaps significantly, it is at the end of the same entry that he emphasizes the necessity of concealing his belief in materialism” (216). The cover story Darwin suggested for his materialism was: “To avoid stating how far, I believe, in Materialism, say only that emotions, instincts degrees of talent, which are hereditary are so because brain of child resemble, parent stock.– (& phrenologists state that brain alters)” (M 57). Leaning on phrenology, a popular belief system at that time, could be a safe way to discuss brain function.

Darwin’s waking up with a fearful start might have been a symptom of the “Tormented Evolutionist,” as asserted by Desmond and Moore (1991 259). It certainly was a risky time to publicly advocate the material basis of thinking, “with disgraced materialists falling like London flies” (Desmond 1991 250-1). Darwin knew the public sentiment, aware of the danger of publicly espousing such ideas. So it seems plausible that he considered a protective strategy.

Also, it is interesting that Darwin’s waking from a dream gave him food for thought, after he recently had contemplated how ideas could be generated during sleep. Darwin’s strategy seemed to include seriously considering all possible sources for ideas—including from castles in the air, from Lamarck, and from worried dreams. The potential danger of his materialist theorizing did not divert Darwin’s speculations.

Darwin was developing details of his theory to explain how a purely material brain could be responsible for *all* mental and emotional responses. Maybe he was nervous, but at the same time he seemed fascinated by possible material mechanisms of thinking. In fact, while the obvious risk of public exposure as a materialist might have increased Darwin's caution, in a contrarian twist it may also have stimulated his thinking. He was like a moth and flame the way he continued to circle the perilous topic of man and materialism even though he would keep private all discussion of man until the *Descent of Man* in 1871, long after publication of the *Origin*. So while contemplating materialistic ideas may have exacerbated his headaches, I propose that the very illicit nature of his topics also energized his thinking.

Immediately after Darwin's cautious comments about how to cover up his materialism, he returned to more speculations on the material mind. He proposed that "thinking consists of sensation of images before your eyes, or ears (language mere means of exciting association.)— or of memory of such sensations" (M 61^{e}-62^{e}). He was giving the origin of thought an associationist foundation.

Darwin had switched from contemplating the material basis of thinking to speculations about memory and fear, onto a parallel track of caution about his materialism and then back to associating thoughts in a material mind. In these dozen pages in notebook M, numbers 50 to 62e, Darwin once again moved productively among trains of thought. After considering how to safely camouflage his materialist thoughts behind an argument of inherited characteristics, Darwin drove forward into speculations on how the brain associates sensations, images, and words that stimulate memories and

ideas. Darwin was filling his head with diverse parallel ideas, and noting what came to mind. Again, intentional use of his "train" metaphor is impossible to prove.

Darwin's considerations about hiding the extent of his materialistic beliefs were written between the 27th of July and 7th of August, 1838 (DMP). On the 9th of August, Darwin wrote a long, friendly letter to his friend and mentor, Charles Lyell, that demonstrated more of his method. The letter began with the detailed geology and entomology typical of their correspondence, plus a few sneers at the untenable metaphysical theories of several fellow natural philosophers.

Darwin thanked Lyell for a suggestion to pace himself: "working about two hours at a spell; I then go out, & do my business in the streets, return & set to work again, & thus make two separate days out of one.— The new plan answers capitally" (*Correspondence* 2:97). I do not think this was purely flattery for his friend, but believe that the new plan really answered "capitally," not only with Darwin's productivity bur perhaps even with his health. Two shorter daily writing sessions could have increased the work he completed each day and perhaps kept him fresher, aiding his creativity. Shorter stints of focused concentration might also have eased his stomach problems and headaches.

Darwin then thanked Lyell a second time, for proposing his membership to the Athenæum, a prestigious men's club that was to become Darwin's second home while in London. "I am full of admiration at the Athenæum; one meets so many people there, that one likes to see.— [….] Your helping me into the Athenæum has not been thrown away, & I enjoy it the more, because I fully expected to detest it" (*Correspondence* 2:97).

Perhaps Darwin originally feared that the club would waste a lot of his valuable time, probably expecting to be surrounded by snobs and boors. Instead, it turned out to be a quiet place to read and a stimulating place for intellectual conversation.

The letter's postscript mentioned a visit with Captain FitzRoy, who had a habit of slipping easily into emotional distress. FitzRoy was still delaying the publication of the *Journal of Researches* and had become upset when that fact was hinted at in Lyell's new book, *Elements*. Darwin framed FitzRoy's disturbance with language that seemed to come from his developing theory of the material organization of the brain.

> He looked rather black at the preface, made a kind of growl, but then came smooth again. I never cease wondering at his character, so full of good & generous traits but spoiled by such an unlucky temper.— Some part of the organization of his brain wants mending: nothing else will account for his manner of viewing things. (*Correspondence* 2:98)

It is a bit curious that Darwin felt comfortable speaking directly about the organization of the brain affecting temperament. Perhaps this vocabulary of brain "organization" was also associated with phrenology, which would make his comment innocent enough. But if not, perhaps it was an inadvertent slip. This way of describing mental traits may have reflected Darwin's developing assumption (or perhaps new foundational belief) that emotional responses were purely materially based in the brain. Either way, he did use a light touch, perhaps for Lyell's benefit.

Darwin's same letter to Lyell included several appeals for specific scientific aid. Such requests for assistance, sometimes quite technical or even obscure, were Darwin's modus operandi for much of his life. Note the specificity:

> I should be very much obliged if you could (without giving yourself, or asking your friend to take much trouble) obtain for me a copy of the two-hourly barometrical observations, made at Leith, from 7 oclock in the morning to seven in the evening on Thursday, July the 5th, - I should be very much obliged. (*Correspondence* 2:97-8)

Darwin was always quite polite but usually insistent in asking his correspondents for detailed information, and often specimens, in what was then an accepted scientific method to gather data. Reliable mail service to the far flung corners of the British Empire was an exciting new technology, eagerly adopted by Darwin and other scientists to follow up on reports and rumors of unusual discoveries. It is quite remarkable how Darwin turned far-flung correspondents into assistants, as they gladly acceded to time-consuming aid requests.

Today, many theories about creativity hold suspect the idea of an individual genius working in solitude and instead focus on groups of minds interacting, networking. There is "an impressive body of research in social psychology and the new field of social neuroscience, which contends that individual agency often pales next to the imperatives of a collective" (Shenk). Darwin relied on such a collective to gather information, but he still had to make the connections alone. He used the British Postal Service analogously to how the Internet was originally intended for scientific research. He was extremely adept

at plying the mails to build his own social-scientific network, leveraging the value of shared knowledge and ideas.

Three days after writing that letter to Lyell, on August 12th, Darwin acknowledged a successful day of thinking that brought another painful headache. After he found quick relief, he then contemplated the method of his success. "At the Athenæum Club. Was very much struck with an intense headache <<after good days work>> which came on from reading <<review of>> M. Comte Phil. Which made me <<endeavor to>> remember, & to think deeply, & the immediate manner in which my head got well when reading article by Boz" (M 81). Boz was a nickname for Charles Dickens.

Perhaps it was just the distraction that relieved his mental pressure, or maybe it was the masterful demonstration of imagination. Dickens' writing was certainly a complete change from the review of Auguste Comte's provocative positivist philosophy, which arguably instigated Darwin's malady (*Edinburgh Review*, 67:271-308). Desmond and Moore suggest that this headache was brought on by the reviewer's warning against taking Comte's atheistic materialism too far and ending up in immorality (1991 260). But Darwin had already gone beyond what the reviewer had feared.

Darwin's mind seemed powerfully stimulated by reading the review of Comte, as his subsequent theorizing shows. Comte's theory "did for the solar system precisely what Darwin was attempting to do for the species problem" (Schweber 1978 322-3). Comte argues (among other issues) that nature's laws explain all planetary motion, with nothing left out. If Comte could remove the hand of providence and any metaphysical forces from astronomical events, and Lyell could do the same for all of geological history, perhaps

the world was ready for Darwin's theory to similarly describe a lawful natural history. No wonder he had a headache.

Reading Comte seemed to excite a lot of ideas and enthusiasm, and within the next few days Darwin wrote: "Mine is a bold theory, which attempts to explain, or asserts to be explicable every instinct in animals" (D 26). This was an undated entry in the D notebook, probably between the 7th and 16th of August 1838 (dated by *DMP*). Darwin here qualified "my theory" as bold, driving him to expand its scope to "every instinct," to feelings, emotions and other mental activities, not just the *physical* transmutations that create new species (D 26).

The mind might be where it's asserted boldness lay. If he could prove all animal instincts were materially based in their brains, and thus heritable, he was suggesting that his theory not only explained the origin of the *physical* structures of all species, but also the origin of mind. Of course, he still needed the mechanism of his theory, but his imagination was taking him to some important implications of that theory.

This was about the time that Darwin started dating his notebook entries with a new regularity. Desmond and Moore propose that Darwin's comment about his "bold theory" reflects his realization of the importance of his work, and his "rising self - importance" encouraged him to start dating his notebooks, as if for posterity (1991 260). Sandra Herbert suggests that his new attention to dating shows that he "became conscious of himself as a being in time," and that he "probably did it to make his notes more useful to him in the future" (Herbert 1977 208). I suspect it was a little of both. This regular

dating showed a shift in his thinking, as if Darwin suspected that he was closing in on an important truth of nature and wanted to mark the path he was following.

After his dated entry about the Comte review of "Aug 12th," Darwin wrote the same date on the next page of his M notebook (M 81-2). Perhaps his headache forced a break and he later returned with fresh ideas.

Darwin wrote that a recent museum visit "amused" him when he "smelt the peculiar smell of Picture" that brought back distinct memories of a Cambridge museum he last visited about seven years previously (M 82). "Much pleasure immediately thrilled across me, bringing up old indistinct ideas of FitzWilliam Musm" (M 82). Darwin was noting connections between physical sensations (scent) and automatic mental activity, and how associations stir the brain and bring up ideas. Again he seemed to be teasing out where ideas come from, expanding what can kindle a thought and maybe initiate creativity. Ideas could be stimulated by a stray smell or word, or by implications of a castle in the air, or by following a train of thought.

There seems to be a lot of Hartley's Associationism here (as discussed in a previous chapter). Hartley believed that we experience the world through sensations and the memories of sensations, building ideas by the *association* of those inputs. "The starting point of Hartley's psychology is not that simple or basic ideas can be linked by associations; rather, it is that a process of association *generates* ideas, including our categories of perception" (Allen 146). Where Locke saw the mind as an arbiter "seated on a throne" giving audience to words that filed by trying to get attention, Hartley saw man as an animal experiencing sensations and emotions, constantly sorting them into

patterns that become more and more complex thoughts as associations build on associations (Allen 224-5). “Associationism served Darwin well as a way of accounting for the development of complex ideas by small steps” (Durant 305, in Kohn 1985a).

One important point of Hartley’s argument was that aesthetics, emotions, and intelligence can exist without some separate, metaphysical mind. Hartley believed that “from the fact that a being can be described mechanistically, it does not follow that it lacks perceptions, feelings, and affections; and from the fact that a being displays intelligence, it does not follow that something exists within it that cannot be described mechanistically” (Allen 187). Hartley doubted Descartes’ dualism, his certainty in an immaterial, self-conscious thinker separate from the brain. He saw feelings, emotions and even mind as the materialistic products of a brain-body connection, as Darwin came to believe.

Another philosopher Darwin was reading at about this time was Herbert Mayo. In *Philosophy of Living*, Mayo discusses double consciousness (schizophrenia), which he speculates may be related to dream-thinking, when: “Thought suggests thought perfectly at random” (Mayo 1838, 140). It may be Mayo’s ideas that stimulated Darwin’s August 15th entry in *Notebook M*, when he considered the habitual nature of some thoughts being demonstrated by double consciousness. “The possibility of two quite separate trains going on in the mind as in double consciousness may really explain what habit is— In the *habitual* train of thought one idea. Calls up another & the consciousness of double individual is not awakened” (M 83^{e}). Perhaps a habitual train of thought just repeats

well-worn ideas, or imitates or mimics. Darwin was considering that some thoughts may not be consciously directed.

Perhaps a habitual thought in the background could call up an unexpected association in the conscious mind. A footnote on a similar Mayo reference suggests that "Darwin very likely discussed the issue with Herbert Mayo at the Athenaeum, where both were members" (Herbert and Barrett in *Notebooks* 546, M 110 fn2). Darwin seemed to be trying to tease out how material minds worked by looking at unusual situations, like dream states or minds that were considered unbalanced or ill.

Maybe Darwin was considering whether parallel mental trains explained how one habitual thought instigated the next idea automatically in the background (unconscious) mind. In such a brain, prone to automatic, habitual thinking, new ideas would be scarce. Darwin may again have been wondering about the paucity of free will and creativity. Such concerns about the brain resisting creativity could have contributed to Darwin's recurring headaches.

The day after those speculations on trains of thought, August 16th, Darwin made *two sets* of dated entries in *each* notebook, D and M. He might only have absent mindedly re-dated in the middle of his thinking sessions, but perhaps he dated each notebook twice because on that day, Darwin followed Lyell's advice. That is, he wrote in both notebooks in the morning, took a break, and returned to both notebooks that summer Thursday afternoon, re-dating two new entries. By the way, I intentionally inserted "summer Thursday" into that sentence not just because it was, but because breaking into a thought and adding just one or two words can tweak associations, provoke imagination

and call up new thoughts—exactly what Darwin was trying to do in his own thinking. Trying to reconstruct this one day's thinking provides an unusual insight into Darwin's working style.

Note that Darwin wrote in parallel notebooks with different yet parallel thoughts: There were some conjectures about science, literature, animals, man and mind. It is tantalizing to think that he may have consciously switched to parallel thought trains in an attempt to stimulate his creativity, for instance by moving from considerations of heredity and mental functions to contrasting thoughts of poetry and passion.

We cannot know with certainty what happened that day, nor even the order of Darwin's writing in the two notebooks, D and M. But based on the way his thoughts flowed I suggest his first entry was in the D notebook. Darwin pondered a Disraeli comment about inheritance of physical characteristics through many generations, in "whole Dynasties" (D 35). Distinctive family noses and lips persisted despite repeatedly "crossing with females not thus characterized" (D 35). The idea that such specific characteristics could hold through generations, and not eventually return to the average characteristics of the species, was one example of variation resisting swamping (not returning quickly to a mean), one of Darwin's theoretical concerns.

After thus considering heritability of physical characteristics, perhaps Darwin began thinking of specific *mental* characteristics that might likewise resist swamping and he switched notebooks to the metaphysical M: "Aug. 16th. As instance of heredetary [sic] mind. I a Darwin & take after my Father in heraldic principle. & Eras a Wedgwood in many respects & some of Aunt Sarahs [. . .] Catherine in some respects"

(M 84e). He again speculated that mental characteristics were heritable just like physical characteristics, pointing to their material roots. "My handwriting same as grandfather" (M 84e). Handwriting combines a complex mix of both mental and physical qualities. Once more Darwin relied on himself as both experimenter and object of study. The thought about handwriting concluded that entry (or at least he re-dated the notebook immediately thereafter).

Darwin began new entries in both notebooks, marked with the same date of August 16th. I suggest he returned first to the M notebook this time. Perhaps during his break he read Spenser's *Faerie Queene* for relaxation or mental distraction, or consciously to initiate a parallel train of thought. Darwin referred to a passage in that poem full of emotion, and began the notebook entry: "Anger «Rage» in worst form is described by Spenser" (M 84e). A footnote points to a passage in *Faerie Queene* about a character's being urged on by uncontrollable animal passions (M 84e fn1, *FQ* I:IV 30-3).

> And next to him malicious Envy rode.
>
> Upon a ravenous wolfe,
>
> . . . . . .
>
> He does backebite, and spitefull poison spues,
>
> . . . . . .
>
> And him beside rides fierce revenging Wrath,
>
> Upon a lion,
>
> . . . . . .
>
> And on his dagger still his hand he held,

> Trembling through hasty rage, when choler in him sweld.
>
> (I:IV 30-3)

Spenser's stirring descriptions of uncontrollable emotion may have reminded Darwin both of the indigenous people in South America and animals in the Zoological Gardens. In notes Darwin made about the zoo animals, he recounted that their emotions look remarkably like those felt by humans. He also noted that animals show unmistakable signs of reasoning.

Perhaps the Spenser quote stimulated Darwin's creativity, as he quickly followed with a tantalizing thought: "Origin of man now proved. —Metaphysic must flourish. — He who understands baboon ‹~~will~~› do more towards metaphysics than Locke (M 84[e]). This quote about "Origin of man now proved" has received diverse comments from numerous writers. To Carl Degler, this was an example of Darwin, in 1838, "already seeing connections between human beings and animals" (7). But Darwin had previously considered the similarity of both physical and mental attributes of animals, savages and man, as discussed earlier.

To Dorothy Cheney and Robert Seyfarth, the same notebook quote suggests Darwin's "growing excitement. . . . [J]ust as the key to reconstructing the evolution of a whale's fin or a bird's beak comes from comparative research on similar traits in closely related species, the key to reconstructing the evolution of the human mind must come from comparative research on the minds of our closest animal relatives" (4). Darwin's speculations on mind held their own importance, and may also have acted as parallel trains of thought to contrast with, and stimulate, Darwin's theorizing on his primary focus

of species origin. Paul Barrett suggests that "Darwin believed the similarity of expressions in other animals to man strengthened, even 'proved', the transmutationist case" (*Notebooks* 518).

Focusing on the next phrase, "Metaphysic must flourish," Michael Ghiselin suggests that we read "psychology" for "metaphysics," which word is closer to its meaning at that time (M 84e 964). This definition gives the quote a different slant, making it similar to Darwin's "bold" claim, a few days earlier, that his theory explained all instincts (D 26). Darwin was not just talking about the shared physical traits of man and baboon, but also the psychological similarities, like shared strong emotions (as in the Spenser poem). Darwin may have been asserting that man's psychological (metaphysical) as well as physical origins were "now proved" by transmutation from animals (M 84e). He believed that proving heritability of mental characteristics was, in turn, evidence that the mind was material and located in a brain similar to brains in animals.

Ghiselin argues that with Darwin's empirical view, "psychology was turned into a natural science" (965). So *psychology* must flourish under Darwin's developing theory of mental characteristics that are purely material, characteristics that are inherited with slight differences just like inherited noses and wings. Before he even had a theory, Darwin was considering some of the wide-ranging repercussions it would have. Ghiselin offered proof that the implications of these thoughts about psychology were important to Darwin, since he reprised them in the conclusion of the *Origin* when discussing the impact of his theory: "Psychology will be based on a new foundation. . . . Light will be thrown on the origin of man and his history" (*Origin* 488 in Ghiselin 964).

Desmond and Moore have another thought about Darwin's phrase "origin of man now proved," suggesting that now "he was convinced that his science was not only right, but as shattering as Galileo's" (M 84e, 1991 260). I am inclined to a less expansive view of what Darwin asserted that he had proved, agreeing somewhat with Ghiselin's definition of metaphysic and backed up by some circumstantial physical evidence. The handwriting in this notebook entry did not show any increased excitement, which it definitely did with his coming Malthusian breakthrough.

Maybe it was only an example of Darwin intentionally building a castle in the air, to see if connecting several trains of thought would stand scrutiny. Darwin was only extending what many people previously asserted about the linkage of mankind and animals; he just added the mind. I think Darwin's meaning may have been that the origin of man's *mind* is now proved, from a belief in his proofs of a material mind. Although if Desmond and Moore are right, Darwin may have been claiming that he had found the source of original thought, which we share with baboons. That would have been a fitting joke on his arrogant peers.

In regard to the disparagement of Locke, Darwin did extremely well on his Cambridge examinations about Locke's *An Essay Concerning Human Understanding* (Desmond 1991 88). I believe that Darwin invoked Locke as a representative of a class of philosophers. Darwin may have been saying that we learn more from real life study, such as of the psychology of baboons, than solely from sitting in a chair in deep contemplation (Ghiselin 965). Darwin may have seen himself as a modern natural historian basing his

arguments on facts, experiments and real-life observations. From this point of view, one learns more about psychology from watching a baboon than from reading Locke.

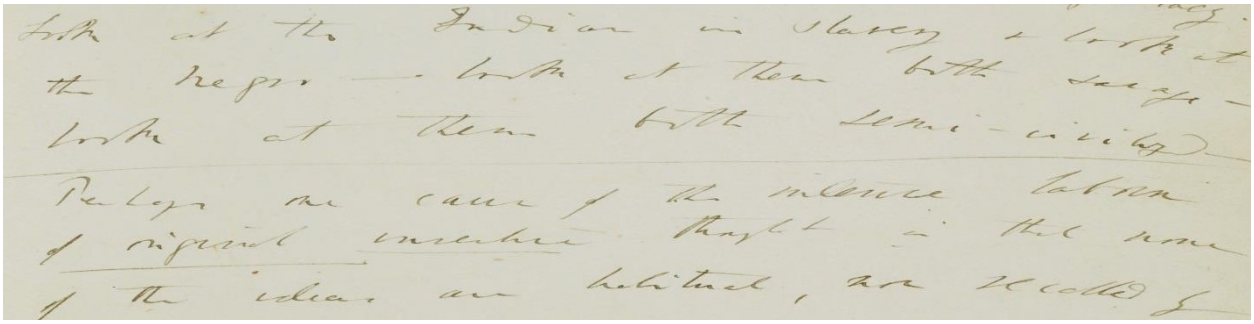
Darwin's belief that his empirical and observational methods were more scientific than Locke's may not only have supported his confidence in his results but also helped him achieve his creative breakthroughs. This modern scientific method combined ideas from many disciplines with the best facts and physical details Darwin could gather. Arguably, this strategy improved his creative ability to formulate an expansive theory to solve the psychological as well as the material mysteries of the origin of species.

Returning to that same notebook session right after his jab at Locke, Darwin clarified some thoughts about animal relatedness: "Seeing a dog & horse & man yawn, makes me feel how ‹~~much~~› all animals ‹~~are~~› built on one structure" (M 85). Darwin again linked animals with man, sharing affective expressions. "He thought as deeply about behavior as he did about form" (Edelman 48). He believed both were made of the same material, and obeyed the same laws. The structure of mind, behavior and form were parallel thoughts that Darwin was bringing together.

As this notebook entry continued, Darwin was writing with energy and his thoughts were ranging widely. He contemplated facts from different regions as well as from different species. Then he seemed to suddenly stop short. "the American in Brazil is under same conditions as Negro on the other side of the Atlantic. Why then is he so different— in organization.— [. . .] look at them both savage— look at them both semi-civilized" (M 87). Darwin could have seen this as a clue to transmutation, since a Creator

should not have put different people in identical climates, while transmutation could have acted on them very differently over time and space.

I think that Darwin's emphasis on "Why then is he so different— in organization" while "under same conditions," and then his repeating "look at them both. . ." suggests that he was stuck in that question, or at least he noticed the hard work of trying to find a creative explanation. He may have thought this small detail could be a big problem with his developing species theory. In his notebook Darwin drew a light line horizontally across most of the page, as if to start a new thought.



(Fig. 5. M 87, DMP, CUL DAR 125:87)

Based on his next immediate comments, it is plausible to suggest that he either noted his intense thinking, perhaps momentarily blocked by a knotty problem, or perhaps just remembered such an experience. "Perhaps one cause of the intense labour <u>of original inventive</u> thought is that none of the ideas are habitual, nor recalled by obvious associations, as by reading a book.— Consider this" (M 86, underlining his).

He had shifted focus from the particular details of species distribution, which may have stymied his focused thinking, directly to the problem of being creative. I could not find if he ever returned to "consider this" in his notebook, which certainly does not

preclude that he gave it later consideration. It is a bit ironic that here he discounted the value of books, while reading one by Malthus would soon instigate the idea of natural selection. Reading something seemingly unrelated to his theory, like Malthus on political economy, would fit the device of switching to a parallel train of thought to try to generate creativity.

Darwin here observed that doing inventive thinking was intense labor. Perhaps he noticed that he was trying to go beyond "obvious associations" (M 86). He had made a distinction between artless associations of habitual ideas and having original, creative thoughts. He pondered the intense effort it took attempting to break routine and generate creative thinking. Switching to a different train of thought, he might consciously have been querying the meaning of stalled thinking, which I think was his current predicament.

In the very next line Darwin again changed tracks, this time to quoting poetry. A few pages previously it was Spenser, while earlier Wordsworth and Dickens seemed to bring relief. This time he turned to Coleridge. "The fledge-dove knows the prowlers of the air" (M 88, fn1). I see several possibilities why he chose this quote. Perhaps it was only an attempt to ease a headache, as in reading Dickens after Comte. Maybe he intentionally switched to a contrasting track in search of fresh ideas. Or perhaps Darwin thought that contemplating poetic creativity would help access his own. It may even have been that the content of the quoted section of *Zapolya* (1817a) seemed pertinent to Darwin's concerns.

– O she was innocent!

And to be innocent is nature's wisdom!

the fledge-dove knows the prowlers of the air,

Fear'd soon as seen, and flutters back to shelter. (Coleridge 1817a 106)

Perhaps Darwin worried that if he let his fledgling ideas fly free too soon, before he resolved all the details, they would be devoured by critics, those "prowlers of the air" (106). Darwin's ideas may be "innocent," and full of "nature's wisdom," but he still feared exposure and kept them sheltered.

Or maybe he was considering whether the brain *itself* resists new ideas. That is, as Darwin previously noted, he believed the material of the brain was designed to respond with habitual and imitative thoughts. Habitual thought patterns repeatedly forced nascent creativity back to ground, like those feared "prowlers" in the poem. The brain is much happier to imitate and repeat what its organization suggests, perhaps with only slight variation. It is more likely to regurgitate stale old thoughts than to author new, creative and previously unconsidered "innocent" ideas. In the language of his developing theory, nascent new ideas were often swamped by more accepted, habitual associations. Coming up with his bold theory would require focused, tenacious effort to repeatedly overcome the prowlers in the brain.

Returning to the next line in the M notebook, Darwin continued the poetic theme. "Fine poetry, or a strain of music" brought "sorrowful delight, very like best feeling of sympathy" (M 88). These thoughts might have been instigated by Darwin's contemplation of Coleridge. Darwin considered how experiencing something creative could bring physical feelings. He saw an empathetic connection between poetry or music and poignant feelings. He then contemplated how similar empathy brought a sympathetic

urge to help others in need—the "desire to assist" (M 89). He considered altruism, and its opposite, in children who were "naughty" with other children (M 89). Finally, he concluded that day's M notebook speculations with the open question: "Why does person cry for joy?" (M 89). Darwin had turned to poetry and envisioned the depth of complexity and entanglement of feelings seemingly as diverse as sadness and joy.

Herbert and Barrett suggest that many of Darwin's M and N notebook thoughts were used in *The Descent of Man* (1871) and *The Expressions of Emotions in Man and Animals* (1872) (*Notebooks* 19). That may even have been his plan, since until he wrote those later books he kept private most speculations on the mind of man. So his comment on sorrowful delight could simply have been a thought to be filed for later use. Or perhaps it was speculation on the complexity of creativity. Maybe it was a nod to the 1802 *Preface* to *Lyrical Ballads*: "The knowledge both of the Poet and the Man of Science is pleasure" (Wordsworth and Coleridge 302). The effort to author one truly original thought in poetry, music—or even science—just might make a mind cry for joy.

We are not quite finished with August 16th, as Darwin made a second entry that day in his D notebook. Perhaps he was inspired by his contemplation of poetry, music and original thought when he wrote a sweeping, framing view of his developing species theory. This is a sublime piece of prose that could have brought tearful pleasure.

> What a magnificent view one can take of the world Astronomical ‹~~& unknown~~› causes, modified by unknown ones. [. . .] instincts alter, reason is formed, & the world peopled «with Myriads of distinct forms» from a period short of eternity to the present time, to the

> future— How far grander than idea from cramped imagination that God created. [. . .] a long succession of vile Molluscous animals — How beneath the dignity of him, [. . .] (D 36-7)

Darwin used Lyell's geological sweep of time and Comte's lawful universe with a Romantic resonance, all dancing to the harmony of his developing theory.

Darwin's Genesis was scientific, with animals adapting and modifying organically from lawful causes. There was room for a deity, but one with more dignity than a mere mollusk-creator. Darwin focused on "adaptation," and before he isolated competition as a mechanism he contemplated that "change of climate [. . .] superinduce changes of form [. . .] as adaptation. &these changing affect each other, &and their bodies"— although the causes are still described as "unknown ones" (D 36). He made a point that "instincts alter, reason is formed," in a nod to the evolving foundation of a material mind (M 36). This was a summation of his current ideas, in strong prose, showing his raw creativity at work. Pieces were falling into place through research, reading science and poetry, his parallel trains of thought and especially his doggedly focused speculation.

We can only guess at the order Darwin wrote in the two notebooks that August day, still about six weeks shy of uncovering natural selection. Perhaps his sweeping vision of a lawful creation was the creative capstone. It may have made Darwin cry for joy, as it foreshadowed the famous ending of the *Origin* (Colp 1980 25):

> There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that,

> whilst this planet has gone cycling on according to the fixed laws of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been and are being, evolved. (*Origin* 490)

When he finally wrote *Origin,* Darwin assiduously avoided man in his evolutionary argument. But in notebook M, Man took center stage.

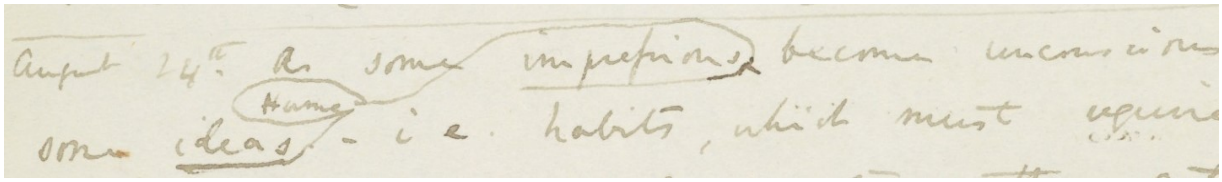
That August 16th was the only time we can be certain we are viewing so much of Darwin's thought process in one expanse, since it was the only time he dated two notebooks twice on the same day. His thinking seemed to be even more focused than usual as he was closing in on the idea of natural selection.

For the next few days, Darwin set aside that expansive view and returned to interrogating details and problems in his accelerating search. He focused on particulars, such as the role of geographic distribution in speciation and how unfavorable conditions could cause extinction. On August 21st he again considered emotions in animals and man, comparing expressions of dogs and babies and pondering the appearance of language (M 92-6). "The distinction was often said of language in man is very great from all animals—but do not overrate—animals communicate to each other" (M 96).

Darwin saw differences in degree, not in kind, between the brains of animals and man. He noted that naturalists had observed animal communication in diverse species, from foxes and cows to insects (M 97-9). Even "Spiders have many,—great powers of communicating knowledge to each other" (M 99). Darwin again declared a "strong argument for [the] brain bringing thought" (M 101e). He clarified his idea that our mind "obeys same laws. As other parts of structure" (M 101e).

If the brain brings thought, and the material of the brain follows the same laws as other bodily structures, Darwin then considered: “Can an analogy be drawn between <<hereditary>> associated pleasures & pains & emotions” (M 101^{e})? Heredity of brain structure suggested many possibilities. With this view, all functions of the mind, even imagination, were hereditary and subject to the mechanism of his developing theory: “brought within <<our own>> limits of examination” (M 101^{e}).

Darwin continued this line of thinking a few days later, August 24th, and ended up on creativity. He wrote: “as some impressions become unconscious. so may some ideas” (M 104). He then drew a line from the word “impressions” to the word “ideas,” adding the name “Hume” in a circle between the two (M 104, *DMP*).



(Fig. 6. M 104, DMP, CUL DAR 125:104)

Darwin was well versed in Hume, reading his *Inquiry Concerning Human Understanding* that August (Richards 1987 106). “Darwin’s account of thought resonates of Hume’s psychology, which his grandfather had also endorsed” (Richards 1987 106). A footnote here in the M notebook directs the reader to Hume’s essay: “On The Origin Of Ideas,” where he defines the word “impression” as “lively perceptions,” feelings like “love, or hate, or desire, or will” (M 104 fn1, Hume 1809 2:18).

Darwin next considered if “some ideas” become “habits, which must require idea to order muscles to do <<certain>> the actions” (M 104). If the workings of the brain

were analogous to muscles, exercising 'thinking muscles' could make them stronger, while some exercised ideas could become habit—thus potentially heritable. Darwin was adding nuance to the idea that habitual thoughts come easily to mind. Perhaps repeating existing thoughts (imitating) did not require as much effort as breaking the mental habits to originate new ideas. That is, habitual ideas were similar to instincts, because it took no thought for the brain to follow existing, well-exercised patterns. Also, a brain practiced in creativity might eventually find it easier to be creative.

Expanding these thoughts, Darwin next wondered if "impressions" when "viewed with little interest" become "unconscious, which make the idea unconscious (think of this)" while "those which are viewed very often" become "objects of interest" and "give rise to ideas" (M 105). Darwin may have been puzzling over how ideas are initiated, in the foreground and/or background of the mind. He wondered whether rarely considered, uninteresting ideas remain in the unconscious, while repeated thoughts become conscious ideas of interest. His self-admonition to keep thinking about this problem suggests that he still believed this train of thought was unresolved.

Darwin then switched tracks, comparing the similarities of animal emotions and expressions to man's. He concluded by again contrasting habitual thinking to creative thinking: "Habitual actions are the reverse of intellectual, there is no comparison of ideas— one follows other as in blindest memory— also low faculty of understanding" (M 108). Habitual actions and thoughts were both directed automatically by a material mind. Again there was a hint of the associationism of Mayo's "thought suggests thought"

(Mayo 1838 140). Maybe Darwin was considering that the human tendency to have habitual rather than creative thoughts led to a low level of creativity and shallow intellect.

Over the next few days Darwin pondered both the heritability of specific physical characteristics and the roots of morality, often looking in works of religious thinkers. In Sir Thomas Browne's *Religio Medici,* Darwin noted: "Curious passages showing how easily chance & will of Deity are confounded.— well applicable to free will" (M 126). Browne uses the argument that an omnipotent and omniscient deity is the direct cause of every detail of life, obviating the possibility of chance occurrence or free will. It seemed "curious" to Darwin when writers called on religious authority rather than look for scientific explanations (M 126). So when he commented on Plato's assertion that "our 'necessary ideas' arise from the preexistence of the soul," it is not surprising that Darwin suggested: "read monkeys for preexistence" (M128). Darwin's dry sense of humor was coupled with his impatience at metaphysical explanation and his increasing certainty that monkeys, not souls, were man's only preexistence.

Darwin's notes were ranging over a diverse list of philosophers, scientists and authors, testing many different trains of thought. He commented on Sir Walter Scott's experience (from Lockart's biography): "as ideas come & the pulse rises, or as they flag & something like a snow-haze. covers my whole imagination" (M 129, fn to Walter Scott 1837-8 7:35-36). Darwin may have shared Scott's experience, noticing a rising pulse from good thinking and a hazy brain when his ideas flagged. Darwin

seemed comforted by another example, like Harriett Martineau, showing he was not alone in his struggles for imagination.

Darwin considered possibilities inclusively, more open mindedly than most of his peers. He read voluminously and examined all potential ideas, not leaving out any reasonable speculations. He turned over thoughts in his mind like clues, separately and in groups, combining them logically into castles he then compared them through rigorous trains of thought. He included reflections of many thinkers including Gassendi, Condillac, Condorcet, Cabanis, Lamarck, Hartley, Paley, Hume, Godwin, Erasmus Darwin—and finally Malthus. Darwin took all ideas seriously, even some discredited theories that others might have discarded—like parts of Lamarck's. I imagine him shaking thousands of ideas like grains of sand, fully expecting the best to rise to the top by nature's laws. His style sometimes suggested that he let the ideas compete and the outcome was a kind of natural selection of the best thoughts.

This chapter has been looking at Darwin's thoughts about and generation of creativity, asking: did his thinking about creativity keep him focused and support his species theorizing? Certainly the problem of the material roots of the mind was not his main focus. Darwin mostly considered physical issues, such as the complex phenomenology of reproduction (including variation and adaptation), geographic distribution, extinction and "phylogeny or the systematic arrangement of taxa" (Kohn 1980 81). But notebook entries about the mind persisted, if peripherally, throughout most of the key two years after his return from the *Beagle* and beyond. In parallel with his

species thinking, Darwin repeatedly contemplated the mind, materialism, free will, thinking and imagination.

Darwin believed that he needed a scientifically defensible explanation of the appearance of a material mind that generated creative thought, human emotions and even morality. Darwin did not question the truth of mental materialism. Certainly by early in the M notebook, as Paul Barrett asserts: "he embraced materialism enthusiastically" (*Notebooks* 519). But Darwin was aware of the real danger of such views becoming public. Darwin may not have considered that such perilous thinking could have potential value, but pondering such disreputable concepts might have brought a thrill and even stimulated the very scientific imagination that he was investigating.

He considered that ideas begin as perceptions associating in the brain that instigate various types of dreaming or daydreaming, and when assisted by focused effort they become imaginative and sometimes ephemeral castles in air. These dream castles imply trains of thought which he studied rigorously, following them through myriad splits and sidings to every possible terminus. At some point on this journey, the original, speculative ideas are abandoned and replaced by well-reasoned suppositions. Parallel trains of Darwin's thought left many air castles behind, either proving false or originating fruitful concepts. Some ideas refused to resolve themselves to his rigid reasoning, so he kept returning, reprising them, focused doggedly on his theoretical goals.

Darwin could not wait to discard his more ephemeral castles in the air and move to firmer footing. He took an empirical view of the world, as in his comment about

learning more from baboons than from Locke. He observed, measured, and double-checked assertions dialectically. He carefully followed each implication, scrupulously questioning the beliefs of others and trying to expose all possible difficulties.

He sometimes tested concepts with his "my theory" trope, although since he never talked *about* his use of that phrase it most likely was unintentional—even if useful. Knowing his theory was still a work in progress, he repeatedly framed incomplete versions as "my theory"—perhaps to examine them, like snapshots of something in motion. The "my theory" point of view sometimes gave him cognitive distance to weigh ideas, while other times it seemed to drive his evolving theory forward toward other assumptions implied by each vision.

Darwin's brain contemplated its own mechanism, thought pondering the origin of thought trying to understand a mental lineage that he traced back through apes, dogs, and maybe even to plants (for plants see M 156 and N 50, among others). One of the many angles Darwin used to approach the species problem was *from* the mind, which reflected a common structure of brain in animals and man. To Darwin more than to his peers, creativity, thinking and imagination were traits shared by all species, varying only in degree.

Perhaps seeing his brain's link to animals helped Darwin's creativity, since a material brain needed to struggle to be creative rather than wait for some metaphysical revelation. Darwin's sweeping understanding of the bond between animal instincts and man's imagination may also have injected romanticism into his view of nature's

connectedness. Conversely, it may also have helped him appreciate poetry's insights into nature.

On September 21st, 1838, in one of the last pages in notebook M that can be definitely dated before his breakthrough of natural selection on the 28th, Darwin considered a recent disturbing dream. Desmond and Moore suggest that Darwin's "fear of persecution translated into a strange dream of execution" (Desmond 1991 263-4). But even in the middle of describing the confused dream-rush of a death, Darwin turned his attention to another speculation on the mind: "all these idea came one after other, without ever comparing them, I neither doubted them or *believed* them.— Believing consists in the comparison of ideas, connected with judgment" (M144). Darwin was still probing the interaction of ideas. He noted that entangled dream-air-castles could not bring belief without grounded thoughts for comparison. Less than a week later, after adding a train of thought from Malthus, Darwin would make comparisons and reach a judgment.

No simple explanation can fully explain the complexity of creativity. Darwin certainly focused on the the science of his species theory, while also considering the origin of mind. In both areas he required imagination to break from accepted thought patterns and beliefs. He achieved his creative point of view not just from dogged focus and hard work, but also from considering an unusual diversity of ideas from seemingly unrelated disciplines. I propose that Darwin's attempt to understand the basis of imagination in a material mind, his thinking about thinking, was one of many roots of his creativity.

Chapter V

The Influence of Emma:

A Nice Soft Wife

Charles Darwin's courtship of Emma Wedgwood unfolded in parallel with the two intense years of theorizing after his return from the *Beagle*. During some of Darwin's most engaged efforts to solve the mystery of species origin, the goal of winning the hand of his future wife was in his thoughts. Darwin's successful courtship was critical to him, as was his success at theorizing. The two were inextricably woven together.

Maybe images of a future wife distracted him from his scientific work from time to time. Probably there were also subtler interactions. Certain topics in his notebooks might have brought Emma to mind, or conversely daydreams of Emma may have nudged his thinking down particular paths. Many of his notebook speculations seem to contain the hint of Emma. While correlation is different than causation, thoughts of her may have been one more element that interacted with his successful theorizing. She was certainly important throughout Charles's professional life, from at least some time after the *Beagle*. There were even suggestions in letters from the *Beagle* that Charles was already considering matrimony.

This chapter examines how Darwin's courtship of Emma and anticipation of proposing marriage may have inspired creativity in a variety of ways. There will be a short history of their related youths, a snapshot of Emma's character, and a review of Charles's early interest in the opposite sex. When marriage entered Charles's thoughts, it came with concerns that a wife might interfere with his work. After deciding to court

Emma, he worried about rejection. In parallel to his romantic interests, Charles was hard at work on his theories.

Some of his notebook considerations of sexuality, heredity, religion, and morality might have been related to his concerns about matrimony and Emma. Darwin's notebook speculations about reproduction do coincide with the beginning of his own reproductive life. There were enough possible connections between Charles's theorizing and thoughts of Emma, both general and specific, that some linkage seems probable.

But although many connections seem quite strong from Emma to Charles's creativity, I must begin with a caveat. At the heart of Darwin's theorizing was how sex, reproduction and heredity were governed by natural laws. While increased sexuality in many notebook entries could have hinted at Emma's impact, no specific connections can be asserted. One cannot talk about transmutation without talking about reproduction.

When Charles Darwin disembarked from the *Beagle* in England on October 2nd, 1836, he was twenty-seven years old. In the spring of 1838, he scribbled some thoughts about marriage, and soon thereafter he wrote a list of matrimony's pros and cons. He expressed concerned about losing freedom and time, and "the expense & anxiety of children" (*Correspondence* 2:444). On the plus side, he started with: "Children—(if it Please God) – Constant companion [. . .] object to be beloved & played with," and he considered it "intolerable" to spend "ones whole life, like a neuter bee" (2:444). He concluded decisively: "Marry—Mary—Marry Q.E.D" (*Correspondence* 2:444).

In a letter to a friend that May, he wrote:

> As for a wife, that most interesting specimen in the whole series of vertebrate animals, Providence only know whether I shall ever capture one

> or be able to feed her if caught. All such considerations are hidden far in futurity, but at the end of a distant view, I sometimes see a cottage & some white object like a petticoat**,** which always drives granite & trap out of my head in the most unphilosophical manner. (DCP 411A)

Even in his letter, thoughts of a wife interrupted his theorizing. At the end of that July he visited his father in Shrewsbury to discuss marriage, then immediately travelled to Maer for a few days with the Wedgwoods and some quiet chats with Emma.

Two months later Darwin read Malthus and had a first key insight into natural selection on September 28th, 1838. Just six weeks after that, on November 11th, he proposed to Emma. Darwin later mistakenly wrote in his autobiography that he had read Malthus "In ***October*** 1838" (Bold emphasis mine, *Autobiography* 71). It was a minor slip of memory, but perhaps it was telling that he recollected the two events as more closely linked in time. That is, perhaps Darwin remembered that he had been waiting to propose to Emma until he succeeded with his theory, so his memory had compressed the gap. That waiting, and wondering if she would accept, could have created nervous pressure, or even a pent up desire, which helped fuel his creativity.

Friendships between the Darwin and Wedgwood families can be traced two generations before Charles and Emma were born. Toward the end of the eighteenth century their grandfathers, Erasmus Darwin and the first Josiah Wedgwood, were friends, business partners and founding members of the Lunar Society, a very influential group of scientists, businessmen and intellectuals. The family relationships became even closer after Charles's father Robert married Emma's aunt, Susannah. About the time Charles was considering matrimony in 1837, Emma's brother Josiah III married Charles's sister,

Caroline. This kind of family intermarrying was fairly common in English society at that time.

A third family joined this close circle when the Allen sisters, Bessy and Jane, married Emma's father and uncle. The Allens were affluent landed gentry, whose family motto, "I scorn envy," would have been appreciated by both Charles and Emma (Healey 4, 31). All three families could count "exceptionally talented men and women among their ancestors" (Healey 4). Emma spent much of her early life mingling with members of these three brilliant families, on European tours and at erudite salons and social events. Many important intellectuals, scientists and politicians visited the Wedgwood home. Emma was comfortable in such rarified company, neither awed nor intimidated.

Young Emma, Charles, and their siblings enjoyed family gatherings. After Charles's mother's death in 1817, Darwin's father became "moody and withdrawn, and Charles's family "were frequent visitors at Maer Hall, finding it positively gay after the constraints of their home in Shrewsbury" (Healey 104). Charles felt comfortable with Emma, her family, and her father, Josiah (Jos): "Of all the nieces and nephews who flocked to house parties at Maer, Caroline and Charles Darwin were Jos's favorites" (Wedgwood 195). Both married Jos's children.

Having known Emma so long, Charles knew her character, both its strengths and weaknesses, including her skill as a pianist. "She certainly was an exceptionally accomplished young woman, though she was then and always completely unaffected. Not only did she dance gracefully, she spoke French, German and Italian well, and played the piano brilliantly, having been taught by distinguished pianists" (Healey 148). Later in life, Emma helped Charles with translations to English.

When Emma was at school in 1822, her piano playing was so strong that she was the "star pupil" chosen to perform during a visit from Mrs. Fitzherbert, the "morganatic wife" of George IV (Healey 74). "She had lessons from Moscheles and a few from Chopin" (Letters I:62). In the tradition of the Wedgwoods, Darwins and Allens, Emma and her sisters "supported good causes—both local and distant—with energy and enthusiasm" (Healey 111). Emma loved gardening, encouraged by her Uncle John, who was a founding member of the Royal Horticultural Society. Emma was widely read, and "was said to have read *Paradise Lost* at age five" (Healey 148).

Although "Emma was more popular" than her sisters, she was still unattached when Charles returned from the *Beagle* (Healey 112). She had turned down several proposals and seemed destined to become a spinster (Healey 112). Charles "was quite convinced that after the lively minds at Maer Hall she would find him boring" (Healey 146). One gets the sense that Emma would not settle for a husband inferior in mind. One indication of the esteem in which Charles held Emma came in his first letter to her after she accepted his proposal, when he echoed his uncle Jos's assessment that he had "drawn a prize!" (*Emma* 2:4).

The voluminous literature around Darwin contains only a few suggestions of Emma's possible influence on Darwin's theorizing. Even those mostly point to an increase in sexuality in notebook entries dated either just before or soon after the two were betrothed: "Evidence comes from his scientific notebooks, which became increasingly erotic during the fall of 1838" (Loy 78). Desmond and Moore suggest that after Darwin's September 28th Malthusian insight: "Courting Emma, he began considering sexual arousal, slobbering and kissing, tracing them to our animal ancestors"

(1991 273). But his courtship with Emma began at least several months before that date, and possibly she was in his mind much longer. Darwin's considerations of Emma might have effected his notebook speculations long before he made his Malthusian connection.

Aside from geology, a growing focus of Darwin's notebooks was on the mechanism of the transmutation of species—what caused their change, extinction and origin. He realized that a key to solving such problems would lie in the heritability of animal traits, both physical and mental, and their variation over time. The root of successful heredity was reproduction, animal sexual habits and their relative success. Transmutation was all about sex.

Thoughts of Emma may have entered his thinking in myriad subtle ways beyond his libido, as he developed his nascent theory. Other areas of possible resonance include religion, the arts, morality, slavery, and perhaps even thoughts of animals. Why animals? Among Charles's traits that Emma described as endearing, she wrote that he "possesses some minor qualities that add particularly to one's happiness, such as not being fastidious, and being humane to animals" (*Emma* 2:6). Charles shared "one of [Emma's] lifelong concerns—the abuse of animals by humans" (Loy 19).

When Charles visited Emma at Maer in July 1838, we cannot know exactly what they discussed in their intimate chats. It would not have been surprising if the family dogs received some attention (possibly they were in the room). In fact, the names of three of the family dogs, Squib, Nina and Pincher, all showed up in the M notebook within a week or two of that July visit (M 24, 56, 70).

Emma's childhood nickname was "Little Miss Slip-Slop," and she was happy that Charles was not fastidious (*Emma* 1:82). In his daughter's recollection:

> She was never tidy or orderly as to little things. But, on the other hand, she had a large-minded, unfussy way of taking life which is more common amongst men than amongst women. My father said that after he married he made up his mind to give up all his natural taste for tidiness, and that he would not allow himself to feel annoyed by her calm disregard for such details. (*Emma* 1:82)

These details paint a picture of Charles not only adoring Emma, but also working hard for a relationship he felt was important.

The richness of potential connections between Darwin's notebooks and Emma can be seen in his notebook entries between the 7th and 12th of August, 1838, about a week after their visit at Maer. There was a long connected series of entries that might bear Emma's imprimatur in several places. Some connections seem stronger while others are more tenuous, but all are plausible.

Charles began with thoughts of God. Religion was their most well-known point of difference. Charles then touched on poetry, animal sexual response, free will, heredity, humility, children and morality—all of which were issues of possible interest to Emma. I will not unpack these quotes closely, since the point is not the meaning of Darwin's theorizing but the possible presence of Emma in his creative thinking. "Savage attribute thunder & lightening to Gods anger.– (∴ More poetry in that state of mind [. . .] one suspects that our will may <~~be~~> <<arise from>> as fixed laws of organization. — M. le Comte" (M 69-70). Charles seemed to be suggesting that our will to believe in God came from the way the brain is organized.

These notebook contemplations on religion may have been instigated by recent conversations with Emma, or conversely may at least have brought Emma's image to mind. At Shrewsbury, Darwin's father had advised him not to speak to a wife about religion, advice which he seems to have immediately ignored in his chats with Emma at Maer (Desmond 1991 256, 259). It might be telling that Darwin's *very next thoughts* seemed to become sexual. "When a man is in a passion he puts himself stiff, & walks hard.— <<He cannot avoid sending will of action to muscles>>" (M 70). Darwin then used an observation of his dog for corroboration: "Pincher does just the same" (M 70).

He continued in this vein with a self-reference: "I noticed this by perceiving myself skipping when wanting not to feel angry" (M 70). For the words "feel angry" one might substitute the words "sexually stimulated," since these thoughts link to his previous sentence about walking stiffly in passion. In his self-reference, Darwin noticed that when he tried to calm his own aroused emotionality, perhaps when Emma's image appeared in his mind, he found it was "as much effort [. . .] as to stop heart beating: one ceasing, so does other" (M 70). If Emma was in his mind here, it is hard to tell whether thoughts of her were the cause or the effect of this line of thinking.

As a further argument that sex may have been on Darwin's mind, he became more explicit in the very next entry.

> What an animal like taste of, likes smell of, ∴Hyæna likes smell of that fatty substance it scrapes off its bottom.— it is a relic of same thing that makes one dog smell posterior at another.—
>
> _____

> Why do bulls & horses [. . .] turn up their nostrils when excited by love? Stallion licking udders of mare strictly analogous to men's affect for womens breasts. (M 71-2)

Darwin was looking for related habits and instincts in man and animals as important evidence for his developing theory, and perhaps was helped by his own sexual arousal at thoughts of Emma. He was considering primary sexual characteristics, the physical structures linked with reproduction. Emma may also have been in some of his thoughts about secondary sexual characteristics, such a coloration and display.

Darwin moved to a new thought, while continuing with animals—this time a puppy, maybe one recently observed at Maer. He associated the image of this frolicking pup with thoughts of free will to begin a long rich passage. "With respect to free will, seeing a puppy playing cannot doubt that they have free will, if so all animals., then an oyster has & a polype (& a plant in some senses, perhaps" (M 72). From thoughts that puppies, and all animals, must have free will, Darwin then moved methodically through implications that eventually had him reverse his conclusion until he doubted the idea of free will altogether, while pointing again to August Comte.

Darwin then returned his attention to heritability, this time of mental attributes: "free will makes change in man.— the real argument fixes on heredetary disposition & instincts" (M 73). Next he questioned his own thinking, perhaps having noticed that he was getting close to Lamarck's questionable idea of a man *willing* heritable change: "probably some error in argument, should be grateful if it were pointed out" (M 73). From God and puppies, and perhaps Emma, he moved to free will and causes of heritable change of mental attributes. Darwin then considered if

improving one's own temperament and ethical standards could be handed down to one's children (M 73). Marriage may have been on his mind as he asserted what an incentive it would be if curing one's own bad habits were heritable and thus could improve one's offspring (M 73).

He was building an argument in support of moral actions acting like physical attributes and being heritable, perhaps improved in one generation and then handed down over time. He was considering the transmutation of morality, without needing any religious foundation but solely based on the scientific laws of his own developing theory. He was gathering evidence of possible heritable change, both physical and mental, to help uncover nature's mechanism for transmutation, which he could not quite understand, yet. Perhaps thoughts of Emma's strong religious ethical values encouraged Darwin's search for a material foundation of morality.

Darwin speculated next about different views of morality (M 73-76). He seemed disturbed that Harriet Martineau thought that "there is no universal moral sense" (M 75). But after deeper consideration, and noting James Mackintosh's opposite view, Darwin added a hopeful note that maybe Martineau "allows some universal feelings of right & wrong" (M 76). That moral feelings be universal would support the thesis that morality was a transmutation of animal instincts, not a culturally or God-given addition. Shared ethical values was an important piece of evidence for Darwin's developing theory of an evolved mind.

Darwin concluded this long line of thought with considerations of family, group attachment, heredity again, and the usefulness of a conscience: "No one doubts patriotism & family pride are hereditary," while if one "disobeys" them it "hurts conscience" (M

77). Conscience was being considered as a possible heritable mechanism underpinning ethical actions in a purely material mind. These speculations came about a week after he initiated his courtship with Emma.

Darwin's theorizing (possibly continued over several days) moved through thoughts of religion, sexual passion, puppies and free will, then considered heritability of mental qualities such as morality and "family pride," and finally pondered the importance of conscience (M 77). Darwin was organizing an entangled bank of ideas into a more coherent developing theory, and many of these ideas could encourage or have been encouraged by resonances of Emma. Her voice could have been reflected in his strongly moral conscience.

This could all be circumstantial, or there could be substance behind the suppositions. Darwin's hopeful moral thoughts might have been encouraged, or energized, by considerations of Emma. Certainly Charles dearly wanted to please Emma, and ultimately win her hand. Perhaps he believed that it would help his cause with Emma if his theory could explain and support man's ethical actions based solely on nature's laws, just as Comte (mentioned twice) and others explained all the workings of the physical world through nature's laws, without needing the hand of Providence. Maybe Charles thought that it would help win Emma's heart if he could prove that morality was a force of nature, like gravity.

Charles may have waited until after their marriage to test this argument on Emma, of transmutation being the source of principled actions without any religious underpinnings. Or perhaps it was an ongoing conversation since their meeting at Maer in July 1838. In February 1839, Emma wrote a touching letter to Charles that he saved all

his life. He described it as: "her beautiful letter to me, safely preserved, shortly after our marriage" (*Correspondence* 2: 172). She framed her thoughts lovingly, respectfully and cautiously: "my own dearest will indulge me . . . Your mind & time are full of the most interesting subjects & thoughts of the most absorbing kind, viz following up yr own discoveries" (*Correspondence* 2: 172). So they did talk about his scientific interests.

Emma then noted that they had agreed on the importance of acting morally, but with a caveat: "I do not quite agree with you in what you once said—that luckily there were no doubts as to how one ought to act. . . . But I dare say you meant in actions which concern others & then I agree with you almost if not quite" (*Correspondence* 2: 172). The double "not quite" pointed to where they *disagreed*—on the importance of prayer. But they seemed to have reached an understanding to not argue about religious beliefs, as Emma noted that Charles would "think I have forgotten my promise not to bother him" (*Correspondence* 2: 172). This forgotten promise suggests that there may have been several discussions of religion and morality, and they had agreed to disagree—but not quite. There is no way to tell if Charles reacted to these discussions with Emma by making notebook speculations.

Darwin wrote down his Malthusian epiphany in his D notebook on September 28th. About that time, or soon after, he was speculating in his M notebook about morality arising from "strong instinctive sexual, parental & social instincts, giving rise 'do unto others as yourself'" (M 150, dated between 23 September and 2 October, 1838). "Do unto others" sounds like how "one ought to act" when it "concerns others." There is no way to tell if he was rehearsing arguments to use with Emma. He was linking parental, social and sexual thoughts with an evolving mental capacity. It seems possible that

considerations of Emma might move his notebook thoughts toward morality or religion. Or perhaps writing about such topics brought to mind her image.

It is impossible to properly date when Charles first considered Emma an object of his affection. He is believed to have begun his consideration of marriage, and then chose Emma, sometime in the spring to early summer of 1838—after his jottings about the pros and cons of marriage. While resonances of Emma in Darwin's notebooks seem plausible after their meeting in the summer of 1838, it is possible that she was in his thinking even earlier in time.

I suggest that Charles may have been thinking about Emma as much as *a year and a half before* the date when he wrote his first marital musings, perhaps even prior to the *Beagle's* return. This explanation will require some background context. If my revised dating is correct, it is possible that *all* of Darwin's notebooks were written after Emma had entered his thoughts. Even if the evidence seems inconclusive, Darwin certainly included Emma in his plans after his visit to Maer at the end of July 1838. So at least from that date forward, thoughts of Emma could have had a noticeable effect on his thinking, as in those notebook passages just considered.

Thoughts of relationships with women did not suddenly arrive in Darwin's mind in 1838. As a young man, he appeared strongly heterosexual. Before the *Beagle*, his youthful attentions focused on a flirtatious neighbor. "At eighteen, Charles was . . . thoroughly infatuated with the dark-eyed Fanny Owen" (Loy 34). He was still smitten with her while at Cambridge in 1828, as noted in a letter to his good friend and second cousin, William Darwin Fox. "Fanny, as all the world knows, is the prettiest, plumpest, Charming personage that Shropshire possesses" (*Correspondence* 1:72). Charles

completes this note to Fox in a joking way that points to the active libido and sexual wit of a young college man: "now that I know a most pleasant train of ideas are excited in your mind, I will not interrupt them by writing anymore" (*Correspondence* 1:72). Charles understands how images of an attractive young woman can excite a young man. He also demonstrates how a bit of titillation fuels his own writing skills, confident that his words would generate excited feelings.

Darwin noticed South American women during his *Beagle* trip, as he wrote to his sister Caroline: "Our chief amusement was riding about & admiring the Spanish Ladies.– After watching one of these angels gliding down the streets; involuntarily we groaned out, 'how foolish English women are, they can neither walk nor dress'" (*Correspondence* 1:277). In this humorous observation, Darwin's own sexual images caused involuntary groaning. He still appreciated women at age 66, when he wrote in his autobiography: "A novel, according to my taste, does not come into the first class unless it contains some person whom one can thoroughly love, and if it be a pretty woman all the better" (*Autobiography* 54).

Darwin's *Beagle* correspondence often included gossipy news of marriages and children, as in this 1836 letter expressing Darwin's hope that Fox had chosen as nice a wife as he "assuredly deserves. . . . How very strange it will be, thus finding all my friends, old married men with families" (*Correspondence* 1:458). Marriage had clearly crossed his mind, in one fashion or another. When Darwin embarked on the *Beagle*, Fanny Owen was the focus of his affection. "Surely, if any face arose in the traveler's imagination when he dreamed of home and a wife, it must have been that of Fanny Owen" (Loy 44). After he learned of Fanny's marriage, his sister Susan proposed that he

widen his search: “in spite of this marrying year I am sure you will find some nice little wife left for you” (*Correspondence* 1:256).

His sister Caroline was more specific, suggesting that cousin Fanny Wedgwood would make a good wife for a prospective Country Parson (a future being contemplated by Darwin). “I hope you will in all probability find Fanny Wedgwood *disengaged* and **sobered** into an excellent Clergman’s Wife by the time you return, a nice little invaluable Wife she would be” (bold in original, *Correspondence* 1:254). Caroline teasingly mentioned an inept suitor’s visit to Fanny Wedgwood, off-handedly describing Emma Wedgwood “choking with laughing at the man’s odd manner” (*Correspondence* 1:254). Emma was always there, in the family circle, and here her name was called upon as a reliable and amusing corroborator of character. Fanny Wedgwood soon became ill and died suddenly, removing one more prospective wife.

Soon after Darwin had learned that Fanny was married, he became quite emotional although he should not have been surprised (Loy 34). Perhaps Charles had not realized the depth of his affections, or maybe unrealistic narcissism had him expect that Fanny would wait for him. In the middle of a newsy letter to his sister Caroline, a crack appeared in Charles’s stoic demeanor. At first, he seemed to express only a bit of annoyance: “Well it may be all very delightful to those concerned, but as I like unmarried woman better than those in the blessed state, I vote it a bore; by the fates, at this pace I have no chance for the parsonage” (*Correspondence* 1:220). The deep surge of his romantic feelings seemed to surprise him, as he realized that his plans for dear Fanny were shattered:

> I feel much inclined to philosophize but I am at a loss what to think or say; whilst really melting with tenderness I cry my dearest Fanny why I demand, should I distinctly see the sunny flower gardens at Maer; on the other hand, but I find that my thought & feelings & sentences are in such a maze, that between crying & laughing I wish you all good night.– (*Correspondence* 1:220)

His British reserve failed him, exposing a deep and hidden sensitivity. In this state of mental turmoil, perhaps it was only a coincidence that his thoughts returned to the sunny gardens of Maer with their extraordinary flowers—and the home of Emma Wedgwood.

Conventional wisdom argues that this was too soon for Charles to be thinking of Emma. I disagree, and this vision of a sunny garden at Maer might have been the moment when Emma first came up for more serious consideration, although we do not have notes or letters from Darwin to this effect. Even when he returned from the *Beagle* he threw himself into his scientific work, until about eighteen months later when he wrote two notes to himself about matrimony, in the spring of 1838. Yet it seems possible that thoughts of young women, girlfriends, brides and marriage were in Darwin's thoughts even before he left England, and certainly throughout the *Beagle* voyage.

There is intriguing evidence hinting that Charles was already thinking of Emma as a potential romantic partner. In January 1837, not too long after his return to England, *Mrs*. Fanny Biddulph wrote to apologize for a delay in sending a thank-you note: "for I believe it is more than a month since I received your beautiful present of Flowers. . . . [T]he Flowers are the prettiest things I ever saw, much too good to wear I think & I mean to do justice to them in a *glass case*" (emphasis hers, *Correspondence* 2:1-2). Glass

cabinets were used as small personal museums to display important or valuable artifacts or oddities. Such cabinets were not good places to keep fragile flowers, so it seems odd that a month after their presentation (and perhaps after months at sea) flowers would still pretty enough to be fashionably displayed. Perhaps they were dried flowers, mementos which could represent preserved sentiments of the past.

I suggest a different solution the 'Flower Mystery,' a clue to which was in a letter from his sister Catherine sent to Charles that February 16th. Among the usual family news, Catherine noted: "Emma Wedgwood is very gay at Edinburgh . . . she writes word that your *Feather Flowers* are very much admired, and she finds them exceedingly useful at all her parties" (emphasis mine, *Correspondence* 2:5).

Combining the two letters, I suggest that Charles brought home some unusual and attractive *feathers*, which made beautifully decorative "Feather Flowers," and he gave them as gifts to (at least) these two young women. One bouquet of feather-flowers went to his only previously-known romantic interest, the other to his future wife. Thus, soon after his return from the *Beagle*, Fanny Owen and Emma Wedgwood were linked by these feather flowers, at least circumstantially, in Charles's mind—and perhaps in his heart. Bonnets "trimmed with frills, feathers, flowers, and ribbons, wide-brimmed bonnets were a 'must-have' fashion accessory for women in the 1830s" (*Victoriana*). Feathers were known to be romantic displays that male birds used to attract mates.

There is no solid proof that the flowers for Fanny were related to the feather flowers for Emma. But if Charles did consider Emma a possible object of affection before his return to England, that was about a year and a half *before* he wrote his notes regarding the pros and cons of marriage. That is, since sometime on the *Beagle,* Emma

might have been somewhere in his mind—hopefully, nervously and lovingly—and perhaps occasionally riling his libido. It may be that thoughts of her were both reflected in, and competing with, his speculations from his earliest notebook theorizing. Parallel projects do not always remain separate in an active mind.

Of course even if Charles had been contemplating Emma while on the *Beagle*, thoughts of her may have been pushed out of his mind in the press of innumerable demands and responsibilities once back in England. It was not until his well-known "Marry—Not Marry" notes, most believe, that Darwin began casting about for a bride and soon focused on Emma (*Correspondence* 2:444-5). Although he may not have firmed up his plans until spring or summer of 1838, I think that the "Feather Flower" gifts show that Emma was on his short list of prospects while still on the *Beagle*, or at the latest soon after his return (*Correspondence* 2:5).

Whenever visions of Emma began appearing in Darwin's mind, we know that sometime between April and July of 1838 he wrote two notes to himself about marriage. A careful thinker, he considered the pros, cons and implications of getting married, with at least circumstantial hints of Emma: "Charms of music & female chit-chat.– These things good for one's health.– <u>But terrible loss of time</u>.– " (*Correspondence* 2:444). Mention of "music" appeared twice in the note, as did Darwin's fear of time-loss due to marriage (*Correspondence* 2:444). Emma was the best pianist among his prospects and was an intelligent but not overbearing conversationalist. His mention of health might have hinted of Emma, since she had proven herself a patient nurse while helping her sister care for their infirm mother.

Charles's note also worried about: "fatness & idleness— Anxiety & responsibility— less money for books &c" (*Correspondence* 2:444). One telling line in support of marriage: "Only picture to yourself a nice soft wife on a sofa with good fire, & books & music perhaps" (*Correspondence* 2:444). Combining the idea of a "soft wife" and "good fire" may have been innocent, or not. "One can read multiple meanings into Charles's desire for a 'nice soft wife on a sofa'" (Loy 78).

Reaching a resolution to marry, he then considered when (and decided "soon") (*Correspondence* 2:445). He concluded, almost as if he were resigned: "Never mind, trust to chance–keep a sharp look out– There is many a happy slave–" (*Correspondence* 2:445). While his "sharp look out" suggests a search for whom to marry, perhaps it only implies looking for opportunities to gain Emma's affections.

Several scholars have suggested that this note makes Darwin seem less than romantic. "With respect to marriage per se Darwin's decision was reached after the most utilitarian calculation. Like a Benthamite accountant, he arrived at his decision by toting up in two columns the points for and against marriage" (Herbert 1977 210). To be fair to Darwin, one should look at these jottings through the lens of sensibilities of reserved British culture. But even if his early marriage thoughts were a bit dry, once committed to his quest for Emma's hand, Charles became romantic and teasing.

In his first letter to her immediately after their August visit, aside from being self-consciously flirtatious, Charles recommended that Emma read a silly and amusing book: "do get the last series of Mr Slick of Slickville sayings---- I read a few chapters yesterday; they are dreadful odd & amazing comical,----& that is a fact,----as Mr Slick himself would say" (*Correspondence,* 2:95). In the middle of all his work on geology,

while writing in his notebooks and preparing papers, while reading science, literature and poetry, while he kept up with the transactions of all of the noted societies, Charles took the time to read a little humorous parody.

One might argue that by recommending such light fare for a woman to read, Charles was being somewhat condescending. But Charles also recommended that Emma read Lyell's book, book, *Elements of Geology*, while in a letter to Lyell suggested that Mrs. Lyell read *Mr. Slick*. I think this light reading recommendation gives a refreshing glimpse of Darwin's human dimension, presenting himself to her as rounded and charming.

One point to note is how few letters survived from the engagement, suggesting that perhaps no more were written. The flirty letter about reading *Mr. Slick* was a response to a letter from Emma that was lost. Perhaps other personal letters were lost also, or even destroyed. Their daughter Henrietta Darwin later noted: "No letters from my mother to my father have been preserved, either before or after marriage. Whether she destroyed them on his death, or whether he did not keep them, I do not know, but he had not the habit of keeping letters except those of scientific interest" (*Emma* 2:12).

Henrietta was not completely correct since several letters do remain, including one which Darwin himself noted as Emma's "beautiful letter to me, safely preserved, shortly after our marriage" (DCP 471, fn1). That letter presented Emma's impassioned plea for Charles to look again at both sides of the issue of religion, making good his father's warning about dangers of sharing religious skepticism with a wife: "I do not know if this is arguing as if one side were true & the other false, which I meant to avoid. . . . Every thing that concerns you concerns me & I should be most unhappy if I thought

we did not belong to each other forever" (DCP 471). The fact that Darwin carefully preserved this letter suggests both that he was touched, and that he saw the importance of handling this subject delicately. Certainly his published writing assiduously avoided closing off either side of the religion question, perhaps partially in consideration of Emma's feeling.

Those first notes of Darwin's marital thoughts were on the back of a letter from Leonard Horner dated April 7th, 1838. So Darwin's overt considerations of matrimony began, at least, sometime after that date. The Horners hoped that their highly accomplished daughters might interest Darwin—Charles Lyell had already married one of them. But they were not the only young ladies who might have been in Darwin's sights.

Janet Browne offered a fairly extensive list of the women he may have considered for matrimony, from the Horner girls to Harriet Martineau, and suggested some of Darwin's possible considerations in a future wife. "He had no need for an intellectual hostess like Mary Lyell or Mrs. Henslow. Erasmus filled that role to perfection, giving dinner parties. . ." (Browne 1995 380). Darwin did not need a scientific foil or a social coordinator. "On the contrary, he wanted someone who would disturb him as little as possible" (Browne 1995 380). Although he wanted an intelligent wife, he did not want to be constantly sparring with a rapier-like wit: "Clever women made him uneasy" (Browne 1995 380).

Now I will trace the few known meetings of Charles and Emma after his return from the *Beagle*. Not long after his October 1836 landing in England, Darwin visited Maer that November. A letter from Emma to her sister-in-law, Mrs. Hensleigh

Wedgwood, just before that visit expressed their impatience for Charles to arrive, and also that "Charles seems to have been much struck with the sight of Hensleigh walking up the street with a bandbox in one hand and a child in the other" (H Darwin 1:272). So Emma had noted Charles's possible interest in marriage and children. Although her letter effused about the fun her family had with Charles, there was no hint of special affection in either direction.

Their next possible meeting was not until late September or early October 1837, when Darwin's *Journal* noted another short swing through Maer (DMP *Journal* DAR 158: 13). No mention was made of seeing Emma on that visit, Nor was Charles's name in Emma's letter about a visit to Shrewsbury that October.

In June 1838, possibly not long after Darwin's first jottings about marriage, Emma Wedgwood and Catherine Darwin returned from a trip to Paris and stopped in London. Charles was at a party they attended at Hensleigh Wedgwood's new home, next door to Charles's brother, Erasmus. There were several notables at the party including Robert Mackintosh and Thomas and Jane Carlyle. Perhaps Charles appreciated the way Emma handled herself with the intellectual crowd, or maybe it was just the way she moved. Some believe that "After this party Charles began to think seriously of marrying his cousin Emma" (Wedgwood 232). If not at that party, Charles certainly initiated his serious consideration of Emma a few weeks later during a visit to her home at Maer.

The idea that Emma first considered Charles seriously at that party is supported by Emma's reminiscence to her favorite aunt, Jessi Sismondi, just after she and Charles were engaged: "Though I knew how much I liked him, I was not the least sure of his feelings [. . .] and the week I spent in London on my return from Paris, I felt sure he did

not care about me" (*Emma* 2:5). In her uncertainty about Charles's intentions, she hid her growing affection. If Charles had similar feelings at that time, he did the same.

Perhaps Emma hinted her encouragement to Charles, or vice versa, unconsciously or in a bit of flirting. But there is no evidence that anyone noticed the beginning of a serious relationship, even as observant, sharp witted and gossipy as were their relatives and friends. Only on the very night before the proposal that November did a few family members suspect and begin to discuss "the chances & probabilities" that Emma and Charles were serious (*Correspondence* 2:114). This is telling, since Charles and Emma must have hidden their feelings well, perhaps from each other as much as from their families.

Darwin had been unwell in London at that June party with Emma, which perhaps explains why he was a bit subdued. Soon after that, for his health, he planned a geology trip to Scotland. His vigor returned after hiking and geologizing for "eight good days in Glen Roy," where he believed that he had solved a stubborn geology problem of the so-called "parallel roads" (Darwin 1959 8). Flush with apparent scientific success, Darwin's next stop was Shrewsbury for talks with his father about marriage, among other things. "Three weeks after Emma Wedgwood caught his eye in Great Marlborough Street he was weighing up his options, looking for advice" (Desmond 1991 256). His father recommended that he "carefully conceal" his religious skepticism from his future wife, because "he had known extreme misery thus caused with married persons" (*Autobiography* 79). Darwin disregarded that advice.

When an older Darwin reminisced in his autobiography about his father's guidance on religion and a wife, the phrases that stayed in his memory were to "carefully

conceal my doubts," or "extreme misery" if one did not (*Autobiography* 79). Religion, as he also in his autobiography, was a focus of his notebooks during these two years of dogged theorizing (*Autobiography* 71). Emma's strong religious views may have figured into his thinking. It is possible that some notebook considerations of religion were associated with thoughts of Emma and colored by his father's cautious comments.

While at Shrewsbury, Charles's father probably reassured him about future financial prospects: "He was visiting Shrewsbury for the last time, so far as is known, before his engagement. The conclusion seems inescapable that in this period Charles and his father finally resolved the problem of marriage and career" (Desmond 1985 455). If he were to succeed in winning Emma's hand, his father probably assured him that he could count on wedding gifts similar those received by Emma's brother when he married Charles's sister (Desmond 1985 455, Browne 1995 378). They included substantial bonds and income from both his father and future father-in-law, Uncle Jos. Charles was now assured of financial security to carry on his research without having to split his time with a job, He no longer worried about becoming a Cambridge professor or country parson, or financial pressures of raising a family—concerns that had surfaced in his "Marry—Not Marry" notes (*Correspondence* 2:444-5). Charles could look forward to concentrating all his efforts on scientific interests, and getting married.

Some Darwin biographers place the date of Charles's serious, conscious focus on Emma to have begun even after the London party of June, to sometime just before or during a visit to the Wedgwoods at Maer, in late July, 1838 (Browne 1995 380, Desmond 1985 455, among others). "Darwin may even have taken a conscious decision to aim for

Emma . . . before setting out from Shrewsbury to visit Maer" (Browne 1995 380). While at Shrewsbury, Emma may have been at the top of his list of marriage prospects.

That visit to Shrewsbury was probably when Darwin began both the D and M notebooks. Pages written while there offer tantalizing hints that Emma was on his mind, even while he considered subjects related to his developing species theory. For instance, in the sixty pages (or so) that Darwin wrote in the M notebook while there, his early thoughts moved from "singing of birds" to "Beauty is instinctive feeling," and then contemplated "Music & poetry" that "causes the mind to create short vivid flashes of images & thoughts" (M 32-3). His thoughts may have been instigated by the romance of birdsong, and anticipation of Emma's beautiful piano music. Perhaps some of his "vivid flashes" contained thoughts or images of Emma.

A few pages later, when Darwin contemplated why people find pleasure in scenery, Emma again may have been present somewhere in the "Pleasure of imagination, which correspond to those <~~he~~> awakened during music.– connection with poetry, abundance, fertility, rustic life, virtuous happiness" (M 39). Abundance and fertility speak to marriage, and "virtuous happiness" could be a hopeful description of his future life with Emma (M 39). Music, of course, was Emma's forte, while thinking of her could have brought poetry to his mind, or suggested something by Wordsworth or Coleridge. Perhaps she even triggered (or figured into) some of his thoughts about the pleasures and origins of imagination and creativity.

In the D notebook, also begun during this Shrewsbury visit, "the dominant theme . . . is reproduction," so perhaps thoughts of offspring and marriage jostled with his theorizing (Kohn in *Notebooks* 329). Maybe he was considering marriage when he

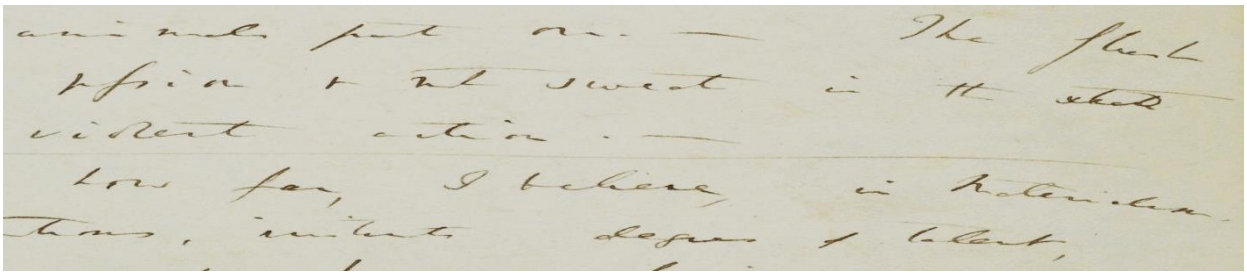
speculated about a docile stallion: “This stallion though eager to all other mare[s] had been entirely broken from their mares, (though horsing every month) & worked in the same cart in loose chains” (D11e). Maybe he was contemplating what his future might look like, in similarly loose chains, as a “happy slave” (*Correspondence* 2:445). Darwin then considered if this was a “case parallel to brothers & sisters in Mankind,” who do not develop sexual attraction (D 11e). Wherever this train of thought originated, Darwin turned it back toward considerations of his theorizing, as was his practice.

Darwin made several references to children in some M notebook pages written at Shrewsbury, probably within days of visiting Emma at Maer, which could imply thoughts of marriage (M 51, 53). He then mentioned waking one night “slightly unwell” and in fear, commenting: “diseases of the heart are accompanied by much involuntary fear” (M 53-4). Most likely he was talking about fear of heart disease. But maybe his involuntary fear related an *emotional* disease of the heart, like love, and his heartfelt hopes (and fears) for the impending meeting with Emma at Maer.

Darwin’s notes then seemed to switch to a new thought and he wrote about a family dog, Nina (M 56). Darwin often discussed family dogs in his notebooks, sometimes generalizing their animal emotions, expressions and instincts to make various points. In this case, he contemplated a dog that became “wretchedly unhappy” and “would not sleep at night” when taken from its own home, and concluded his thought: “How like strong feelings of man” (M 56). Seeing parallel feelings in man and animals supported his contention that all feelings were material, thus heritable and involved in transmutation. Perhaps he saw himself in that homesick dog, and was worrying about his own sleeping habits after marriage.

Darwin's notebook thoughts moved to his own troubled sleep. "The sensation of fear is accompanied by <<troubled>> beating of heart, sweat, trembling of muscles," which he then compared to "The flush which accompanies passion" (M 57). He wrote this when he was about to visit Emma, and was waking fearfully in the night, considering dogs, leaving home and contemplating the physical manifestations of sexual arousal. Certainly these are only hints, but possibly pointing toward thoughts of Emma steering some of his notebook theorizing.

Darwin then drew a rough line across the page and below it wrote about hiding his belief in materialism behind discussions of heredity. The story that would screen his materialism would rest **innocently** on an assertion about heredity: "because brain of child



(Fig. 7. X *DMP* CUL DAR 125:57)

resemble, parent stock"—a quote that I discussed extensively in the chapter about creativity (M 57). It could be that Darwin's plan to hide his materialistic views behind a story of heredity was partly a rehearsal for Emma, to shield her from the full anti-religious implications of his thinking, especially since this was written at the same time that his father was warning him to hide religious doubts from his wife.

A similar possible argument for Emma came just a few pages later. Darwin noted that the confessions of the religious Captain FitzRoy actually "made him less repentant" (M 60). Darwin then contemplated the relationship between confession and morality, noting that his similar personal confession "was tending to make myself in act less

grateful" (M 60). He imagined that such duplicitous confession "was not merely morally wrong, but hurting my character[.] I felt it" (M 60-1). Proposing that religious confession could hurt morality and character may have been a test of an argument he hoped to use to persuade Emma that his theory could *improve* people's ethical actions. The importance of a strong moral foundation was a belief he knew he shared with Emma.

Charles left Shrewsbury and travelled to Maer on July 29th, with his father's marital advice fresh in mind and the promise of financial security. The last few notebook pages just considered were undated, but probably written within a few days of this visit. Charles spent three days with Emma, helping her at a church bazaar and enjoying some private discussions. Most secondary literature suggests that their courtship began to warm at this point, perhaps literally while sitting in front of the fire for a "sentimental fat goose" (slang for chat) (*Correspondence* 2:95). Emma was hopeful after that visit, but still had her doubts whether Charles cared for her. "He came to see us in the month of August, was in very high spirits and I was very happy in his company, and had the feeling that if he saw more of me, he would really like me" (*Emma* 2:5). Travelling was time consuming, and more visits were not to be until Darwin's November proposal.

Emma seemed uncertain that her own strong feelings were being reciprocated. Charles may not have helped matters, possibly being deliberately circumspect. Privacy was becoming a new facet of his character. He had started a private notebook, privately initiated his courtship, kept private his true affections from Emma and his friends, and may have had private sexual thoughts. Soon he would keep private for twenty years his insights into species origins. All this secrecy appeared despite that fact that Emma later

wrote about Charles that he was "the most open, transparent man I ever saw, and every word expresses his real thoughts" (*Emma* 2:6).

There are several possible reasons for his caution in keeping his growing affection a secret from Emma. Perhaps it was as simple as that the close quarters on *Beagle* had initiated new privacy habits. Or maybe Charles wanted some time to build his case slowly. He may have been shy or nervous, not wanting tip his hand before he was more certain of Emma's feelings. Possibly the nervous thought of proposing marriage encouraged circumspection. Browne suggests: "It was easier to make himself far too busy to think about it: far too busy to write letters or pay another visit to Staffordshire" (Browne 1995 382).

Charles later admitted that he was afraid Emma would decline his proposal. The thought of rejection might have kept him excessively guarded. As his daughter Henrietta later noted: Charles was "far from hopeful, partly because of his looks" (*Emma* 2:1). Perhaps Charles knew that Emma had declined the advances of several suitors, maybe including Charles's own brother, Erasmus (Loy 51-3). "It seems quite likely that Erasmus Alvey Darwin, then aged twenty-eight, floated a proposal of marriage to his cousin during the spring of 1833" (Loy 51). Charles was close to his brother, and if Erasmus had told him of Emma's rejection it may have exacerbated his timidity.

Even with his mind apparently made up, Charles seemed to be waiting for the right time to propose. His uncertainty could have kept him anxious and with Emma in mind through much of his most productive theorizing. For whatever reason, Charles was patient and kept his intentions secret. This was despite the fact that he was probably in a hurry. Darwin had noted that his father recommended he act "soon" (*Correspondence*

2:445). But he carefully hid his urgency, at least until after Emma accepted his proposal in November. Once they were finally betrothed in November, Charles wanted a quick wedding in January but Emma a delay of two months. Charles responded with a strong emotional plea, lovingly tempered: "do, dear Emma, remember life is short, & two months is the sixth part of the year, & that year, the first, from which for my part, things shall hereafter date. Whatever you do will be right,—but it will be *too* good to be unselfish for me, until I am part of you, dearest Emma" (*Correspondence* 2:118).

Darwin had proceeded slowly until November, but now uncapped the true intensity of his feelings and he could wait no longer. His comment: "until I am part of you" sounds like an explicit double entendre, if tastefully done (*Correspondence* 2:118). Emma acquiesced. Charles may not have meant to put sexual overtones into his comment, nor I into the word "acquiesce."

The fact that Darwin's proposal came relatively soon after he had solved the species mystery could mean that he consciously had delayed until achieving that success. His move to act would mirror his actions after his geologizing in Scotland in July. At that time, believing he had been successful with the Glen Roy puzzle, "He was feeling on top of the world" (Desmond 1991 255). That confidence carried him through conversations about marriage with his father, beginning his private M notebook, and initiating his courtship with Emma. Perhaps his euphoria at uncovering a key piece of the transmutation puzzle with his Malthusian epiphany in September gave him a similar confidence.

I may have belabored the idea of Charles and Emma's mutual hidden affections, but it was to make the point that there were strong feelings being concealed. The discreet

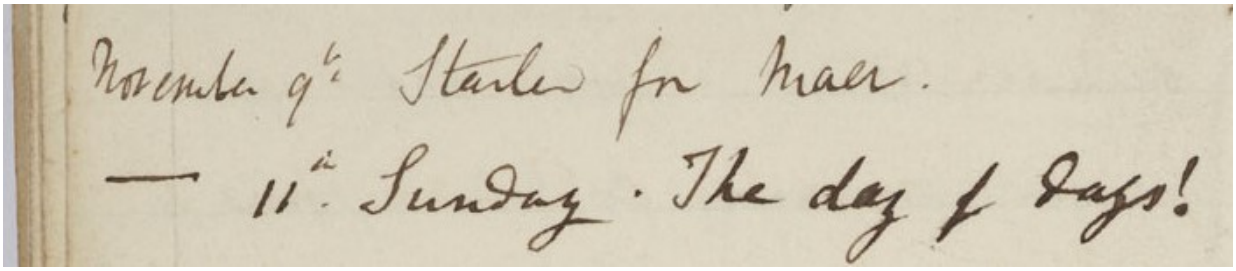
English veiled emotions, so it is not a surprise that Charles hid this biggest decision of a young man's life. Thus marriage could have been affecting his thoughts in myriad subtle ways since the *Beagle*. Darwin was surrounded by married friends and young children. In his first year back, marriage may not have been his top concern but maybe it was simmering quietly, and insistently. More reflective of the "open, transparent" side of Charles was that once they were married, it does seem that Charles openly shared many of his private theory details with Emma (*Emma* 2:6).

In mid-1838, before Darwin's betrothal but after his decision to "Marry—Mary—Marry," thoughts of matrimony may have held an important position, entangled with his efforts at solving the species problem (*Correspondence* 2:444). They also may have given him a sense of mission and added motivation to succeed. "Adding to Darwin's psychological stress and workload, in September, just when he was agonizing over whether to propose marriage to Emma, one of the last pieces of the transmutationist jigsaw puzzle fell into place" (Thompson 213).

Entries in the D notebook on September 13th 1838, before the breakthrough of the 28th, again may have hinted at the importance Darwin placed on theorizing success in relation to gaining a wife. "The passion of the doe to the victorious stag, who rubs skin off horns to fight—is analogous to the love of woman [. . .] to brave man." Darwin then switched thoughts, perhaps nervously, to the "effect of castration" (D 99). A few days later, on September 17th, he revisited the idea of fighting for a mate. His notebook entries mentioned birds' plumage, singing and fighting, and then considered female birds that take on bright plumage: "do the females then fight for the male" (D 114e)?

These could be early speculations about what Darwin eventuality proposed as sexual selection, and they could have been colored by thoughts of Emma.

When Charles finally visited Maer and proposed marriage on November 11th, he was deeply and joyfully surprised that Emma accepted. That day's simple *Journal* entry noted the engagement in atypically large, clear letters and fresh ink: "The day of Days!" (*DMP CUL* DAR 158: 17). This is in stark contrast to his usually small, barely legible scrawl. One senses Charles was shaking, but his pen was victoriously steady.



(Fig. 8. *DMP CUL* DAR 158: 17)

As he wrote jubilantly to Lyell the next day: "I have the very good, & shortly since, very unexpected fortune, of going to be married. [. . .] I determined, when last at Maer, to try my chance" (*Correspondence* 2:114). His true feelings seemed to be gushing out. There was similar emotion in his letter to Emma a few days later: "the one conclusion, I exult in, is that there never was anybody so lucky as I have been, or so good as you" (*Correspondence* 2:117).

The focus of this chapter is Emma's possible influence on the creativity that led to Charles's solving the species problem on September 28th, 1838. I have continued a little farther in time for evidence that Darwin linked his theory success to Emma, as suggested by the fact that he proposed to her so soon after he became the metaphorical victorious stag.

Browne notes that when Darwin was thinking about getting married in 1838, in the middle of "furious work on transmutation," his "frantic activities were a sign of mounting internal pressure to come to a decision about Emma" (Browne 1995 381-2). After his July visit with Emma at Maer: "even if he made his decision about marriage, or recognized how far he had already moved towards it, he would still have to act—a discomforting worry that gnawed away at his nerves. 'One *could* do it,' he noted, 'but other motives prevent the action'" (Browne 1995 382, quoting OUN 25). These thoughts about taking action, perhaps on marriage, were on a loose note dated September 6th, 1838.

That same note contained more of his thoughts, suggesting that his main concern was ostensibly about free will. A bit fuller version offers a bit more depth to his thoughts: "Every action whatever is the effect of a motive. [. . .] ones feelings when wagging one's finger—one feels it in passion, love—jealousy [. . .] when one wishes to do some action [. . .] & yet dare not—one could do it . . ." (OUN 25). Browne uses this impassioned speculation to show the pressure on Darwin to propose, to "do it." But also it may point to the importance of thoughts about Emma being intermingled with other issues such as free will.

As discussed in the chapter on creativity, Darwin saw the question of free will as a serious difficulty to explaining a purely material mind. Here once again he may have been using introspection about his difficulty of proposing marriage to tease out theory ideas—the nature of free will. Also, perhaps Darwin wondered if even his choice of Emma actually entailed free will. Maybe he wondered if it was purely his animal passions, "love—jealousy," that caused him to wish for marriage, and Emma (OUN 25).

I have postponed an analysis of Darwin's early notebooks until now, because most of those entries suggest very little deviation from his geological concerns and embryonic transmutation theorizing. Earlier in this chapter, I offered epistolary evidence that Emma could have been a factor in Darwin's thinking much earlier than generally believed—perhaps as far back as his time on the *Beagle*. While written evidence of Emma's early connection to Darwin's thinking may be tenuous, following is a quick synopsis of possible hints.

Darwin began the Red Notebook while still on the Beagle in 1836 (*Notebooks* 17). The few short sections that were not about geology perhaps offer some of Darwin's earliest transmutation thoughts (Sloan 1985 110-1). Darwin speculated about different types of reproduction that species use to continue their heredity: "Propagation, whether ordinary, hermaphrodite, or by cutting an animal in two [. . .] we see an individual divided either at one moment or through lapse of ages" (RN 132). Whether zoophyte, plant or invertebrate, propagation is required for a species to continue beyond just one individual. In human beings, that means sexual reproduction. In most societies, including England, the condoned method of reproduction includes marriage. The Red Notebook was finished in England in 1837.

The A notebook came next, probably started around June of 1837 but not finished until long after Darwin had begun other notebooks. A few of the later entries seem to have been added even after July 1839 (Herbert *Notebooks* 83). Once again, geology made up most of the entries. The B notebook overlapped A. It was begun sometime between late May and early August 1837, perhaps right after finishing the Red Notebook, and was completed about the beginning of March, 1838 (*Notebooks* 167).

The very first entry in B was a nod to his grandfather's book, "*Zoonomia*," continuing considerations about propagation. "Two kinds of generation" (B 1). Generation is another word for reproduction. Many of Darwin's early theory ideas began with similarities to those of his grandfather, who was well known for his sexual proclivities throughout his life. The topic of reproduction could have prompted subconscious connections to Erasmus, or to Emma, without having been ostensibly related to them.

Darwin dove right into issues related to species creation and extinction in the B notebook, with reproduction at the heart of the issue. "Why is life short, Why such high object generation" (B 2)? Since asexual offspring do not vary, Darwin considered the importance that sexual "generation here seems a means to vary. or adaptation.— Again we <~~believe~~> <<know>> in course of generations even mind & instinct becomes influenced.— " (B 3). Sexual reproduction leads to variation and adaptation, even of mental capacities. Life being short creates more generations in a shorter time, allowing for more adaptation and variation. Life being short also suggests a young man should not wait to marry. Darwin was theorizing about the change and origin of species, and speculating about the heritability of changing physical characteristics over time. Even in this early theorizing, Darwin included the highly-charged area of inherited mental characteristics, which pointed to the mind being generated by the material of the brain.

I doubt that many of his early thoughts about reproduction and heredity were encouraged by marital thoughts. I think Emma was mostly absent—but not always. Darwin speculated about animal and human heritability and crossing. "The children cannot be made intermediate, the first children partake more of the mother, the later ones

of the father <<is this not due to each copulation producing its effect>>" (B 32)? The question of offspring taking after different parents was important in livestock breeding, and was a recurring theme in the notebooks. Darwin talked about "intermarriages" versus the "instinct" of "keep[ing] to their type" (B 34). This notebook contained many comments about reproduction, copulation and inheritance of characteristics, and it seems plausible that thoughts of a wife, perhaps Emma, came to mind.

Darwin was seeking the mechanism that caused change and variation, and allowed for creation of new species. He speculated that sexual reproduction was required to mix the characteristics of both parents. Darwin saw it as a "Law" that "without change, superinduced, or new species [. . .] animals would perish" (B 61). Change over time by sexual reproduction was needed for variation and adaptation, and at the heart of Darwin's developing theory. He was thinking beyond reproduction of individuals: "it is generation of species like generation of individuals.— " (B 63). Sex is required for all of this. "If individual cannot procreate, he has no issue, so with species" (B 64). If Darwin does not procreate, he has no issue.

There were important scientific questions behind useless "nipple on man's breast," that were like "useless wings [. . .] of beetles" (B 84). He deprecatingly proposed that if God had created each species, individuals "surely would have been born without them" (B 84). Darwin certainly was not the first person to ponder the meaning of vestigial organs. A few pages later he returned to this idea, commenting that his theory explained useless physical structures "like Mammae on mens' breasts.—" (B 99). These were important issues for his theory to explain.

Oblique sexual references make a tenuous connection between Charles's theorizing and Emma. "Sometimes a cigar is only a cigar" (a quotation attributed to Sigmund Freud). Thoughts of Emma may not have been present in any of the many sexual allusions in his theorizing, nor in his religious conjectures, nor references to dogs, heredity, morality or even children. Certainly, early in his notebooks, the entries seem narrowly focused on details of his theory. My assertions of Emma's influence is based on the number of such references repeated over time, their increasing explicitness and the cumulative weight of such possibilities—which seem to add up, even if only as possibilities and inferences.

Later in the B notebook are references to slave holders and abused animals. It is well documented that Emma, like her Wedgwood forebears, was a vocal abolitionist, and Charles shared this concern. Charles and Emma also demonstrated a strong mutual concern over the abuse of animals. "Animals — whom we have made our slaves we do not like to consider our equals.— <<do not slave holders wish to make the black man other kind?>>" (B 231). Charles then let his "conjecture run wild," considering that humans and animals share "one common ancestor" and thus "may be all netted together" (B 232). The preceding notebook entry was probably made in February 1838, still a few months before Darwin's jottings on marriage.

Darwin considered similar topics throughout the B notebook, with some additional thoughts about humility (B 248, 252). By mid-March 1838 he began the C notebook, which was mostly completed by the end of that June. "The problem that dominates Notebook C is the relation between adaptation and heredity" (Kohn *Notebooks* 238). A growing interest in "behavior and materialism become so important that upon

completing Notebook C, Darwin established Notebooks M and N as a separate series of 'metaphysical enquiries'" (Kohn *Notebooks* 238).

In the C notebook, there are too many notes on heredity to detail, so only a representative few will be mentioned. As already suggested, discussions of heredity and thoughts of Emma were not a one-to-one relationship, but there may be some connections. As the summer of 1838 approached, perhaps Darwin was serious about marriage and his libido was more active.

One theoretical point Darwin was considering was that "Changes in species must be very slow, owing to [. . .] offspring not picked.— as men do. When making varieties.— " (C 17). In domestic animal breeding man does the selecting. In nature the picking, or selecting, is dependent upon survival, reproduction, and the choice of strong sexual partners, reflecting the idea of competitive success leading to procreation: "<<whence seals take victorious seals, hence deer victorious deer>>" (C 61). This might be an early step (April or May of 1838) toward survival of the fittest, and perhaps also sexual selection (it is the female animal that takes the "victorious" male in most of his examples) (C 61, Michael Ruse 2009 52). Somewhere in Darwin's mind, possibly he connected being 'victorious' to his own winning of a bride.

The C notebook is full of discussions about heredity and sex, both of animals and man (C 65, 84, 112, 120-5, 133, 167, etc.). There are also many discussions of how different parental crossings effect offspring (C 1-4, 17, 58-9, 61-3, 154, 163, etc.). Darwin commented on health and heredity, which could relate to concerns about his own health and hopes for a robust wife: "The case of hereditary disease [. . .] healthy parents have healthy children" (C 65). It was probably too early for Darwin to consider the "bad

effects of incestuous intercourse" as a concern of marrying, or crossing, with his cousin (C 133). James Moore noted Darwin's personal worries about inbreeding, especially since he was not the first Darwin to marry a Wedgwood, but Moore did not suggest that Darwin had any awareness of the problem before his marriage (Moore 2005 45-6).

Darwin's thoughts on animal suffering would have been shared by Emma, and possibly became future conversation points. "Animals have voice, so has man [. . .] <<[s]hare of sickness,— death, unequal life,— stimulated by same passions— brought into the world same way>>" (C 154). That was written about the same time he made his notes on marriage, between mid-May and mid-June, 1838, (DMP dating).

Then Darwin immediately returned to his complaint about intellectual hubris stimulating his peers to exalt white men while enslaving both black men and animals: "It is our arrogance, to raise" ourselves above animals and blacks (C 154). "Has not the white Man, who has debased his Nature <<& violates every best instinctive feeling>> by making slave of his fellow black, often wished to consider him as another animal" (C 154). These sentiments could have mirrored family conversations from his youth while visiting Maer.

Then Darwin went beyond what Emma would have approved, suggesting that man would "like to think his origin godlike, at least every nation has" (C 153). He then stopped, as if he realized he was getting off course, and put his focus back on topic: "We now know what is the natural arrangement, it is the classification of <~~arrangement~~> relationship; latter word meaning descent.— " (C 155). If what happened here is that Darwin caught his thoughts wandering and refocused on "classification" and "descent," it makes an interesting point about his doggedness of purpose and ability to true-up after

being distracted. Perhaps his thinking was sidetracked by outraged feelings, and by empathy with abused animals and blacks—feelings he shared with Emma.

Sexual matters were at the heart of his theory, so most of his writing on those topics was probably purely scientific. But some may have been stirred by his libido. For instance, during a consideration of differing physical characteristics to expect in an "animal halfway between man & monkey," Darwin added a note to himself to read an abstract on "female genital organs," and then offered more detail: "in some monkeys clitoris wonderfully produced" (C 204). This was written approximately between the middle of May and the middle of June, 1838 (DMP).

Slightly later in the same timeframe, Darwin considered reports of unusual hermaphroditism in certain crustaceans: "where several generations are produced [. . .] without impregnation, therefore sexual passion must arise after long interval very good case. habit is awakened by association" (C 234-5). Darwin saw this as a case of "dormant instinct. (how wonderful a case bees developing sex of neuters)" (C 235). From dormant sexual passion being awakened, he moved to: "The sexual curiosity of the orang outang [. . .] good instance of instinct showing itself" (C 235). These sexual comments are important concerns for the development of his theory.

Considering actions that "may be instincts or habits," after noting that "Even plants have <u>habitual</u> actions," Darwin used the example of "how children come to suck or other actions in fetus of Mammalia," and next noted: "Generation becomes necessary" (C 236). He then considered how asexual "gemmation" could have been an adaptation, and seemed to conclude his thought by wondering if: "∴ Those animals, which only propagate by scission can not alter much.??" (C 237). One wonders if Darwin had

parallel thoughts about "generation" becoming "necessary" in his life, hoping his personal non-sexual state would soon end with his own "sexual curiosity" of a "young male" being fulfilled (C 235-6). While Darwin was clearly pursuing his theory in these notebooks, between the lines is a reflection of his rising libido at a time in his life when that was perfectly appropriate. He was thinking about marriage.

Just before his summer visits to Shrewsbury and Maer, on June 23rd Darwin started out on a geology trip to Scotland. In his *Journal*, he noted that in June he was working on birds, geology, and "some little Species theory, & lost very much time by being unwell" (DMP DAR 158:15). Some of his bad health may have been due to stress in anticipation of the initiation of his courtship with Emma.

While in Scotland, Darwin wrote a separate notebook about the geology around Glen Roy, between June 28th to July 5th, 1838 (*Notebooks* 141). On his return to London, Darwin would write a paper about the geology of Glen Roy. At the time, he thought he had solved that mystery and carried a triumphant belief through his entire courtship with Emma—although later, a new understanding of the effects of icebergs proved this paper to be incorrect.

The *Glen Roy Notebook* was filled mostly with geological notes and sketches, but there were a few entries about animals and scenery that did not fit that mold, including on the very first page. Certainly Darwin always had many diverse scientific projects on his mind, so his speculations in the *Glen Roy Notebook* about scenery, sheep and heredity are not outside his normal interests. He began this notebook saying: "Generally received opinion that male impresses offspring more indelibly than female" (Glen Roy 1). After some geological observations, Darwin returned again to considerations of parental

imprinting of offspring: "I asked this question in many ways & received same answer _____ Thought lambs most like MOTHER!" (Glen Roy 25). Perhaps he was thinking about the parental imprinting of his own children.

The latest that Darwin probably wrote his "Marry—Not Marry" chart is conjectured to be during his July Shrewsbury visit (Browne 1995 378). Similarly, the latest date he set his sights on Emma was during his subsequent visit to Maer, making it more likely that Emma's background presence in the notebooks would increase around and after that time.

When Emma accepted Darwin's proposal that November, he was truly surprised, grateful and joyous. He had feared rejection. His daughter noted that he "was far from hopeful, partly because of his looks" which he believed were "repellently plain" (*Emma* 2:1). In his own autobiography, Darwin said that "I marvel at my good fortune that she, so infinitely my superior in every single moral quality, consented to be my wife" (*Autobiography* 80). Possibly Darwin was living with tensions about the uncertain successes of both his theorizing and his courtship, impinging on his thoughts and disturbing his health from the moment he decided to pursue Emma.

Religion remained a delicate subject between Charles and Emma throughout their lives. Their differences about religion were sensitive and lasting concerns of both Charles and Emma. Earlier in this chapter, I discussed a letter from Emma about religion that Darwin kept until he died. In 1885, three years after Charles's death, Emma urged that Darwin's autobiography be revised before publication to remove a sentence that suggested morality had nothing to do with religion: "There is one sentence in the

Autobiography which I very much wish to omit, no doubt partly because your father's opinion that *all* morality has grown up by evolution is painful to me" (*Autobiography* 78). The sentence that Emma objected was removed, but after her death it was added back into later editions, and here follows:

> Nor must we overlook the probability of the constant inculcation in a belief in God on the minds of children producing so strong and perhaps an inherited effect on their brains not yet fully developed, that it would be as difficult for them to throw off their belief in God, as for a monkey to throw off its instinctive fear and hatred of a snake. (*Autobiography* 77-8)

When writing in his notebooks, Darwin certainly knew Emma's deep religious convictions.

There were so many M notebook pages that touched on issues that might have inspired (or been inspired) by images of Emma, that rather than interrogate them I offer a selection of page numbers to give a sense of their frequency. Some pages that bore on religion include M 82-3, 126, 128, 135-6, 151, and 154. Heredity, babies, children were discussed in M 95, 101, 104, 107, 118, 127, and 132-6. Sexual thoughts and related passions were topics in M 85, 93, 106, 131, 138, 141, 146-9, 152, and 156. Morality, humility and pride were considered in M 123, 142, and 150-1. Music, poetry, beauty, aesthetics, love, happiness and pleasure were topics in M 88, 91, 108-9, 117-27, and 132. Dogs played a part on pages M 91, 94-7, 102, 128, 144, 146, 148-9, and 152.

I do not suggest that Emma was behind very many of Darwin's contemplations on any particular subject, not even those that were sexual, moral and religious. But it seems quite possible that when he was thinking about related subjects, or perhaps when reading

poetry, she was sometimes present in his mind. Mental images of Emma may also have stimulated particular thoughts, for instance on topics about which she was passionate. Religion would have been a concern without Emma, at least due to the many natural theological explanations he was working against. Knowing Emma's religious bent, thoughts of her may have functioned as a bellwether of how future audiences might react to certain contentious ideas.

In his *Journal* (pocket diary), started at about the same time he began his serious courtship of Emma, Darwin wrote about that autumn of 1838: "All September Read a good deal on many subjects: Thought much upon religion" (DMP *Journal* DAR 158:8). September was a month after visiting Emma at Maer, making plausible the connection of religious musings to Emma. In his autobiography Darwin devoted an entire chapter to his thoughts on religion during this same time frame (*Autobiography* 71-80). Darwin also noted: "About this time I took much delight in Wordsworth's and Coleridge's poetry" (A*utobiography* 70-1). Beginning his courtship may have influenced his reading. It is possible that thoughts of Emma encouraged Darwin's interest in poetry and his picking up *The Excursion*. Certainly religion, poetry and Emma were related in time, if not also in mind.

Sandra Herbert suggests that Darwin's reading selections were affected by his extended family circle, both the Darwins and the Wedgwoods. "Apart from works of literature, to which any of his contemporaries might have referred him, the combination of subjects represented by these books suggests a more obvious instrument of selection, which is that in choosing these books Darwin was acting on advice from members of his family" (Herbert 1977 213). Emma was certainly an important part of that family.

Darwin's nervous and sincere commitment to marry Emma may have increased his resolve to successfully unravel the species problem. He might have imagined that career success could help attract a wife and provide additional financial support for a family. His written goal to get married, his well-documented worry about possible rejection and the sexual anticipation of contemplating married life might have stimulated his imagination, or at times been a distraction to his scientific thinking—or a little of both. Contemplation of marriage may have stirred up diverse thoughts, stimulating creativity in untraceable ways.

Sometime from mid-May and mid-June, 1838, perhaps thinking of soon visiting Emma at Maer, Darwin made some tantalizing entries in the C notebook. After contemplating hereditary habits and instincts that were bred into a particular type of "ambling horses," Darwin may have been distracted and switched thoughts: "Talent &c in man not hereditary, because crossed with women with pretty faces" (C 163). He could have been thinking about hereditary reasons to choose a wife with qualities beyond beauty. His next comment ostensibly related to horses but may also have been a metaphor about his efforts at theorizing, and perhaps marriage: "When horse goes a round, the minute [he] gets into the road at right angles, how pleased it is, just like man, emotions very similar" (C 163). The horse stuck on a circular track, "just like man," may have been a thought about his own impending loss of freedom, thinking he might soon be walking the marital track with no open road in sight.

Or perhaps he was contemplating the struggle to get new ideas while talking about those ambling horses wanting to break free of a circular track. How pleased the horse was, and perhaps how pleased he saw himself becoming whenever he left the well-

trodden path and his thoughts could run free and straight. Perhaps Darwin connected creative mental freedom with a wife who was more than a pretty face.

It is impossible to tell if Charles considered that thoughts of Emma might feed into successful theorizing. In notes about marriage, Darwin had exposed many fears about losing time to drudgery and frivolity. Perhaps by the early summer of 1838, in this conjecture about pretty faces and the heritability of talent, Darwin was thinking about the Emma's solid attributes, comparing them favorably as opposed to cute flirtatious women, like the unavailable Fanny Owen. Maybe Charles was trying to justify his marital choice of Emma by suggesting that his talents would be passed down more readily through her, than through a wife who was just another pretty face, or one who would keep him on a habitual circular track. As interesting as these connections seem, Emma may have been nowhere in these thoughts about heritability of favorable traits.

The secondary literature offers scant suggestions linking notebook pages to thoughts of Emma or marriage, aside from some of Charles's more obviously sexual thoughts at key times in his courtship. Emma's possible effect on Darwin was not much commented upon until he was about to propose, right after his Malthusian insight into natural selection. Even then, her influence mostly was seen as negative. For instance, when Darwin lost days to sickness it was often attributed to thoughts of marriage: "Perhaps it is also significant that, having read Malthus and also decided to ask Emma to marry him, he noted: "Lost 6, 7, 8th of Novemb. unwell" (Thompson 214, *Journal* July-October 1838). Thoughts of marriage certainly may have distracted Darwin and exacerbated his well-documented nervous ailments, but that is only one side of the story. I think most scholars underestimate the breadth of Emma's importance to Charles.

I do not suggest that Emma collaborated in Charles's theorizing, but that images of Emma may have inspired him in a variety of ways. Emma could have added impetus to his querying many scientific topics, whether consciously or unconsciously. Considerations of Emma may have stirred deeper thoughts about the hereditability of mental traits like morality, or of instincts like the urge to marry. Their shared concern for animal rights could have encouraged his view of man and animals being netted together, an insight and perspective that added so much to his theory.

This optimistic view of Emma's possible inspirations offers rich interpretive opportunities to help understand Darwin's complex path toward solving the species problem. Emma's influence, distracting or helpful, good or bad, was probably not an either-or. As Darwin demonstrated in his consideration of marriage, he realized that there were opposite complex sides to the issue. Courtship is its own mysterious entangled bank, motivated by a very strong, evolved drive to procreate. Darwin may have been aware of his own aroused sexual and paternal instincts affecting his free will, and noticed times when thoughts of Emma wedged into his mind. Darwin was under the double tension of uncertainty of successful theorizing and courtship. He actually seemed more confident that he would succeed with this theory.

Janet Browne suggests that Emma may even have played a part in Darwin's reading Malthus: "A good case can be made for at least some of his initial interest lying in the fact that Malthus dealt with the question of the 'fruitfulness of marriages,' an issue running high in his notebooks. . . . (U)nderneath bubbled Dr. Darwin's warning that he should marry soon if he wanted healthy children" (Browne 1995 385). Perhaps that is so. I have also suggested many other possible intersections of Emma's influence in Darwin's

thinking beyond just thoughts of fecundity. Deciding to marry and picking a prospective mate is, in myriad ways, one of the most important decisions one makes in life. Although Emma's specific effects on Charles Darwin's thinking is impossible to determine, I argue that she played a serious part, at least from time to time, in his focused species theorizing.

Conclusion

This study has discussed several factors that contributed to Charles Darwin's creativity, mostly during the two years between Darwin's return from the *Beagle* and his Malthusian insight that led to natural selection, September 28, 1838. I contend that Darwin's path to solving the species problem was aided by his unusually humble character, simultaneous courtship of Emma, interest in the creativity of a material mind, and interaction with the ideas of William Wordsworth. These factors were distinct but entwined with Darwin's specific study and inquiry into the species problem that were primary to his theorizing. Darwin's own metaphor of an entangled bank is appropriate when one considers creativity such as his.

My intention in this study was to show that Darwin's creativity was supported in unexpected ways by these four diverse topics. I have pointed to numerous correlations between these four issues and Darwin's theorizing. Causation is harder to prove. That the very nature of creativity precludes it being studied like a science is part of my argument. Darwin lived in a time when the sciences were not studied in a strictly compartmentalized fashion. In the 1830s a young naturalist would seriously consider claims of knowledge about natural history not only made by men of science but also made by theologians, philosophers and poets.

The borders between these four disciplines were not always distinct, as demonstrated by Darwin's grandfather, Erasmus, who combined them all in a very successful career that influenced future poets, scientists and novelists. In that interdisciplinary context, Darwin read Wordsworth's insights into the profundities of man and nature. Darwin's notebooks reflected many of the poet's themes, with tantalizing

possible resonances, intellectual stimulation and counter-readings. Thinking is conducted through memories, images, feelings, words, analogies, and metaphors. Wordsworth's vision of nature's contrasts and complexity, especially from the twice-read *The Excursion*, were current additions to Darwin's voluminous store of information during the important two years of this study.

Darwin's consideration of marriage and courtship with Emma were unfolding concurrently with the two years of his productive theorizing. Marriage is one of the most important decisions a person makes in his or her lifetime. While sex was crucial to his theory in many important ways, it would be a mistake to suggest that Emma was always on his mind when he mused about sexually related details, like heredity. On the other hand, there were so many speculations of sexual topics, often increasing in quantity and heat near the dates of his few visits with Emma, that I propose their romance added productive energy, at least, to his theory development. Investigating Emma's importance to Darwin's creativity leads to hints of words like inspiration, influence and muse, linkages that are provocative but unprovable.

Emma was drawn to many facets of Darwin's personality including his unusual humility, a part of his character that many of his contemporaries also noticed. Taught the importance of humility Darwin was on guard against his own prideful urges, as his notebooks and letters demonstrate. I argue that his introspective concern with such intellectual vanities helped Darwin create a powerful frame on the species problems he was addressing. It allowed him to look beyond widely held assumptions, including anthropocentrism. Darwin faced problems not only of certain religious conceits but also of intellectual and racial vanities. In *Origin* he warned that many experienced and

eminent naturalists held strong beliefs that would prevent them from giving his theory a fair hearing.

While I have presented a variety of evidence suggesting that Darwin's humility allowed him to avoid various intellectual conceits of his fellow naturalists and helped him see that all species are netted together, the reverse is also possible. That is, Darwin's developing understanding of species connectedness encouraged humility. While the timing makes the latter argument suspect, since I traced Darwin's modest nature to his youth, prior to his species theorizing, this may not be an either-or proposition. I suspect a creative feedback loop between humility and natural selection.

During his theorizing, Darwin came to see that even the "discerning intellect of Man" was materially evolved, only "A simple produce of the common day" (Wordsworth *Excursion* Preface 51, 55). If one "thinks deeply" about the implications of natural selection, it could teach humility from seeing the conceit of feeling special in the vast scheme of nature, and offer the foundation of a creative, connected view "of Man, Nature and Society" (D 134, *Excursion* Preface 26-7). And that would not be a bad thing.

Perhaps similarly, Darwin's theory's natural framing of creativity offered him more tools to be creative. Pondering how a physical mind produced original thought put him in the challenging position of having his mind consider itself. Contemplating how creativity, emotions, aesthetics and even morality had evolved and were generated in the brain, he examined evidence in simpler animals, man, and himself. Discounting metaphysics, he envisioned a physical structure for thinking and seemed to try it himself—building new ideas as "air castles" and then comparing them in parallel trains

of thought, a style which hinted at ideas competing, selecting, with the ‘strongest’ winning out.

The fact of creativity’s notoriously complex underpinnings does not mean that it should not be studied. Charles Darwin was not considered a genius through his youth and education, yet he demonstrated remarkable creativity whose impact has only continued to increase more than two hundred years after his birth. This study has examined four diverse factors that were among the intertwined roots of that creativity; his humble character, courtship of Emma, inclusion of poetry during his theorizing, and concern about the many implications of a material mind. They were related, at least, in that they stimulated and supported his productive thinking.

It is important to consider the links between these roots of Darwin’s creativity and his success, not only because they add another level of richness to the story of Charles Darwin (although that would be enough). Creativity is not a single well-defined effect, but a web of interactions and ideas, often including humble open-mindedness. Many scholars have pointed to the influence of cultural and political forces on Darwin, as well as his doggedness, concern with details, systematizing skills, and voluminous reading. Darwin’s theory development was supported by many factors that may seem unrelated, including his considerations of creativity, humility, Emma, and Wordsworth. I contend that these four topics deserve consideration in the mix that generated his creative thinking. They may seem only to be small pieces of the expansive entangled bank of Darwin' theorizing, but as he demonstrated the study of common details can lead to important insights.

Appendix A—Transcription Conventions

With a few exceptions I have followed the transcription conventions in Barrett et. al. *Notebooks*.

Darwin's spelling and punctuation have been left in their original form, to the best understanding of the transcribers.

When Darwin deleted a word or a phrase, it will be marked as follows in my text: ‹~~to do good~~›, although in the original transcription it was marked: ‹to do good›

When Darwin inserted a word or a phrase, it will be marked as follows: «to improve his organization»

bold type indicates Darwin's later annotation.

When I inserted a phrase, I used brackets: [my addition].

When Darwin used brackets: [CD Brackets][CD]

I have removed all footnotes from transcriptions, but noted them when appropriate in the text.

Works Cited

Abbreviations

A, B. . . , Glen Roy, OUN, RN	Individual Notebooks in Barrett, Paul H., et al., eds. 1987. *Charles Darwin's Notebooks, 1836-1844*.
Autobiography	Darwin, Charles. *The Autobiography of Charles Darwin.*
Correspondence	Burkhardt and Smith. *Correspondence of Charles Darwin.*
CUL	Cambridge University Library.
DAR	Darwin Archive. Cambridge University Library.
DCD	Darwin Correspondence Database, Cambridge University.
DMP	Kohn, David. *Darwin Manuscripts Project.*
Emma	Litchfield, Henrietta, ed. *Emma Darwin: a Century of Family Letters.*
Excursion	Wordsworth, William. *The Excursion.*
Marginalia	Di Gregorio, Mario, assisted by N. W. Gill. *Charles Darwin's Marginalia. vol* 1.
Notebooks	Barrett et. al. *Charles Darwin's Notebooks*.
Origin	Darwin, Charles. *On the Origin of Species by Means of Natural Selection.*
Preface	Wordsworth, W. and S. T. Coleridge. *Lyrical Ballads. Preface* to *Lyrical Ballads*, revised 1802.

Works Cited

Abercrombie, John. *Inquiries Concerning the Intellectual Powers and the Investigation of Truth.* London, 1832. *Google Books*. Google. Web. 16 Nov 2010.

Abrams, M. H. *Natural Supernaturalism: Tradition and Revolution in Romantic Culture*. New York: Norton, 1971. Print.

Allen, Richard C., *David Hartley on Human Nature*. Albany: SUNY UP, 1999. Print.

Amigoni, David. *Colonies, Cults and Evolution: Literature, Science and Culture in Nineteenth-Century Writing*. Cambridge: Cambridge UP, 2007. Print.

Averill, James H. "Wordsworth and 'Natural Science': The Poetry of 1798." Jour. *of English and Germanic Philology.* U of Ill. 77.2 (1978): 232-46. *JSTOR*. Web. 2 May 2010.

Barrett, Paul H. "The Sedgwick-Darwin Geologic Tour of North Wales." *Proceedings of the Amer. Philos. Soc.,* 18.2 (1974): *JSTOR*. Web. 2 September 2012.

Barrett, Paul H., Peter J. Gautrey, Sandra Herbert, David Kohn, and Sydney Smith, eds. *Charles Darwin's Notebooks, 1836-1844*. Ithaca: Cornell UP, 1987. Print.

Beach, Joseph Warren. "Reason and Nature in Wordsworth." *Jour. of the History of Ideas*. 1.3 (1940): 335-51. *JSTOR.* Web. 27 March 2011.

Beer, Gillian. *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction.* 2nd Edition. Cambridge: Cambridge UP, 1983, 2000. Print.

---, "Darwin's Reading and the Fictions of Development." *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 543-88. Print.

---, "'The Face of Nature': the Language of *The Origin of Species*." *Languages of Nature: Critical Essays on Science and Literature*. Ed. L. J. Jordanova, New Brunswick: Rutgers UP, 1986. 207-43. Print.

---, "Translation or Transformation? The Relations of Literature and Science*." Notes and Records of the Royal Society of London*. 44.1 (1990): 81-99. *JSTOR*. Web. 19 September 2009.

---, "Darwin and Romanticism." *Grasmere 2009: Selected Papers from the Wordsworth Summer Conference*. Comp. Richard Gravil. Tirril: Humanities-Ebooks, 2009. 7-26. Print.

Bentham, Jeremy. *A Fragment on Government*. Ed. F.C. Mantague. Oxford: Clarendon Press, 1891. *Google Books*. Google. Web. 13 October 2012.

Bernhardt-Kabisch, Ernest. "The Stone and the Shell: Wordsworth, Cataclysm, and the Myth of Glaucus." *Studies in Romanticism*. 23.4 (1984): 455-90. *JSTOR.* Web. 20 December 2011.

Blackwood, William, ed. *Blackwood's Edinburgh Magazine: January - June.* 41 (1837). New York: William Lewer. *Google Books*. Google. Web. 25 November 2012.

---, *Blackwood's Edinburgh Magazine: July – December*. 44 (1838). London: W. Blackwood and Sons. *Google Books*. Google. Web. 25 November 2012.

Bloom, Harold. *The Anxiety of Influence: a Theory of Poetry*. New York: Oxford UP, 1973. Print.

Bowler, Peter J. *Evolution: The History of an Idea*. 3rd Edition. LA: U of Cal P, 2003. Print.

Boynton, Robert S. "The Birth of an Idea: a Profile of Frank Sulloway." Rev. of *Born to Rebel*, by Frank Sulloway. *New* Yorker New Yorker. 7 October 1996. Web. 12 December 1999.

Bradford, Galaliel. *Darwin*. Boston: Houghton Mifflin, 1926. Print.

Bradley, Benjamin S. "Darwin's Sublime: The Contest Between Reason and Imagination in *On the Origin of Species.*" *Jour. of the Hist. of Biol.* (13 November 2009): 1-28. Springer. Web. 5 June 2011.

Breed, David R. Rev. of *The Evolution of Darwin's Religious Views*. By Frank Burch Brown. *The Jour. of Religion*. 69.4 (1989): 556-7. *JSTOR*. Web. 2 August 2012.

Brent, Peter. *Charles Darwin: a Man of Enlarged Curiosity*. New York: Harper, 1981. Print.

Bromwich, David. *A Choice of Inheritance: Self and Community from Edmund Burke to Robert Frost*. Cambridge: Harvard UP, 1989. Print.

Browne, Janet. *Charles Darwin: Voyaging*. Princeton: Princeton UP, 1995. Print.

---, *Charles Darwin: The Power of Place*. London: Jonathan Cape, 2002. Print.

---, "Darwin's Intellectual Development: Biography, History and Commemoration." *Darwin: The Darwin College Lectures*. Eds. W. Brown and A.C. Fabian. Cambridge: Cambridge UP, 2010. 1-30. Print.

Bryson, Bill. *A Short History of Nearly Everything*. New York: Broadway Books, 2003. Print.

Burke, Edmund. *A Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful.* Basil: Tourneisen, 1792. *Google Books*. Google. Web. 30 January 2016.

Burkhart, Frederick and Sydney Smith, eds. *The Correspondence of Charles Darwin*. 28 vols. Cambridge: Cambridge UP, 1986. Print.

Cabanis, Pierre-Jean. "Rapports du physique et du moral de l'homme." 1802. *Oeuvres Completes de Cabanis*. Vol III. Paris: Bossange. 1827. *Google Books*. Google. Web. 2 August 2 2015.

Cambridge University. *Darwin Correspondence Database* (DCD). Cambridge: CUL, 2013. www.darwinproject.ac.uk. Web. 30 July 2013.

Cannon, Susan Faye. (*see also* Cannon, Walter F.). *Science in Culture: The early Victorian period.* New York: Dawson and Science History Publications, 1978. Print.

Cannon, Walter F. (*see also* Canon, Susan Faye). "Scientists and Broad Churchmen: An Early Victorian Intellectual Network." *The Jour. of British Studies*. 4.1 (1964): 65-8. *JSTOR.* Web. 5 April 2011.

---, "The Normative Role of Science in Early Victorian Thought." *Jour. of the History of Ideas*. 25.4 (1964): 487-502. *JSTOR.* Web. 26 March 2011.

---, "Darwin's Vision in *On the Origin of Species*." *The Art of Victorian Prose*. Eds. George Levine and William Madden. New York: Oxford UP, 1968. 154-76. Print.

Cheney, Dorothy L., and Robert M. Seyfarth. *Baboon Metaphysics: The Evolution of a Social Mind*. Chicago: U of Chicago Press, 2007. Print.

Christensen, Francis. "Creative Sensibility in Wordsworth." *The Jour. of English and Germanic Philology*. 45:4 (1946): 361-68. *JSTOR*. Web. 27 March 2011.

Church, R.W. "William Wordsworth" *The English Poets: Selections with Critical Introductions by Various writers.* Ed. Thomas Humphry Ward. Vol. 4. New York: Macmillan & Co, 1894. *Google Books*. Google. Web, 21 July 2012.

Clark, John Willis and Thomas Mckenny Hughes. *The Life and Letters of the Reverend Adam Sedgwick.* 2 vols. Cambridge: Cambridge UP, 1890. *Google Books*. Google. Web, 17 August 2011.

Coleridge, Samuel Taylor. *Zapolya: a Christmas tale.* London: Fenner, 1817. *Google Books*. Google. Web. 9 August 2014.

---, *Biographia Literaria; or Biographical Sketches of My Literary Life and opinions*. 2 vols. London: Fenner, 1817. *Google Books*. Google. Web. 26 September 2011.

---, *The Complete Works of Samuel Taylor Coleridge; With an Introductory Essay Upon His Philosophical and Theological Opinions.* Ed. Professor Shedd. Vol. 4. New York: Harper. 1854. *Google Books*. Google. Web. 29 September 2011.

---, *Letters of Samuel Taylor Coleridge.* Ed. Earnest Hartley Coleridge. Vol. 2. Boston: Houghton Mifflin, 1895. *Google Books*. Google. Web. 1 September 2011.

---, *Unpublished Letters of Samuel Taylor Coleridge*. Ed. Earl Leslie Griggs. London: Constable, 1933. *Google Books*. Google. Web. 11 December 2011.

Colp, Ralph Jr. "'I Was Born a Naturalist': Charles Darwin's 1838 Notes About Himself." *J Hist Med Allied Sci.* 35.1 (1980): 8-39, *PubMed*. Web. 30 Aug 2007.

---, "'Confessing a Murder': Darwin's First Revelations about Transmutation." *Isis*. 77:1 (1986): 9-32, *JSTOR*. Web. 30 April 2010.

Conrad, Joseph. *Victory*. New York: Doubleday, 1922. *Google Books*. Google. Web. 21 April 2014.

Cook, E.T. *The Life of John Ruskin*. New York: Macmillan, 1911. *Google Books*. Google. Web. 3 July 2011.

Costa, James T. "The Darwinian Revelation: Tracing the Origin and Evolution of an Idea." *BioScience*. 59:10 (2009): 886-94, *JSTOR*. Web. 7 August 2015.

Crawford, Joseph. *Raising Milton's Ghost: John Milton and the sublime of terror in the early Romantic period*. New York: Bloomsbury Academic, 2011. Print.

Culler, Dwight. "The Darwinian Revolution and Literary Form." *The Art of Victorian Prose*. Eds. George Levine and William Madden. New York: Oxford UP, 1968. 225-46. Print.

Cunningham, Peter, ed. *The Letters of Horace Walpole: Earl of Oxford*. Vol. 9. London: Richard Bentley, 1859. *Google Books*. Google. Web. 8 December 2011.

Dale, Peter Alan. *In Pursuit of a Scientific Culture*: *science, art and society in the Victorian age*. Madison: U of Wisconsin P, 1989. Print.

Darwin, Charles. *Charles Darwin's Diary*. Cambridge: Cambridge UL. 1838. Print.

---, *Journal of Researches Into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle Under the Command of Captain FitzRoy, R.N. from 1822 to 1836*. Ed. Captain Robert Fitzroy. London: Murray, 1839. Print.

---, *Journal of Researches into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle Under the Command of Captain FitzRoy, R.N. from 1822 to 1836*. New York: Harper, 1839-1846. *Google Books*. Google. Web. 27 January 2016.

---, *1842 Essay*. 1842. CUL. *DMP CUL* DAR 6: 1-50. Web. 27 January 2016.

---, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. A Facsimile of the First Edition.* Cambridge: Harvard UP, 1859-1995. Print.

---, *The Expression of the Emotions in Man and Animals*. London: Murray, 1872. Print.

---, *Charles Darwin's The Life of Erasmus Darwin*. Ed. Desmond King-Hele. Cambridge: Cambridge UP, 1879-2003. Print.

---, *The Formation of Vegetable Mould Through the Action of Worms, With Observations On Their Habits*, London: Murray, 1881. Print.

---, *The Life and Letters of Charles Darwin*. Ed. Francis Darwin. New York: Appleton, 1901. *Google Books*. Google. Web. 30 January 2016.

---, *The Autobiography of Charles Darwin: 1809-1882, With Original Omissions Restored*. Ed. Nora Barlow. New York: Norton, 1958-2005. Print.

---, *Darwin's Journal*. Ed. Sir Gavin De Beer. London: British Museum (Nat Hist). 2:1, 1959. Print.

---, *Charles Darwin's Beagle Diary*. Ed. Richard Darwin Keynes. Cambridge: Cambridge UP. 1988. Print.

---, *Voyage of the Beagle*. Eds. Janet Browne and Michael Neve. New York: Penguin, 1989. Print.

Darwin, Erasmus. *Zoonomia*, *Or, the Laws of Organic Life*. London, 1794. *Gutenberg Project.* Web. 2 May 2010.

---, *The Botanic Garden. A Poem in Two Parts. Part I Containing the Economy of Vegetation, Part II The Loves of the Plants.* New York, T & J Swords, 1798. *Google Books*. Google. Web. 29 August 2011.

---, *The Temple of Nature; or, the Origin of Society: a Poem, with philosophical notes.* London: Jones & Co., 1803-1825. *Google Books*. Google. Web. 3 September 2011.

Darwin, Francis. *Charles Darwin: his life told in an autobiographical chapter, and in a selected series of his published letters*. London: Murray. 1902. *Google Books*. Google. Web. 7 November 2010.

Davy, Humphry. "A Discourse Introductory to a Course of Lectures on Chemistry; Delivered in the Theatre of the Royal Institution on the 21st of January, 1802." *The Collected Works of Sir Humphry Davy.* Ed. John Davy. London: Cornhill, 1840. 307-26. *Google Books*. Google. Web. 21 June 2011.

Day, Catherine and James G. Lennox. "Seeking Darwin's Origins." *Victorian Studies*. 52:3 (2010). 449-456. *JSTOR*. Web. 3 January 2015.

Day, Robert. "The Life and Times of Erasmus Darwin; With Special Attention to His Possible Influence on the Work of Charles Darwin and on the Conflict Between Conservatism and Modernism." Ohio State U. Web. 25 September 2011. *Angelfire.com*.

De Beer, ed. *Darwin's Notebooks on Transmutation of Species: Part I. First Notebook (July 1837-February 1838).* London: British Museum (Nat Hist). 2:2 (1960). Web. 26 May 2013. *Darwin-online.org.uk*.

Degler, Carl N. *In Search of Human Nature: The Decline and Revival of Darwinism in American Social Thought*. Oxford: Oxford UP, 1991. Print.

Dennett, Daniel C. *Intuition Pumps and Other Tools for Thinking*. New York: Norton, 2013. Print.

Desmond, Adrian, and James Moore. *Darwin, the Life of a Tormented Evolutionist.* New York: Norton, 1991. Print.

---, *Darwin's Sacred Cause: how a hatred of slavery shaped Darwin's views on human evolution*. New York: Houghton Mifflin, 2009. Print.

Dickenson, Emily. *Poems by Emily Dickenson*. Boston: Roberts Brothers, 1892. *Google Books*. Google. Web. 10 September 2014.

Di Gregorio, Mario, assisted by N. W. Gill. *Charles Darwin's Marginalia. vol* 1. New York: Garland, 1990. Print.

Durant, John R. "The Ascent of Nature in Darwin's *Descent of Man.*" *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 283-326. Print.

Durrant, Geoffrey. *Wordsworth and the Great System: A Study of Wordsworth's Poetic Universe*. London, Cambridge UP, 1970. Print.

Edelman, Gerald M. *Bright Air, Brilliant Fire: On the Matter of the Mind.* New York: Basic, 1992. *Google Books*. Google. Web. 26 September 2014.

Evans, Joan. *John Ruskin*. London: Cape, 1954. Print.

Feinstein, Jonathan. *The Nature of Creative Development*. Stanford: Stanford Business, 2006. *Google Books*. Google. Web. 14 December 2014.

Feuerbach, Ludwig. *The Essence of Christianity*. Tr. Marian Evans. London: Kubner, 1881. *Internet Archive.* Web. 1December 2012.

Ferrier, James F. "An Introduction to the Philosophy of Consciousness. Part III." *Blackwood's Edinburgh Magazine January – June 1838*. Ed. William Blackwood. London: Blackwood. 43 (1838): 784-91. *Google Books*. Google. Web. 20 August 2014.

Fitzgerald, F. Scott. “The Crack-Up.” *Esquire Magazine*. Hearst. Web. 10 February 2016. Esquire.com.

FitzRoy, Robert, ed. *Narrative of the Surveying Voyages of His Majesty’s Ships Adventure and Beagle.* London, 1839. Print.

Fleming, Donald. “Charles Darwin, the Anaesthetic Man” *Victorian Studies*, 4:3 (1961): 219-36. Indiana UP. *JSTOR.* Web. 5 May 2010.

Foote, George William, ed. *The Freethinker*. London: Foote, 1895. *Google Books*. Google. Web. 21 July 2014.

Foucault, Michel. “What Is an Author.” Ed. Paul Rabinow. *The Foucault Reader*. New York: Pantheon, 1984. Print.

Frank, Lawrence. “The Hound of the Baskervilles, the Man on the Tor, and a Metaphor for the Mind.” *Nineteenth-Century Literature*. 54:3 (1999): 336-72. *JSTOR.* Web. 27 March 2011.

Frye, Paul H. *Wordsworth and the Poetry of What We Are*. New Haven: Yale UP, 2008. Print.

Fullmer, June Z. *Young Humphry Davy: the Making of an Experimental Chemist.* Philadelphia: Amer. Philos. Soc., 2000. *Google Books*. Google. Web. 27 July 2011.

Galperin, William H., “Anti-Romanticism, Victorianism, and the Case of Wordsworth.” *Victorian Poetry*. W Virginia UP, 24.4 (1986): 357-71. *JSTOR*. Web. 18 April 2010.

Gaull, Marilyn. “From Wordsworth to Darwin: ‘On to the Fields of Praise.’” *The Wordsworth Circle*. 10 (1979): 33-48. Print.

Garrod, Heathcote G. *Wordsworth: Lectures and Essays*. Oxford: Clarendon, 1927. *Google Books*. Google. Web. 15 September 2011.

Ghiselin, Michael T., "Darwin and Evolutionary Psychology." *Science.* New Series. AAAS, 179.4077. (1973): 964-968. *JSTOR*. Web. 9 August 2014.

Gill, Steven. *Wordsworth and the Victorians*. Oxford: Clarendon, 1998. Print.

---, *The Cambridge Companion to Wordsworth*. Cambridge: Cambridge UP, 2003. Print.

Gilserman, Susan. "Early Victorian Science Writers and Tennyson's 'In Memoriam': A study in Cultural Exchange: Part I." *Victorian Studies*. 18.3 (1975): 277-308. *JSTOR*. Web. 5 January 2010.

---, "Early Victorian Science Writers and Tennyson's 'In Memoriam': A study in cultural exchange: Part I." *Victorian Studies*. 18.34 (1975): 437-59 *JSTOR*. Web. 5 January 2010.

Gonzalez, Susan. "A Composer, a President, and a Dean Share in Conversation About Creativity and Expression." *Yale News*. New Haven: Yale UP, October 21 2014. Web. 21 October 2014. http://news.yale.edu/

Gregory, Frederick. *History of Science 1700 to 1900*. The Teaching Company, n.d. Web. 27 June 2012. Audio Lecture. *thegreatcourses.com.*

Grene, Marjorie and David Depew. *The Philosophy of Biology: an Episodic History.* Cambridge: Cambridge UP, 2004. *Google Books*. Google. Web. 5 October 2012.

Gruber, Howard E. *Darwin on Man; a Psychological Study of Scientific Creativity*. Chicago: U of CP, 1981. Print.

---, "Going the Limit: Toward the Construction of Darwin's Theory (1832-1839)." *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 483-510. Print.

Gruber, Howard E. and Valmai Gruber. "The Eye of Reason: Darwin's Development During the Beagle Voyage." *Isis*. 53.2 (1962): 186-200. *JSTOR*. Web. 19 September 2009.

Gruber, Jacob W. "Who Was the Beagle's Naturalist." *The British Jour. for the Hist. of Science*. 4.3 (1969): 266-82. *JSTOR*. Web. 19 September 2009.

Haliburton, Thomas. *The Clockmaker: Of the Sayings and Doings of Samuel Slick, of Slickville*. Philadelphia: Blanchard, 1838. Print.

Hartman, Geoffrey H. *The Unremarkable Wordsworth.* Minneapolis: U of Minn P, 1987. Print.

Hartley, David M.D. *Observations on Man: His Frame, His Duty, and His Expectations, in Two Parts*. London: Tegg, 1834. *Google Books*. Google. Web. 20 October 2007.

Hayden, John. "Wordsworth, Hartley, and the Revisionists." *Studies in Philology*. 81.1 (1984): 94-118. *JSTOR*. Web. 17 March 2011.

Hazlitt, William. *The Round Table: A Collection of Essays on Literature, Men and Manners*. Vol. 2. Edinburgh: Constable. 1817. *Google Books*. Google. Web. 21 July 2012.

---, "Lectures on the English Poets. Delivered at the Surrey Institution." *The North-Amer. Rev. and Misc. Journ*. 8.23 (1819): 276-322. *JSTOR*. Web. 21 July 2012.

---, *Sketches and Essays*. London: Templeman, 1839. *Google Books*. Google. Web. 28 November 2012.

Healey, Edna. *Emma Darwin, the Inspirational Wife of a Genius*. London: Headline, 2002. Print.

Herbert, Sandra. "Darwin, Malthus, and Selection." *Jour. of the Hist. of Biol.*, 4.1 (1971) 209-17. *JSTOR*. Web. 8 January 2016.

---, "The Place of Man in Darwin's Theory of Transmutation: Part I, to 1837." *Jour. of the Hist. of Biol.*, 7.2 (1974): 217-258. *JSTOR*. Web. 19 September 2009.

---, "The Place of Man in Darwin's Theory of Transmutation: Part II" *Jour. of the Hist. of Biol.* 10.2 (1977): 155-227. *JSTOR*. Web. 7 September 2009.

---, "Darwin the Young Geologist." *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 483-510. Print.

---, *Charles Darwin, Geologist*. Ithaca: Cornell UP, 2005. *Google Books*. Google. Web. 31 July 2012.

---, "The Darwinian Revolution Revisited." *Jour. of the Hist. of Biol.* 38.1 (2005): 51-66. *JSTOR*. Web. 7 September 2009.

Herringman, Noah, ed. *Romantic Science: The Literary Forms of Natural History*. Albany: SUNY P, 2003. Print.

Hickey, Alison. *Impure Conceits: Rhetoric and Ideology in Wordsworth's Excursion.* Stanford: Stanford UP, 1997. Print.

Hilton, Tim. *John Ruskin: The Early Years, 1819-1859*. New Haven: Yale UP, 1985. Print.

Hodge, M.J.S. and David Kohn. "The Immediate Origins of Natural Selection." *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 483-510. Print.

Home, Henry, Lord Kames. *Sketches of the History of Man*. *Vol. 1*. Edinburgh: Creech, 1774. *Google Books*. Google. Web. 31 December 2014.

Howe, H.P., ed. *The Complete Works of William Hazlitt*: *After the Edition of A. R. Waller and Arnold Glover*. New York: AMS Press, 1967. Print.

Hudson, Alex. "Poetry, the Creative Process and Mental Illness." BBC, 7 February 2011. Web. 19 July 2014. http://www.bbc.com/news/entertainment-arts-12368624.

Hume, David. *Essays and Treatises on Several Subjects. Vol. 2*. Edinburgh: Clarke, 1809. *Google Books*. Google. Web. 19 August 2014.

Hunt, Leigh. "Wordsworth's Sonnet's." *Leigh Hunt's London Jour.* 60. London: Knight, 1834. *Google Books*. Google. Web. 23 July 2012.

---, *The Seer: or, Common-Places Refreshed*. Part 1. London: Moxon, 1840. *Google Books*. Google. Web. 31 July 2012.

Huxley, Thomas Henry. "Thomas Henry Huxley (1825-1895)." U. C. Berkeley, n.d. Web. 30 January 2016. http://www.ucmp.berkeley.edu/ .

Jackson, Noel. *Science and Sensation in Romantic Poetry.* Cambridge: Cambridge UP, 2008. Print.

---, "Rhyme and Reason: Erasmus Darwin's Romanticism." *Modern Language Quarterly* 70.2 (2009): 171-94. Web. 2 February 2016. Lit.mit.edu.

James, Tony. Dream, *Creativity, and Madness in Nineteenth-Century France*. Oxford: Oxford UP., 1995. *Google Books*. Google. Web. 5 August 2015.

Jarvis, Simon. "Wordsworth and Idolatry." *Studies in Romanticism* 38.1 (1999): 3-27. *JSTOR*. Web. 27 March 2011.

Jeffrey, Francis. Rev. of *The Excursion*, by Wordsworth. *Edinburgh Review* 24 (1814). spenserians.cath.vt.edu. Web. 23 July 2012.

Jeffrey, Lloyd N. "Wordsworth and Science." *The South Central Bulletin*, 27.4 (1967): 16-22. *JSTOR*. Web. 26 March 2011.

Jenyns, Rev. Leonard. *Memoir of the Rev. John Stevens Henslow; Late Rector of Hitcham, and Professor of Botany in the University of Cambridge*. London: Van Voorst, 1862. *Google Books*. Google. Web. 18 August 2011.

Johnson, Curtis. *Darwin's Dice: The idea of CHANCE in the Thought of Charles Darwin.* Oxford: Oxford UP, 2014. *Google Books*. Google. Web. 24 October 2014.

Johnston, Kenneth R. "Wordsworth and The Recluse: The University of Imagination." *PMLA*. 97.1 (1982): 60-82. *JSTOR*. Web. 26 March 2011.

---, *Wordsworth and "The Recluse."* New Haven: Yale UP, 1984. Print.

Keats, John. *Keats's Poetry and Prose*. Ed. Jeffrey N. Cox. New York: Norton, 2009. Print

Keen, Paul. ed. *Revolutions in Romantic Literature: An Anthology of Print Culture, 1780-1832*. Peterborough Ontario: Broadview, 2004. *Google Books*. Google. Web. 21 July 2015.

King-Hele, Desmond. *Erasmus Darwin and the Romantic Poets*. New York: St. Martin's Press, 1986. Print.

---, “Erasmus Darwin, Man of Ideas and Inventor of Words.” *Notes and Records of the Royal Society of London*, 42.2 (1988): 149-80. *JSTOR.* Web. 4 May 2010.

---, *Erasmus Darwin: A Life of Unequalled Achievement*. London: de la Mare, 1999. Print.

---, “Are Ideas Free to Roam.” Rev. of “Open fields: Science in Cultural Encounter,*”* by Gillian Beer. *Notes and Records of the Royal Society of London* 54.3 (2000): 400-402. *JSTOR*. Web. 2 May 2010.

---*,* “Portrait of Erasmus Darwin.” *Strangescience.net*, n.p., n.d. Web. 25.Nov 2010.

Knight, William, col. and ed. *Letters of the Wordsworth Family; From 1787 to 1855*. Vol. 3. Boston: Ginn, 1907. *Google Books*. Google. Web. 15 March 2012.

Kohn, David, Robert C. Stauffer, Sydney Smith. “New Light on ‘The Foundations of the Origin of Species’: A Reconstruction of the Archival Record.” *Jour. of the Hist. of Biol.* 15.3 (1982): 419-42. *JSTOR*. Web. 13 May 2010.

Kohn, David, “Charles Darwin’s Path to Natural Selection.” Massachusetts: U of Mass, 1975. Web. 12 June 2013.

---, “Theories to Work By: Rejected Theories, Reproduction, and Darwin’s Path to Natural Selection.” *Studies in History of Biology*. 4 (1980): 67-170. Print.

---, ed. *The Darwinian Heritage*. Princeton: Princeton UP, 1985. Print.

---, “Darwin’s Ambiguity: the Secularization of Biological Meaning.” *British Jour. for the Hist. of Science.* 22 (1985): 215-39. Print.

---, “The Aesthetic Construction of Darwin’s Theory.” *The Elusive Synthesis: Aesthetics and Science*. Alfred I. Tauber. Boston: Kluwer Academic Pub, 1996. 13-48. Print.

---, ed. *“*Darwin Manuscripts Project.” New York: AMNH, 2014-2016. Web. Amnh.org.

Kors, Alan Charles. "Birth of the Modern Mind: The Intellectual History of the 17th and 18th Centuries." The Teaching Company, n.d. Audio Lecture. Web. 27 June 2012. *thegreatcourses.com.*

Kuhn, Thomas. *The Structure of Scientific Revolutions*. Chicago: U of Chicago P, 1970. Print.

Kuper, Adam. "Changing the Subject: About Cousin Marriage, Among Other Things." *The Jour. of the Royal Anthropological Institute*. 14:4 (2008): 717-735. *JSTOR*. Web. 3 January 2015.

Lamb, Charles and Mary. *The Works of Charles and Mary Lamb: Miscellaneous prose 1798-1834.* Ed. E. V. Lucas. London: Methuen, 1903. *Google Books*. Google. Web. 23 January 2016.

Levine, George. "By Knowledge Possessed: Darwin, Nature and Victorian Narrative." *New Literary History*. 24.2 (1993): 363-91. *JSTOR*. Web. 12 May 2011.

---, *Darwin the Writer*. Oxford: Oxford UP, 2011. Print.

Lewes, George Henry. *The History of Philosophy: From Thales to Comte*. Vol. 2. London: Longmans, Green, 1867. *Google Books*. Google. Web. 28 May 2014.

Litchfield, Henrietta, ed. *Emma Darwin: a Century of Family Letters, 1792-1896*. 2 vols. New York: D. Appleton, 1915. Print.

Locke, John. "Essay Concerning Human Understanding." *And a Treatise on the Conduct of the Understanding*. Philadelphia: Hayes & Zell, 1854. *Google Books*. Google. Web. 29 November 2012.

Loy, James D. and Kent M. Loy. *Emma Darwin: a Victorian life.* Gainesville: UP of Florida, 2010. Print.

Lucas, J.R. "Wilberforce and Huxley: a legendary encounter." *The Historical Jour.*. 22.2 (1979) 313-30, Oxford U. Computing Services. Web. http://users.ox.ac.uk/~jrlucas/legend.html. 7 January 2011.

Lyell, Charles. *Principles of Geology*. Ninth Edition. New York: Appleton, 1853. Project Gutenberg. Web. 15 December 2015.

Lyell, Mrs. Katherine M., ed. *Life, Letters and Journals of Sir Charles Lyell, BART; Author of 'Principles of Geology' &c.* 2 vols. London: Murray, 1881. *Google Books*. Google. Web. 12 February 2012.

Lyon, Judson Stanley. *The Excursion*: *a Study*. North Haven: Archon, 1970. Print.

Mackintosh, Sir James. *The Right Honorable Works of Sir James Mackintosh*. Philadelphia: Carey and Hart, 1848. *Google Books*. Google. Web. 24 November 2007.

Malthus, Thomas R. *An Essay on the Principle of Population; Or, a View of its Past and Present Effects on Human Happiness; With an Inquiry into our Prospects Respecting the Future Removal or Mitigation of the Evils which it Occasions.* London: J. Johnson, 1803. *Google Books*. Google. Web. 16 January 2016.

Mandelbaum, Maurice. "Darwin's Religious Views." *Jour. of the History of Ideas*. 19.3 (1958): 363-78. *JSTOR.* Web. 2 August 2012.

Manier, Edward. *The Young Darwin and His Cultural Circle: A Study of the Influences which Helped Shape the Language and Logic of the First Drafts of the Theory of Natural Selection.* Boston: Reidel, 1978. Print.

---, "Darwin's Language and Logic." *Studies in History and Philosophy of Science*. 11.4 (1980): 305-23. Print.

---, " 'External Factors' and 'Ideology' in the Earliest Drafts of Darwin's Theory." *Social Studies of Science*. 17.4 (1987): 581-609. *JSTOR*. Web. 23 March 2011.

Martineau, Harriett. *Harriet Martineau's Autobiography; with Memorials by Maria Weston Chapman*. 3 vols. London, 1877. *Google Books*. Google. Web. 2 May 2010.

Mayo, Herbert. *The Philosophy of Living*. London, 1838. *Google Books*. Google. Web. 20 December 2007.

Mays, J. C. C. Rev. of *Erasmus Darwin and the Romantic Poets,* by Desmond King-Hele. *The Review of English Studies*, New Series. 38.151 (1987): 396-97. *JSTOR*. Web. 12 January 2012.

McNeil, Maureen. "The Scientific Muse: the poetry of Erasmus Darwin." *Languages of Nature: Critical Essays on Science and Literature*. Ed. L. J. Jordanova, New Brunswick: Rutgers UP, 1986. 159-203. Print.

Mitchell, P. Chalmers. *Thomas Henry Huxley: A Sketch of his Life and Work*. New York: Putnam, 1900. *Google Books*. Web. Leaders in Science Series III. 12 February 2016.

Moore, James R. "Darwin of Down: The Evolutionist as Squarson-Naturalist." *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 435-481. Print.

---, "Good Breeding." *Natural History Magazine*. 114.9 (November 2005): 45-6. Print.

Nichols, Ashton. "Roaring Alligators and Burning Tygers: Poetry and Science from William Bartram to Charles Darwin." *Proceedings of the Amer. Philos. Soc.*. 149.3 (2005): 304-15. *JSTOR*. Web. 17 March 2011.

Ospovat, Dov. *The Development of Darwin's Theory; Natural History, Natural Theology, and Natural Selection, 1838-1859.* Cambridge: Cambridge UP, 1981. Print.

Owen, Richard. "Darwin on the Origin of Species." (1860). Rev. of *Origin*. *Edinburgh Review*. Web. 3 February 2016. Victorianweb.org.

Oxford English Dictionary. Web.

Paley, William. *Natural Theology; or, Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature.* Vol. I. Oxford: Vincent, 1826. *Google Books*. Google. Web. 16 February 2016.

Pancaldi, Giuliano. "Darwin's Intellectual Development (Commentary)." *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 259-63. Print.

Paradis, James. "Darwin and Landscape." *Victorian Science and Victorian Values: Literary Perspectives.* Eds. James Paradis and Thomas Postlewait. New York: NY Academy of Sciences, 1981. 85-110. Print.

PBS, "Am I Not a Man and a Brother, 1787." *Public Broadcasting System*. Web. 31 January 2016. Pbs.org.

Poe, Edgar Allen. "Eleanora." *The Complete Works of Edgar Allen Poe*. New York: Lamb, 1902. *Google Books*. Google. Web. 10 September 2014.

Pope, Alexander. "Essay on Man." *The Works of Alexander Pope, Esq.*" Vol. 3. London: Law et. al., 1797. 1-164. *Google Books*. Google. Web. 13 February 2016.

Potter, George R. "Coleridge and the Idea of Evolution." *Modern Language Association*. 40.2 (1925): 379-97. *JSTOR*. Web. 18 April 2010.

Punch. "Monkeyana: Am I A Man and a Brother." *Punch Magazine*. May 1861. Web. 31 January 2016. Punch.photoshelter.com.

Pray, Isaac Clark. “English Bards: William Wordsworth: Prose and Verse, From the Portfolio of an Editor” (1836) 56-59. spenserians.cath.vt.edu. Web. 23 July 2012.

Piestley, Joseph. *Hartley’s Theory of the Human Mind, on the Principle of the Association of Ideas; With Essays Relating to the Subject of It.* London: J. Johnson, 1775. *Google Books*. Google. Web. 20 April 2014.

Quammen, David. *The Reluctant Mr. Darwin: an Intimate Portrait of Charles Darwin and the Making of his Theory of Evolution.* New York: Norton, 2006. Print.

Richards, Robert J. *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior*. Chicago: U of Chicago P, 1987. Print.

---, “Darwin’s Romantic Biology: The Foundation of His Evolutionary Ethics.” *Biology and the Foundation of Ethics*. Eds. Jane Maienschein and Michael Ruse. Cambridge: Cambridge UP, 1999. 113-53. Print.

---, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe*. Chicago: U of Chicago P, 2002. Print.

---, ‘‘Darwin’s Metaphysics of Mind.’’ V. Hoesle and C. Illies, Eds. *Darwin and Philosophy*. Notre Dame: Notre Dame UP, 2005. 166–80. Web. 5 June 2011.

Richardson, Alan. *British Romanticism and the Science of the Mind*. Cambridge: Cambridge UP, 2001. Print.

Root-Bernstein, Robert S. “The Sciences and Arts Share a Common Creative Aesthetic.” *The Elusive Synthesis: Aesthetics and Science*. Alfred I. Tauber. Boston: Kluwer Academic Pub, 1996. 49-82. Print.

Ross, Catherine E. “Twin Labourers and Heirs of the Same Hopes: the Professional Rivalry of Humphry Davy and William Wordsworth.” *Romantic Science: the*

literary forms of natural history. Ed. Noah Herringman. Albany: SUNY P, 2003. 23-51. Print.

Rousseau, G. S. Rev. of *Erasmus Darwin and the Romantic Poets,* by Desmond King-Hele. *Isis*. 78.4 (1987): 659-60. *JSTOR*. Web. 12 January 2012.

"Royal Society; History." London: n.p., n.d. Web. 29 September 2012. Royalsociety.org.

Rudwick, Martin J. S. "Adam Sedgwick." *Dictionary of Scientific Biography*. XII. 275-78. Ed. Charles C. Gillespie. New York: Charles Scribner's Sons, 1975. Print.

---, *The Great Devonian Controversy; The Shaping of Scientific Knowledge Among Gentlemanly Specialists*. Chicago: U of Chicago P, 1985. Print.

---, "Darwin and the World of Geology (Commentary)." *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 543-88. Print.

Ruse, Michael. "Darwin's Debt to Philosophy: an Examination of the Influence of the Philosophical Ideas of John. F. W. Herschel and William Whewell on the Development of Charles Darwin's Theory of Evolution." *Studies in History and Philosophy of Science*. 2.6 (1975): 159-81. Print.

---, *The Cambridge Companion to 'Origin of Species.'* New York: CUP, 2009. *Google Books*. Google. Web. 15 January 2015.

Rushdie, Salman. *Midnight's Children*. New York: Penguin Books, 1991. Print.

Russell, Bertrand. "The Triumph of Stupidity." Russell and Harry Ruja. *Mortals and Others, VII: American Essays 1931-1935*. New York: Routledge, 1998: 27-8. *Google Books*. Google. Web. 30 January 2016.

Schweber, Silvan S. "The Origin of the Origin." *Jour. of the Hist. of Biol.* 10.2 (1977): 232-34. Print.

---, "The Genesis of Natural Selection – 1838: Some Further Insights. *BioScience*. 28:5 (1978): 321-326. *JSTOR.* Web. 21 July 2014.

---, "The Young Darwin." Rev. of *The Young Darwin and His Cultural Circle* by Edward Manier. *Jour. of the Hist. of Biol.* 12.1 (1979): 175-92. *JSTOR.* Web. 17 September 2009.

---, "John Herschel and Charles Darwin: A Study in Parallel Lives." *Jour. of the Hist. of Biol.* 22:1 (1989): 1-71. *JSTOR*. Web. 16 November 2014.

Secord, James. "King of Siluria: Roderick Murchison and the Imperial Theme in Nineteenth-Century British Geology." *Victorian Studies*. 25.4 (1982): 413-42. *JSTOR*. Web. 20 December 2011.

---, *Victorian Sensation: the Extraordinary Publication, Reception, and Secret Authorship of "Vestiges of the Natural History of Creation*." Chicago: U of Chicago P, 2000. Print.

---, "Global Darwin." *Darwin: The Darwin College Lectures*. Eds. W. Brown and A.C. Fabian. Cambridge: Cambridge UP, 2010. 31-58. Print.

Sedgwick, Rev. John Stevens. "Presidential Address to the Geological Society, 18 February 1831." *Proceedings of The Geological Society of London: November 1826 to June 1833.* Vol. 1. London: Richard Taylor, 1834. *Google Books*. Google. Web. 14 July 2011.

Shakespeare, William. *Hamlet*. New York: Maynard, Merrill, 1902. *Google Books*. Google. Web. 11 April 2016.

Shapin, Steven**,** Simon Schaffer. *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Princeton: Princeton UP, 1989. Print.

Sharrock, Roger. "The Chemist and the Poet: Sir Humphry Davy and the Preface to *Lyrical Ballads.*" *Notes and Records of the Royal Society of London*. (1962): 17.1 57-76. *JSTOR.* Web. 11 April 2011.

Shaw, George Bernard. *Saint Joan*. New York: Penguin, 1924-2001. *Google Books*. Google. Web. 22 June 2015.

Shenk, Joshua Wolf. "The End of 'Genius'." *New York Times*. New York Times.19 July 2014. Web. 19 July 2014. http://nyti.ms/1nlZ4lg.

Sloan, Phillip R. "Darwin's Invertebrate Program, 1826-1836: Preconditions for Transformism." *The Darwinian Heritage.* Ed. David Kohn. Princeton: Princeton UP, 1985. 71-120. Print.

---, "The Sense of Sublimity": Darwin on Nature and Divinity." *Osiris*. 2.16 (2001): 251-69. *JSTOR.* Web. 5 April 2011.

Smith, C. U. M. "Charles Darwin, the Origin of Consciousness, and Panpsychism." *Jour. of the Hist. of Biol.* 11.2 (1978): 245-67. *JSTOR.* Web. 9 September 2009.

---, "Evolution and the Problem of Mind: Part I. Herbert Spencer." *Jour. of the Hist. of Biol.* 15.1 (1982): 55-88. *JSTOR.* Web. 16 September 2009.

---, "Coleridge's 'Theory of Life'." *Jour. of the Hist. of Biol.* 32.1 (1999): 31-50. *JSTOR.* Web. 18 April 2010.

Southey, Robert. *Poems by Robert Southey*; *chosen and arranged by Edward Dowden*. New York: Macmillan, 1895. *Google Books*. Google. Web. 25 May 2012.

Spenser, Herbert. *Faerie Queene.* 1758. London: J. & R. Tonson, 1589. *Google Books*. Google. Web. 9 August 2014.

Stewart, Dugald. *Philosophical Essays*. Edinburgh: George Ramsay, 1816. *Google Books*. Google. Web. 20 December 2011.

Sulloway, Frank J. *Born to Rebel: Birth Order, Family Dynamics, and Creative lives.* New York: Pantheon, 1996. Print.

Thompson, Keith. *The Young Charles Darwin*. New Haven: Yale UP, 2009. *ProQuest*. Web. 3 January 2015.

Todhunter, I.*William Whewell, D.D., Master of Trinity College, Cambridge: An Account of his Writings with Selections from his Literary and Scientific Correspondence*. Vol. 2. London: Macmillan, 1876. *Google Books*. Google. Web. 31 October 2015.

Trilling, Lionel. *The Moral Obligation to Be Intelligent: Selected Essays*. Ed. Leon Wieseltier. New York: Farrar, Straus, Giroux, 2000. Print.

Urban, Sylvanus, ed. *The Gentleman's Magazine*. Vol. 12. London: Pickering, 1839. *Google Books*. Google. Web. 28 November 2012.

Victoriana magazine. "*Victorian Hats*." Victoriana.com. Web. 8 February 2016.

Ward, J.P. "'Came from Yon Fountain': Wordsworth's Influence on Victorian Educators." *Victorian Studies*. Indiana UP, 29.3 (1986): 405-36. *JSTOR*. Web. 18 April 2010.

Wedgwood, Barbara and Hensleigh Wegwood. T*he Wedgwood Circle 1730-1897: Four Generations of a Family and Their Friends.* Westfield NJ: Eastview Editions, 1980. Print.

Wenley, R.M. "The Movement Towards 'Physiological' Psychology. II." *The Popular Science Monthly.* 33 (1908): 73-80. New York: Science Press. *Google Books*. Google. Web. Aug 3 2015.

Whewell, William. “On the Connexion of the Physical Sciences” (with the Pseudonym of “Mrs. Somerville”). *Quarterly Review*. LI. 54-68. London: Murray, 1834. *Google Books*. Google. Web. 27 September 2012.

---, *The Philosophy of the Inductive Sciences, Founded Upon their History.* 2 vols. London: Parker, 1847. *Google Books*. Google. Web. 21 October 2011.

White, Paul. “Darwin’s Emotions: the Scientific Self and the Sentiment of Objectivity.” *Isis.* 100.4 (2009): 811-826. *JSTOR*. Web. 15 June 2012.

Wilkin, Simon, ed. *Sir Thomas Browne’s Works, Including his Life and Correspondence.* London, 1835. *Google Books*. Google. Web. 25 November 2007.

Wilson, Leonard G. *Charles Lyell; The Years to 1841: The Revolution in Geology*. New Haven: Yale UP, 1972. Print.

Wheeler, J. M and G. W. Foote, eds. *Voltaire: a Sketch of His Life and Works: With Selections from his Writings*. London: Robert Forder, 1894. *Google Books*. Google. Web. 26 January 2016.

Woof, Robert. *William Wordsworth, the Critical Heritage, 1793-1820*. Vol. 1. New York: Routledge, 2001. *Google Books*. Google. Web. 16 April 2011.

Wordsworth, Christopher. *Memoirs of William Wordsworth.* Vol. 1. London: Moxon, 1851. *Google Books*. Google. Web. 29 September 2012.

Wordsworth, Jonathan. “William Wordsworth, *The Prelude*.” *William Wordsworth*. Ed. Harold Bloom. New York: Infobase, 2007. *Google Books*. Google. Web. 1 December 2011.

Wordsworth, William. *Poems, In Two Volumes*. London: Longman, 1807. *Google Books*. Google. Web. 18 February 2016.

---, *The Excursion*. 1814. Eds. Sally Bushell, James A. Butler and Michael C. Jaye with assistance of David Garcia. Ithica: Cornell UP, 2007. Print.

---, *Thanksgiving Ode: With Other Short Pieces*. London: Longman, Hurst, et al., 1816. *Google Books*. Google. Web. 15 April 2014.

---, *The Prelude, or Growth of a Poet's Mind; An Autobiographical Poem.* London: Moxon, 1850. *Google Books*. Google. Web. 21 January 2016.

---, *The Complete Poetical Works of Wordsworth*. Ed. Henry Reed. Philadelphia: Troutman & Hayes, 1851. *Google Books*. Google. Web. 30 November 2011.

---, *Wordsworth's Excursion: The Wanderer*. Ed. J.J. Turner. London: Rivingtons, 1874. Print.

---, *The Poems.* Ed. John O. Haydn. Vol. 2. New York: Penguin, 1977. Print.

Wordsworth, William, and Samuel Taylor Coleridge. *Wordsworth and Coleridge Lyrical Ballads.* Eds. R. L. Brett and A. R. Jones. New York: Routledge Classics, 1798-2005, Print.

Wulf, Andrea. *The Invention of Nature: Alexander von Humboldt's New World*. New York: Knopf, 2015. Print.

Wyatt, John. *Wordsworth and the Geologists*. Cambridge: Cambridge UP, 1995. Print.

Yeo, Richard R. "Scientific Method and the Rhetoric of Science in Britain, 1830-1917." *The Politics and Rhetoric of Scientific Method; Historical Studies*. Eds. John A. Schuster and Richard R. Yeo. Boston: D. Reidel, 1986. 259-97. Print.

---, *Defining Science: William Whewell, Natural Knowledge, and Public Debate in Early Victorian Britain*. Cambridge: Cambridge UP, 1993. Print.

Young, Robert M. *Darwin's Metaphor: Nature's Place in Victorian Culture*. Cambridge: Cambridge UP, 1985. Print.

Zimmer, Carl. "This Is Your Brain on Writing." *New York Times*. New York Times. 20 June 2014. Web. 20 June 2014. www.nytimes.com.

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