UNIVERSITY OF WINCHESTER

Charles Darwin's Debt to the Romantics

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As well as seeing Darwin's 'tree of life' in terms of descent, it can also be seen as a 'tree of enchantment' like a Christmas tree covered in baubles, a celebration of life itself and all those privileged to be part of it. So in this sense I would like to thank my late parents, Peter and Ruth Lansley, for enabling me to be a bauble on this tree, and my wife Claire for enabling us to attach our children, Charlotte and William, thereby connecting the past and the present to the future. I would also like to express my indebtedness to my wife Claire for keeping me in the manner whilst carrying out my research.

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ABSTRACT

Charles Darwin's Debt to the Romantics

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The thesis examines the principal works of Charles Darwin to determine whether there is any evidence of Romantic concepts in his writings and whether, therefore, he owes a debt to the Romantics such as Alexander von Humboldt and Goethe.

The first two chapters of the thesis trace the influence of Alexander von Humboldt (1769 – 1859) on Charles Darwin (1809-1882). There are frequent references to Humboldt in Darwin's works. Humboldt's Romantic concepts of Nature, expressed in his *Personal Narrative* [1807 – 1834] and in his later *Cosmos* [1845], are compared to Darwin's concepts of Nature in his *On the Origin of Species* [1859, first edition]. An analysis of Humboldt shows him firmly within the German Romantic school of thought with influences from Schelling and Goethe, especially concerning the concept of Mind. Humboldt's method of analysing Nature aesthetically had a profound effect on Darwin's own imaginative view of Nature. Further analysis of this method, coupled with Goethe's 'Genetic Method' of moving between the particular and the infinite when seeing the 'leaf' and 'vertebrae' archetypes, shows strong evidence of the influence of the German Romantics on the development of Darwin's theory of natural selection. In analysing the Romantic concept of a 'One Reality Nature', the thesis shows that Darwin's evidence of a common progenitor provides a moral imperative for treating all races as equal in terms of their origins and their potential for development.

In Chapter Three the origins of morality are seen by Darwin as having been generated by natural instincts rather than having come from a Creator. This is examined with reference to Darwin's *The Descent of Man* [1871; 1879, second edition] within the moral and cultural context of the Victorian era in which he lived. The final Chapter Four compares *The Voyage of the Beagle* [1839, first edition] to Darwin's later works to see if there are differences between his earlier and later forms of Romanticism and how easily they sit alongside Darwin the Victorian. The thesis concludes that essentially Darwin's Romantic theme of

wonder and enchantment is the same for both his early and later years. However, Darwin's Romanticism has moved from an anthropocentric view with Man as its centre to an anthropomorphic view in which Man is seen as part of Nature but not at its centre. Darwin's self-expression in his writing has also moved from a subjective form of poetry developed through his personal experience of Nature, to a more objective form of poetic science in which Darwin is able to step back from the science he creates.

Finally, the Conclusion suggests that there is sufficient evidence in Darwin's works to claim that he can be regarded as a Romantic materialist. This is evidenced by his view that Mind and Man's morality have been developed by Nature's laws out of matter. It is also evidenced by Darwin's own mental methods of discovery through his own form of imagination and poetry, sharing some of the themes of the English Romantic poets such as Wordsworth and Tennyson.

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Chapter 4: The Transmutation of the Origins of Charles Darwin's Romantic Thought, Language and Science on the *Beagle* into the Romanticism of His Later Works

INTRODUCTION

General Introduction

This thesis examines the principal works of Charles Darwin, viz. *The Voyage of the Beagle* [1839], *On the Origin of Species* [1859],[1] *The Descent of Man* [1871] and his *Notebooks [1836 – 1844]* to determine whether there is any evidence of Romantic concepts in his writings. Particular reference is made to the Romantic concepts employed by Alexander von Humboldt in his works as Darwin took Humboldt's *Personal Narrative* [1807 – 1834] with him on the voyage of the Beagle [1831 – 1836] and frequently praised Humboldt in his *Voyage of the Beagle* for his descriptions of Nature. In examining the Romantic concepts used by Humboldt and their possible influence on Darwin, the thesis considers what is meant by 'Romantic' and whether there is a contradiction in being a 'Victorian' and a 'Romantic'.

The Romantic influences on Charles Darwin's work have been chosen as a research topic because generally the literature available concentrates on exploring his work in the context of the Victorian period and Darwin as a significant 'Victorian', with little reference to influence from the Romantic era. An exception is to be found in Beer (1983), Levine (2008 and 2011) and a post-script chapter in the work of Robert Richards (2002) in which he argues that Darwin's Romanticism led him to attribute a moral conscience to human beings and not one of Malthusian selfishness:

> Darwin's Romantic inclinations led him to attribute to human beings a moral conscience that sought not selfish advantage but one that would respond altruistically to the needs of others (Richards, 2002, p. 516).

The research aims to examine what it meant for Darwin to be a 'natural philosopher' (today's 'scientist') and to provide evidence in his writing and use of concepts of what could be regarded as Romantic and what kind of Romantic Darwin was. To satisfy this aim, the research defines 'Darwin the Victorian' and 'Darwin the Romantic' in order to help determine whether Darwin could have been both and to what effects. To this end, the term 'Romanticism' is defined and explicitly addressed.

Today the academic establishment recognises Darwin's place in the 'history of ideas' as a 'high Victorian'; he is acknowledged by Desmond and Moore (2009) as having begun a

[1] The edition referred to throughout the thesis, apart from one exception, is the 1859 first edition (Darwin, 1985). The reason for this is that Darwin weakened his argument in later editions by making concessions to his critics. The earliest version also brings the reader closer to Darwin's thought processes during the time the theory was first conceived (Burrow, 1985, p. 49).

paradigm shift away from Paley's concept of divine creation of Nature to one of slow 'transformation' or evolution over millions of years. For example:

> The world had been turned upside down in fifty years [since the publication of Paley's *Natural Theology* in 1805]. Seen through Paley's rose-tinted spectacles, it was a continual summer's afternoon […]. But no longer. An expanding industrial society meant that more and more people were herded, hungry and angry, into factory towns […]. At Downe Darwin peered hard into nature's 'horridly cruel' face; the time had come for him too to challenge Paley, whose words he had once embraced (Desmond and Moore, 2009, pp. 449-50).

The 2009 centenary celebrating Darwin's birth produced a plethora of studies and testaments, both textual and multimedia, to Darwin's Victorian contribution and his continued influence. There is little research available, however, that looks at Darwin's own intellectual precursors and cultural influences. However, as noted above, Robert Richards does posit the view that Darwin was profoundly influenced by the German Romantics, principally Johann Wolfgang von Goethe and Alexander von Humboldt.

Richards (2002) views the community within species as a form of altruism and therefore not selfish and not purely material. Along similar lines, Gillian Beer (*passim*) sees Darwin's works as an example of 'Romantic Materialism' as science can be said to use instruments to understand Nature without destroying its mystery. The observation of Nature is at the heart of any discussion of whether Darwin was a Romantic. What is observed and captured through the senses may be material but the pleasure of the experience is Romantic, whether 'optimistic' or 'pessimistic' (Beer, 1983, pp. 244-5).

How, if at all, was the Romantic influence in Darwin reflected in the language of his published and unpublished works? Darwin uses many metaphors in his texts and these reflect Beer's argument above that the pleasures of observation are Romantic. The most common metaphor used is 'struggle'. On one level it depicts plants and animals fighting for survival both as individuals and as species. The consequent violent destruction of individuals through this struggle is represented by Darwin's pessimistic metaphorical use of 'wedges' breaking up the face of Nature (Darwin, 1985, p.119). On another level it can be seen as representing the vibrancy of life, regeneration, adaptation, development, mutuality – in fact everything that makes up the 'entangled bank', success and achievement, not just failure.

In the textual analysis of Darwin's works, the use of metaphor (e.g. 'selection' and 'struggle') and narrative is explored to draw out his theory of Natural Selection. The question of whether Darwin's *Origin* can be regarded as an example of Romantic literature

as well as science is explored (with reference to George Levine, 2008 and 2011). The use of 'narrative' is particularly important as Darwin's story can be seen as a story of the evolution of life over time. Beer (1983) compares this to the writing of a plot in a novel. Darwin's use of the term 'entangled bank' reflects both the struggles of individuals and species as well as the varied forms of life that reproduce themselves and adapt to their environment. The thesis considers the evidence of the pessimistic struggles and optimistic pleasures in both Darwin's texts and correspondence and discusses whether they are Romantic or not. It also examines Darwin's quest to understand the 'struggle' in Nature as well as his struggles within his own scientific, intellectual and personal development and whether these can be regarded as Romantic.

The Objective of the Thesis

The objective of the thesis is to analyse the writings of Charles Darwin [1809-1882], the Victorian natural historian, to determine to what extent he has been influenced by Romantic thought. The Romantic concepts used to analyse Darwin's texts are those reflected in the German Romantics, in particular Goethe and Humboldt, as Darwin frequently refers to Humboldt in his texts and letters and Humboldt had been a student of Goethe's. Following Robert Richards' (2002) definitions of Romanticism, I use these key Romantic concepts to identify any significant evidence of Romanticism in Darwin's work. Darwin regarded John Herschel, the astronomer and natural historian, as an equally strong influence, but as this influence is already covered by Richard Holmes (2009), I am going to concentrate on Humboldt. I am prioritising Humboldt as I frequently came across his name in Darwin's works and wanted to know what his connections were to the German Romantic school of thought and what his influence on Darwin was.

Darwin's strain of Romanticism can be interpreted as a blend of Romantic ideas emanating from the German Romantic tradition in the eighteenth and nineteenth centuries. Although some of these Romantic ideas are in conflict with each other, they are examined to see if they have had an influential effect on Darwin's main works. It is also argued that this blend of Romanticism is not just a blend of ideas but could also be seen as a blend of different ways of seeing and interpreting the world, from Darwin the naturalist in the field noting his empirical experiences to Darwin the 'scientist'[2] reflecting on those experiences, drawing up theories based on his perceptions and the perceptions of other naturalists, reflecting on those theories, and then going back to experiencing Nature again through the eyes of those

[2] Terms like 'scientist' and 'botanist' are twenty-first century terms.

theories. In examining how Darwin experiences and perceives Nature, his use of the term 'archetype' is discussed. It can be demonstrated that there is a tension in its underlying meaning between either the view that archetypes are pre-formed genealogically from a primordial form (or primordial forms) or the view that they are teleological forms seeking perfection. It is argued that Darwin's use of the concept is a complex mix of the two. This interpretation allows for both a material genealogically-based primordial form fixed in space and time, and evolving teleological forms seeking perfection; forms that are constructed from Man's[3] understanding of the world and which therefore may be interpreted as belonging to a collective mind, whether this be in the form of God or Nature. As a student at Cambridge, and through his friendships with academics such as John Stevens Henslow,[4] 'botanist'and mineralogist, and Adam Sedgwick,[5] geologist, he socialised in intellectual circles familiar with Romantic concepts such as 'archetype'. Richard Owen, a comparative anatomist and associate of Darwin's, uses the term[6] as does Darwin in his *Origin.*[7]

As with Darwin's *Origin*, this thesis is unfolding a narrative, examining the hypothesis of the origins of Darwin's Romanticism. The thesis mainly covers the influence of Humboldt with some reference to other German Romantics such as Goethe who had an influence on Darwin's thought processes. The thesis shows an overlap of influence from some of the British Romantics such as Wordsworth and Coleridge, but it is beyond the scope of this

[3] Although in this century the term 'Man' is not an appropriate term to refer to men and women, it is used in this thesis to reflect Darwin's concepts and the concepts of his time, as reflected by his work *The Descent of Man*, for example. This thesis aims to examine Darwin within the context of his own time rather than to examine his text within the context of the present century. The term 'Man', therefore, refers to humanity, humankind, men and women. However, where 'man' refers to males specifically, 'man' is used, for example in the context where Darwin believed men to be superior to women. The lower case 'm' in 'man' is also used in quotes where 'man' occurs in primary and secondary texts.

[4] List of letters between Henslow and Darwin during *Beagle* Voyage at Burkhardt (2009a), p. 633.

[5] Letter to Darwin from Adam Sedgwick on 18 September 1831 giving advice on what geology books to read as well as reference to Humboldt's *Personal Narrative* at Burkhardt *(2009a), p. 157.*

[6] Owen, 1847, and 1849. Cited in Richards (2002), footnote 33, p. 528. Richards summarises Owen's archetype as follows: 'The archetype of the vertebrata, in Owen's construction, was simply a string of vertebrae. According to his theory, different vertebrate skeletons manifested modifications of this basic plan. So for instance, the bones of the head would be regarded as a development of the several anterior vertebrae, and the ribs, pelvis, and limbs as developments of different processes of more posterior vertebrae' (Richards, 2002, p. 528).

[7] In his Glossary to the *Origin*, Darwin defines 'Archetypal' as follows: 'Of or belonging to the Archetype, or ideal primitive form upon which all the beings of a group seem to be organised' (Darwin, 1985, p. 464). Darwin refers to it when discussing Classification: 'If we suppose that the ancient progenitor, the archetype as it may be called, of all mammals, had its limbs constructed on the existing general pattern, for whatever purpose they served, we can at once perceive the plain signification of the homologous construction of the limbs throughout the whole class' (Darwin, 1985, p. 416).

thesis to examine their work in great detail. Robert Richards (2002) is frequently referred to as his Romantic concepts are used as a matrix to test Darwin's works out as to whether or not they can be regarded as Romantic.

Research Methods

In determining whether Darwin was influenced by Romantic thought, Darwin's three major works are analysed: *Voyage of the Beagle*, *The Origin of Species* and *The Descent of Man*. These are analysed according to the definitions of 'Romantic' and 'Romantic materialism' used above. In addition Darwin's unpublished autobiography (meant for his family), his notebooks, correspondence and marginalia are also analysed. Most of the unpublished material is accessed on-line from the Darwin Correspondence Project at the University of Cambridge (or published versions). Darwin's library is also accessed at the University of Cambridge Library. His domestic non-scientific library is accessed at Down House. Research is conducted at the libraries to determine which 'Romantic' works Darwin referred to and which ones might have influenced his own work. Marginalia is used to further inform my speculations. Ideas expressed in letters are compared to the published texts to provide evidence for any conclusions expressed in the research. These are also cross-referenced against any reading Darwin may have done that reinforce this. In the textual analysis, the use of metaphor (e.g. 'selection' and 'struggle') and narrative (as a reflection of change over time) are explored as an appropriate medium to draw out his theory of Natural Selection (Beer, 1983). The argument for and against the thesis that Darwin was a Romantic is researched in published books and journals. The research is interdisciplinary primarily using the tools of textual, historical, political, and philosophical analysis.

The chronological order of the research attempts to mirror Darwin's own methods and creative insights as expressed through the influence of the 'Humboldtian Method' (discussed in Chapter One), Goethe's 'Genetic Method' (discussed in Chapter Two) and Darwin's 'Rastro' method (discussed in Chapter Four). These methods enable the observer to gain a deep understanding of the secrets of Nature through a to-ing and fro-ing in place and time. This could be anything from making links between past progenitors and present Man through the discovery of fossils or shells above sea level and present rudimentary forms once of use to our forebears such as wisdom teeth; or this could be the mind's ability to move between the particular and universal archetypes, as expressed by Goethe's 'leaf' archetype which captures the underlying form responsible for the metamorphosis of the seed, the root, the leaf and the flower of a plant. My thesis intentionally starts with

Darwin's *Origin* as this is his central work and his *The Descent of Man* is an extension of this. But Darwin's key theory of natural selection was developed from his data gathering and experiences during his five-year voyage on the *Beagle*. The older Darwin, both in terms of the man and his works, cannot therefore be understood without reference to his *Voyage of the Beagle*. Reading the *Voyage* on its own without any reference to the *Origin*, it can be seen almost as a naturalist's adventure story or travelogue. But when the reader goes backwards and forwards between the *Origin* and the *Voyage*, the embryonic theory of natural selection can clearly be seen in the *Voyage*. It is therefore the intention of the thesis to move freely between the two Darwins, moving backwards and forwards in time in order to fully understand his thought processes. As with Humboldt and Goethe before him, this movement between insights in time and place should be able to create an interrelated organic overview of Darwin's theory of Nature revealing all his various shades of Romanticism like the feathers of a Peacock.

In order to reduce unnecessary footnotes, biographical information on naturalists referred to in the thesis will be listed in the *Dramatis Personae* in Appendix B, unless such information needs to be inserted to strengthen a particular argument. The *Dramatis Personae* mainly draws its data from texts referred to in the Reference section at the end of the thesis and the *Biographical Register and Index to Correspondents* in Burkhardt (1985, pp. 611 – 661) for those in correspondence with Charles Darwin.

The Research Covered in Chapters One and Two

In researching the possible influence of Humboldt on Darwin and his works, it is a sensible starting point to analyse the concepts used by Humboldt in his main work, the *Personal Narrative* (as this was the work the young Darwin most often referred to on the *Beagle*); to then compare them to the definitions of Romantic concepts as suggested by Richards (2002); to then decide which concepts had the best supporting evidence identifying them as Romantic and which could be regarded as Humboldtian but not necessarily Romantic; and finally to analyse the *Origin of Species* (as Darwin's seminal text) to see to what extent Darwin's text uses these concepts and whether they are Romantic or only Humboldtian. Darwin may have been influenced by Humboldt and Humboldtian concepts without having been influenced by Romantic concepts. On the other hand Humboldtian concepts may also be Romantic.

Chapter One concentrates on those Humboldtian concepts that are not necessarily Romantic: Organic Nature (as in the 'web of affinities'), One Reality Nature and the Forces of Nature (Chapter Two highlights those Humboldtian concepts which are also Romantic). To understand the Humboldtian concepts of Nature, one needs to understand the Humboldtian Method of naturalist research. It demonstrates that including the observer's aesthetic experience of Nature alongside scientific observations of measurement, enables 'art' and science to complement each other. Together they enable the naturalist, poet and artist (and many naturalists in the eighteenth and nineteenth centuries were all three) to trace the history of creation and diversity, whether this be in the plants or the rocks, and what makes particular regions distinct. Darwin learnt from Humboldt that making comparisons between species and between regions gave a greater insight into diversity and the interrelationships between the underlying laws responsible for it. In comparing Darwin's concepts to Humboldt's, Darwin's theory of Natural Selection can be seen to sum up Humboldt's organic interrelated Nature as everything is related to everything else, and the sum total of Nature is the sum total of its own creation, its underlying forces and laws, as it is its own creator. Like the 'entangled bank' in Nature, all the relationships work together to produce change in order to adapt and survive. Nothing stands still in time.

Chapter Two is concerned with defining Romanticism and concentrates on those concepts that appear to be Romantic: One Reality Nature (that is, Nature seen as both the creator and product of animal and plant life rather than the product of God's creation); the Forces of Nature (viz., the causes and laws that create the products of Nature); Nature as Mind (viz., the relationship between the observer and that observed through the interpretation of sense impressions and the emotions produced by them); Nature as Archetype or Idea [or 'morphology as science'] (for example the common structure of mammals represented by the vertebrae or the common structure of plants represented by the 'leaf'). Flowing through these concepts is also the concept of Nature as mechanistic versus purposive. Darwin believed species derived from one or more primordial species in Nature, not from God, and that species adapted and improved themselves to survive. There are many different elements of Romanticism dealt with in this chapter covering the unknown forces and secrets of Nature, the division between the two experiences of the finite in individuals and the infinite in the existence of species and their histories that cannot be directly experienced. This leads to the question of whether Nature is a mental construct made up of ideas (whether this be histories of species, their organisations represented by a 'tree of life', mental representations enabling the identification of individuals, the experience of

pleasure through the aesthetic interpretation of sense impressions, or just the experience of the 'sublime' forces of Nature without understanding what those forces are (for example seeing the stars, experiencing earthquakes or an electric shock). It is argued that Darwin tries to make sense of Nature Romantically by both explaining it teleologically as something striving for improvement through adaptation, and genealogically as something made up of its past histories. It can also be seen as a movement between the finite and the infinite. It is argued that this mental movement between the two (known as the 'Genetic Method') enables the mind to understand the archetype of the 'leaf' or the 'vertebrae' (and this can be seen in the work of Goethe, Humboldt as well as Darwin).

The Research Covered in Chapters Three and Four

As mentioned earlier, *The Origin* was chosen for the first two chapters as this is generally regarded as Darwin's most important work on evolution. If Romantic concepts or influences of Romantic thought could be identified here, it would be a good place to both move backwards in time to identify embryonic Romantic thought in the young Darwin through his earlier work of *The Voyage of the Beagle*, and move forwards in time to see if there was any evidence of Romantic thought or Romantic influence in the later Darwin, for example in *The Descent of Man* (in a literary sense, this could be seen as neatly following Darwin's own method of going back in time genealogically and forward in time teleologically). From an initial reading, as one would expect, the language of the young Darwin is more youthful, more spontaneous and more poetic and can be seen to be very similar in form to Humboldt's *Personal Narrative*, and Darwin got chided by his sister Caroline for this.[8] All his experiences are new and he is bowled over by wonder and this is expressed in his use of language. The later Darwin in the *Descent* is written in a more scientific, and perhaps more Victorian, vein. He is in his sixties and is an establishment figure. He has more to lose in terms of his reputation and therefore has to be more careful in the way he expresses himself. From an initial reading of the prose there are still hints of Romanticism, it could be argued, but they are more difficult to find, hidden under a heavy text of detailed evidence (always, almost obsessively, providing perhaps more detail than required due to a fear of others trying to prove him wrong). But for the reader it suddenly becomes all worthwhile when one comes across Darwin's descriptions and illustrations of

[8] In a letter to Darwin from his sister Caroline on 28 October 1833 regarding the journals sent to her from the *Beagle*: 'As to your style. I thought […] that you had, probably from reading so much of Humboldt, got his phraseology [..] instead of your own simple straight forward & far more agreeable style.' (Burkhardt, 2008, p. 236).

the peacock and the Argus pheasant in which their respective rich histories of sexual development can be seen in the ocelli (or 'eyes') on their feathers. Just like a fossilised imprint of their development frozen in time, they demonstrate 'that a gradation is possible' in which spots are converted into 'elliptic ornaments for the purpose of sexual selection' (Darwin, 2004, pp. 495 – 6).

The aim of Chapters Three and Four is to analyse the texts of the earlier Darwin and the later Darwin, namely *The Voyage of the Beagle* and *The Descent of Man* along with their corresponding notebooks. These two chapters are used as an opportunity to compare and contrast the language used in each of the texts to highlight the differences in the expression of Romantic thought through his language. In addition to this, Darwin the Victorian is compared to Darwin the Romantic to determine whether there are any conflicts or contradictions between the two. Are there pressures on the establishment Victorian figurehead to rein in his Romanticism and therefore his evolutionary theories? There certainly seem to be some ideological differences between the two Darwins; for example the older Darwin saw evolution as an example of improvement through all the stages of humanity such that the savage was at a lower stage of improvement to that of the Victorian gentleman, whereas the younger Darwin seemed to think of all humanity being on the same level. The older Darwin, perhaps due to the civil unrest at the time both in America and England, ironically displayed a degree of racism himself regarding Irish workers in New York as lesser beings: 'What devils the low Irish have proved themselves in New York' (cited by Desmond and Moore, 2004, p. xlv). Darwin even thought women were at a lower stage of development[9] than men: ['Intuition', 'imitation' and 'rapid perception' in women characterized] 'the lower races, and therefore … a past and lower state of

[9] Darwin's *Origin* inspired his cousin, Francis Galton to research human intelligence which he believed to be hereditary. He coined the term 'eugenics', believing that marriage between families of high rank should be encouraged in order to produce intelligent offspring, and that geniuses could be created by selective breeding just like the selected breeds created by pigeon fanciers as outlined in Darwin's *Origin* (Galton's theory was published in his book *Hereditary Genius* 1869) (Desmond and Moore, 2004, pp. xlvi – lvii). Darwin's *Descent* prescribed a form of this eugenics by advocating that 'both sexes ought to refrain from marriage if in any marked degree inferior in body or mind'; 'all ought to refrain from marriage who cannot avoid abject poverty for their children'; and following Malthus, 'our natural rate of increase, though leading to many and obvious evils, must not be greatly diminished by any means' (cited by Desmond and Moore, 2004, p. liii). Darwin's son, George, also supported these views. This is an example of Social Darwinism that got a bad name after being taken up by the Nazis and used against the Jews in the Second World War. The analysis of post-Darwin Social Darwinism is beyond the scope of this thesis. However, it is important when researching Darwin to make a distinction between his views and his theories and not to make a category error in conflating an 'is' with an 'ought'; that is, describing a state of affairs (for example, the law of Natural Selection) is different from prescribing a state of affairs (for example, 'only the well-to-do should breed').

civilization' (cited by Desmond and Moore, 2004, p. xlviii). Chapter Three analyses the text of Darwin's *Descent* alongside his letters and notes to determine whether these changes and any others constitute a shift away from Romanticism. When Darwin was on the *Beagle* he was horrified by the sight of slaves, and although equally horrified by the primitive way of living of some of the native tribes he met on his travels, he regarded both slaves and primitive tribes as human with equal rights as they ultimately came from the same progenitor and were not a separate species. Darwin's extension of his theory of natural selection to include the addition of his theory of sexual selection is critical in this regard. Darwin noticed that humans' skin colour, shape and form did not directly correspond to region or habitat as those from the same climatic region did not necessarily have the same skin colour. Darwin attributed this to sexual selection. According to Darwin, the concept of beauty varied regionally and males and females selected each other within their respective regions according to what was held to be beautiful in their regions. Darwin argued that the same applied to the animal kingdom. The importance of this argument for Darwin is that it further strengthens his view that humans of whatever colour can be traced back to the same progenitor and that although their differences make them different races, they are all varieties of the same species. In terms of the argument for defining Darwin's concepts as Romantic, this may seem to be a digression. But the argument for sexual selection can be seen as another example of the 'web of affinities' in that the whole of existence, whether this be plant life, animal life or human life, is all related, and that the past histories of all life are also all connected to the present. As such sexual selection can be seen as an essential spoke in the wheel of Organic Nature. Chapter Four further develops the importance of Mind in Darwin's writing and this is examined with reference to Darwin's 'Rastro' method of following the traces of Nature's histories. This is also linked to Darwin's development of his poetic imagination that ultimately leads to a more objective poetic science. Chapter Three deals with how morality in Man is developed from instincts that lead to sympathy. The feeling of sympathy is followed up in Chapter Four where it is seen as an essential part of Darwin's own thought processes in feeling that all creatures share a common consciousness. This not only enables Darwin to feel a common empathy with animals but enables him to get into their 'minds', thus understanding sexual selection for example.

CHAPTER 1: THE INFLUENCE OF ALEXANDER VON HUMBOLDT ON CHARLES DARWIN

1.01 Introduction

Chapter One considers the influence of Humboldt on Darwin without specific reference to any Romantic influences as these are left to Chapter Two. The influence on Darwin's *Origin* is traced back to Humboldt's *Personal Narrative* which Darwin took with him on his voyage of the Beagle. Humboldt's concept of 'Organic Nature', in which everything in Nature is related to everything else, is examined in relation to Darwin's 'web of affinities' and is seen as influential in the development of his thought. The unity of the relatedness of Nature's parts can also be seen in Humboldt's and Darwin's concept of the 'One Reality of Nature' in which Nature creates itself through its own laws. Humboldt strives to understand the underlying secrets of the forces of Nature through his aesthetic experiences of Nature as well as his Galvanic experiments on his own body. Darwin develops Humboldt's aesthetic appreciation of Nature in his imagination, helping him to 'see' the hidden laws of Nature at work, which he articulates as his theories of natural selection and sexual selection. Both Humboldt and Darwin also saw the darker side of Man's Nature in the act of slavery in which white Europeans and North Americans sought to present 'primitive' culture as inferior. Both saw the origins of Man as coming from the same progenitor and so believed that one race should not be treated as inferior to another. Darwin's anti-slavery views had already been formed at an early age through his Darwin-Wedgwood family upbringing, but these were reinforced through his reading of Humboldt's anti-slavery views and experiences, and through his similar experiences in South America whilst on the voyage of the Beagle.

1.02 Humboldt's 'Organic' Nature

Before outlining Humboldt's organic view of Nature,[10] it is useful to understand which thinkers had helped Humboldt develop this view. Humboldt had read Immanuel Kant[11] whose own organic way of thinking had been sparked off through his dissatisfaction with

[10] The 'N' in 'Nature' is used throughout the thesis in upper case. This is to identify the complexity of its use as it can refer to empirical instances before the observers' eyes or abstract concepts. It may refer to one or the other or may refer to both at the same time. The context of the word's use in this thesis should make its meaning clear. Lower case 'n' will only be used where its use occurs in quotes from other authors.

[11] Humboldt refers to Kant's *On the Theory and Structure of the Heavens* [1755] (Humboldt, 1997, p.50) and says that 'the sidereal portion, termed by Kant the natural history of the heavens, should not be made subordinate to the terrestrial' (ibid. p. 65). In other words, both the planets and stars and earth make up the organic whole that is Nature.

Carl Linnaeus' classification system of the natural world;[12] Kant saw this system as incapable of conveying the idea of the whole by not placing enough emphasis on the unifying processes and the interrelationships between the parts[13] and too much emphasis on their external structures (McCrory, 2010, p. 122). What was missing was a description of the interrelated unifying processes that could not be directly seen. Humboldt filled this gap by describing the character of each geographical region of land through these interrelationships, such as the hills, the plants and the colour of the sky[14] (Nicolsen, 1995, p. xiii). Humboldt had also been influenced by Johann Forster[15] and his son George Forster, both of whom had been with Captain James Cook on the second of his three voyages of discovery[16] to the Pacific. Humboldt travelled with George Forster around Europe and Forster's publication of their journey in 1790, *Ansichten vom Niederrhein von Brabant, Flandern, Holland, England und Frankreich*, 'was a demonstration that scientific inquiry need not be cold and unresponsive to the beauties of Nature. It could embrace and celebrate the earth in the act of studying it' (Nicolsen, 1995, xv). The word *Ansichten* refers to both a visual view and a personal view or opinion. This is the approach taken up by Humboldt's empiricism that encapsulates both the subjective and the scientific, as well as his ecological approach to Nature (Sachs, 2007, p. 55). This was a turning point in the way Nature should be viewed. No longer were plants and features of the earth to be seen in isolation. For Humboldt, a history of the earth should not just concern itself with geological phenomena but should also concern itself with the diversity of biological phenomena. For Humboldt, voyages were not only about exploration and the adventure of discovering new continents and peoples of the world, but also about understanding the diversity that was

[12] However, building on the Linnaean system, modern taxonomy follows the principle that taxonomic groups should be based on evolutionary relationships. 'Modern classifications are viewed as evolutionary hypothesis about the relationship of organisms' (Davidson, 2012, unnumbered page).

[13] Linnaeus and Kant did, however, agree on the question of Race. In *Systema Naturae* (1767), Linnaeus listed five human-race taxa: red skinned 'Americanus', black skinned 'Africanus', yellow skinned 'Asiaticus', white skinned Europeans', and human mythological 'Monstrosus', each having different mental abilities. In *'On the Different Races of Men'* [1775], Kant defined 'Race' as the development of the potential in an animal through careful breeding, and that this potential was modified according to climate (Larrimore, 2008, pp. 341 – 363).

[14] According to Nicolsen, 'In his *Florae Fribergensis specimen* [1817], Humboldt followed Kant in distinguishing between a true history of nature and a mere description of natural objects such as had been provided by the older Linnaean system' (Nicolsen, 1995, p. xvii).

[15] Forster senior published his account of the voyage with Captain Cook as *Observations Made during a Voyage round the World* in 1778. Forster influenced Humboldt through his experimental methods and his theory of the environmental influences of climate, winds etc. on vegetation producing the diversity of forms. For both Forster and Humboldt, the study of vegetation was a key part in the understanding of Nature as this impacted most on Man (Nicolsen, 1995, p. xiii – xiv).

[16] His second voyage was between 1772 – 5 in which he circumnavigated the globe, sailing close to the Antarctic in the east and west.

underlying the unity of Nature (Nicolsen, 1995, xvii).This diversity could be understood through Humboldt's method of blending science with aesthetic sensitivity (the 'Humboldtian Method'); this was a move away from an analysis of individual specimens (as per Linnaeus) to an analysis of how the individuals and species interacted with each other and their environment, including the sensitivities of the observer and how they impacted on him/her.[17]

In Humboldt's time, exploration was still very much part of colonial expansion.[18] As a German, Humboldt was fortunate, through his contacts, to get permission from the Spanish king to explore Spanish America as this was under Spain's control and was out of bounds to foreigners. As a mining geologist, he was seen as an asset to further developing their colonies. At the time of his visit to America (1799 – 1804), Humboldt had all the latest scientific equipment and was better equipped than any previous explorers, enabling him to take detailed readings of the terrain, climate, plant life, animal life and geography. Previously most explorers had limited their travels to the coast for mapping and trade purposes whereas Humboldt was one of the first to go into the interior.

In Humboldt's *Personal Narrative*[19] the reader familiar with Darwin's *Origin of Species* can see some of the similar questions being posed and a hint at some of the similar answers being proposed. These are questions dealing with the concepts of organic forms, their connections, relationships,[20] similarities and interrelatedness forming the unity of life. An

[17] This is the very foundation of modern ecology.

[18] Captain Cook's voyage on the *Endeavour* was primarily arranged by the Royal Navy to measure the transit of Venus in 1769 in order to calculate the distance of the Earth from the Sun, having been beaten by the French in their last voyage in 1761. However, Cook was also secretly instructed by the government that the objective was also to acquire new territories showing that such voyages were also concerned with colonial expansion (Fara, 2003, pp. 74 – 5 and p. 77).

[19] It took Humboldt 30 years and 30 volumes to publish his American expedition. It was originally published as *Voyage aux régions équinoxiales du nouveau continent, fait en 1799, 1800, 1801, 1802, 1803 et 1804*. The publication in French began in 1805 and ended in 1834. The work as a whole can be divided into three main categories: the scientific results consisting of botanical, zoological, geological, astronomical and meteorological data; treatises on the geography and economy of Cuba and Mexica; and the narrative account of his travels. The *Personal Narrative* part of his publication, which covered the popularization of his actual journey, appeared in volumes 28 to 30 and was published in French as *Relation historique du voyage aux régions équinoxiales du nouveau continent* in 1814, 1819 and 1825. Volume 4 (of the *Personal Narrative*) was not published as it dealt with his mountaineering feats and he did not want these to detract from his scientific findings as well as his humility – he did not want to be seen to be conquering Nature. It was ready for publication but he had it destroyed. Bonpland helped edit four of the volumes but, due to delays and to settling in South America, from 1810 the remainder were edited by Kunth. (Sachs, 2007, p. 46; Wilson, 1995, pp. lv – lv1; Botting, 1973, pp. 2002 – 7 and McCrory, 2010, pp. 54 -5 and p. 118).

[20] The term 'relations' is probably the most common term in Humboldt's *Personal Narrative* (Sachs, 2007, p.49). In the same way as Humboldt establishes the 'relations' between rocks, wind and water, he also establishes 'relations' between his 'scientific tangents' such as his descriptions of volcanoes

analysis of Humboldt's discussion of migration and the development of identical species in different areas reveals some of Darwin's embryonic thoughts on his theory of natural selection:

> Even when nature does not produce the same species in analogous climates […], we still noticed a striking resemblance of appearance and physiognomy in the vegetation of the most distant countries. This phenomenon is one of the most curious in the history of organic forms. I say history, for reason cannot stop man forming hypotheses on the origin of things; he will always puzzle himself with insoluble problems relating to the distribution of beings (Humboldt, 1995, p. 138).

This groping towards a position later taken up by Darwin can be seen in the words 'striking resemblance of appearance […] in the vegetation of the most distant countries'. The importance of this is that Humboldt is breaking with the view that the Creator, as a first cause, created these similarities. Humboldt is here suggesting that change might be responsible as a result of interactions between species and their environment, that there might be a connection between these resembling species from different countries and that they might have a common heritage. The key word that hints at change is 'history': the notion that 'organic forms' may have a 'history' suggests that over time they may change and that time may enable further change to take place in different places (that is, the hint that not all species necessarily migrate as they now appear, but migrate and then change as they adapt to their new environment). This enables him, like Darwin after him, to form 'hypotheses on the origin of things' and to consider the 'problems relating to the distribution of beings'. Here the concept of 'distribution' relates to all the other factors concerning the modification of species and how they move to different regions, and, at the same time, how they resemble each other.

Humboldt is not convinced that migration is responsible for similar species appearing at the same altitudes; he believes that there is something else as yet unknown responsible for this, but something to do with the species themselves and how they interact with their environment:

> Neighbouring species are often found at enormous distances from each other, in low regions of a temperate zone, and on mountains on the equator. And, as we found on La Silla at Caracas, they are not the European genera that have colonized mountains of the torrid zone, but genera of the same tribe, which have taken their place and are hard to distinguish (Humboldt, 1995, p. 139).

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and earthquakes, and these 'relations' create the same unity in his book as exists in Nature (Sachs, 2007, p. 49). As expressed by Humboldt, 'To give greater variety to my work I have often interrupted the historical narrative with straightforward descriptions. I begin by describing the phenomena as they appeared to me, then I consider their individual relations to the whole' (Humboldt, 1995, p. 12).

These observations are hints at ideas later taken up by Darwin; for example, species of the same 'tribe' (or genera) not necessarily having migrated as they are but having taken up different habitats and adapted to them, resulting in changed appearances, yet, through their similarities, still showing a relationship to their original forms. Humboldt had not arrived at this fully formed idea, but his thoughts can be seen as moving in this direction.

In abandoning the hypothesis that migration is responsible for the distribution of species, Humboldt also abandons the view that identical temperatures are responsible for a certain kind of vegetation growing in specific regions:

> It is tacitly assumed that under identical temperatures a certain kind of vegetation must grow. This is not strictly true. The pines of Mexico are absent in the Peruvian Andes. The Caracas la Silla is not covered with the same oaks that flourish in new Granada at the same height. Identity of form suggests an analogy of climate, but in similar climates the species may be very diversified (Humboldt, 1995, p. 139).

There is therefore something else responsible for this diversification. Here Humboldt is doing some of the scientific spadework for Darwin enabling him to distil his theory of natural selection, but also (as discussed later) helping him develop the Humboldtian Method of seeing the world differently from the way naturalists had viewed it before. It is Humboldt's notion of the organic unity of life's relationships (between species and species, and species and their environment) that makes this possible.

The concept of relationships in Nature and how everything has an effect on everything else is an important one in Humboldt's works and has an important influence on Darwin in the development of his own theory of Nature. The cause and effect of relationships in Nature leads to change or transmutations in Nature. Humboldt shows how the geographical distribution of plants is due to the relationship between plants, climate, terrain and altitude (Humboldt, 1995, pp. 95-6). The relationships of the features of a specific area make that area's characteristics unique and therefore easily identifiable and distinct from other areas. Humboldt underlines the importance of this when comparing the Orinoco to other river beds:

> These differences do not depend solely on the width or speed of the current; they derive from a combination of relations easier to grasp on the spot than to define precisely. In the same way, the shape of the waves, the colour of the water, the kind of sky and clouds, all help a navigator guess whether he is in the Atlantic, the Mediterranean or in the equinoctial part of the Pacific (Humboldt, 1995, p. 186).

This way of seeing was important to Darwin in being able to relate the histories of rock strata and their fossils with the development of the surrounding plant and animal life. It enabled him to see the histories and developments of species in space and time rather

than fixed unchanging entities frozen in present time. In Humboldt's study of earthquakes, he goes beyond the collection of facts stressing the importance of comparing them in order to go beyond what is variable. 'We get to know the features of each region better the more we indicate its varying characteristics by comparing it with others' (Humboldt, 1995, pp. 34 – 5). This is unity in diversity. Comparisons can lead to the discovery of the laws that make things variable. This again is a hint of what is to be developed by Darwin:

> When we cannot hope to guess the causes of natural phenomena, we ought at least to try to discover their laws and, by comparing numerous facts, distinguish what is permanent and constant from what is variable and accidental (Humboldt, 1995, p. 59).

Humboldt also taught Darwin that making comparisons through first-hand experience of the forces of Nature, despite its dangers, was a better way to learning about and understanding the laws of Nature. Humboldt's direct experience of earthquakes, literally breathing in the sulphurous gases around him and feeling the ground move, enabled him to make the connection between earthquakes and volcanoes:

> Thus sitting in the interior of a burning crater near those hillocks formed by scoriae and ashes, we feel the ground move several seconds before each eruption takes place. We observed this phenomenon at Vesuvius in 1805 [and] in 1802 on the brink of the immense crater of Pichincha […]. Everything in earthquakes seems to indicate the action of elastic fluids seeking an outlet to spread into the atmosphere (Humboldt, 1995, p. 64).

This made Humboldt break with the view that volcanoes were merely the result of burning matter beneath the surface. It made him realize that there were much stronger hidden forces at play. As a 'natural historian',[21] Humboldt realizes that establishing relationships between phenomena helps the naturalist understand Nature's history, and thereby its inner secrets, its inner laws:

> As a historian of nature, the traveller should note down the moment when great natural calamities happen, and investigate the causes and relations, and establish fixed points in the rapid course of time, in the transformations that succeed each

[21] As this quote shows, Humboldt regarded himself as 'a natural historian' concerned with 'natural history' or the history of Nature. Darwin also saw himself as a natural historian. Darwin's *Voyage of the Beagle* is also referred by him as 'the Zoology of the Voyage of the *Beagle* ', *Journal of Researches* (an alternative title) and his travels during the voyage as 'the Natural History of the different countries we visited' (Darwin, 1985, p. 33). At the time of writing the *Origin* the term 'science' had not really developed, as natural history included everything concerned with life and its origins. However, towards the end of his life, natural history was separated into these respective subjects as 'natural historians' began specialising in distinct areas of 'Nature'. For Darwin the term 'natural historian' could be seen as appropriate in another respect – his 'natural history' could be seen literally as a 'history of Nature' (or as Beer, 1983, would put it, a story, a plot or narrative). Yet Darwin could also be called a 'philosopher of Nature' as he tries to uncover the mysterious laws that underpin Nature and as such he is examining the metaphysical concepts of Nature. Little wonder, therefore, that Darwin's nickname on the *Beagle* was 'the Philosopher'.

> other ceaselessly so that he can compare them with previous catastrophes (Humboldt, 1995, p. 142).

In examining these 'transformations that succeed each other ceaselessly', Humboldt is informing his reader of his quest to discover the permanent laws of Nature that create this 'process of constant change' (McCrory, 2010, p. 81).

Darwin also experienced earthquakes on his voyage and his reading of Humboldt's experiences must have been an aid to his own understanding of such phenomena. In a letter to his Cambridge mentor John Stevens Henslow[22] from the *Beagle* in 1832, Darwin refers to this Humboldtian experience of the unity of Nature on an expedition in South America to Rio Macaò:

> Here I first saw a tropical forest in all its sublime grandeur. – Nothing, but the reality can give any idea, how wonderful, how magnificent the scene is. – If I was to specify any one thing I should give the preemenence [sic] to the host of parasitical plants […]. I never experienced such intense delight. – I formerly admired Humboldt, now I almost adore him; he alone gives any notion, of the feelings which are raised in the mind on first entering the Tropics[23] (Burkhardt, 2008, p. 128).

Darwin had read descriptions of the Tropics in Humboldt which inspired him to travel. Everything was so completely different from anything he had seen in Britain. To see whole gardens of plants growing on other plants was an incredible sight for a naturalist, especially at that time when he would only have had access to books and drawings (and as Humboldt had observed, many explorers copied from each other creating a distorted view of reality). This first fresh experience of the Tropics gained first-hand opened up his mind to the unfathomable possibilities of what Nature could be and how it got to that position. As all things seemed possible it opened up his mind to the possibility of all things biologically and botanically. This openness is crucial to an understanding of how Darwin was able to collect data, analyse the data comparatively in relation to other data rather than in isolation, and to be open to all possible interpretations which others might have missed at the time as well as the development of his new insight of inter-relatedness.

We also know from Darwin's letters that Adam Sedgwick[24] arranged for him to have a copy of Humboldt's *Personal Narrative of a Journey to the Equinoctial Regions of the New Continent* [1799 – 1804] with him on the *Beagle*: 'Humboldts [sic] personal narrative you

[22] Henslow received many specimens from Darwin while on his *Beagle* voyage (Burkhardt, 2008, p. 420.

[23] As referred to in the passage of Humboldt's experience of the Tropics quoted on pp. 24-5.

[24] Although Darwin was not formally studying geology at Cambridge, he developed his knowledge of geology through his friendship with Sedgwick (Professor of Geology) and through going on field trips with him.

will of course get – He will at least show the right spirit with wh. a [sic] man should set to work' (Burkhardt, 2008, p. 47).

Humboldt (along with other important philosophers and natural historians of the time such as Schelling and Goethe), had read Carl Kielmeyer's published lecture 'On the relationships of the organic forces' (1793)[25] and had been influenced by his argument that organs in an organism should be seen as cause and effect of each other.[26] For example, the heart and lungs work together to support each other's existence as do other organs in the human body. This relationship could be seen as not just being between organs in individual organisms but also as being between members of the same species, for example, between male and female members, and between members of different species, for example, cats killing mice that damage bumble bee nests thereby improving clover and honey production through pollination,[27] and bumblebees nesting in disused rodent nests.[28] This organic concept of Nature viewed as both product and creator of itself (following Spinoza's theory of Nature) was therefore not purely mechanistic (Richards, 2002, p. 116; 241; 539). Darwin sums this up in the mutual relationship between the bee and the flower:

> Thus I can understand how a flower and a bee might slowly become, either simultaneously or one after the other, modified and adapted in the most perfect manner to each other, by the continued preservation of individuals presenting mutual and slightly favourable deviations of structure (Darwin, 1985, p. 142).

Humboldt also saw this mutual relationship between species as being under threat when Man failed to realize how his own behaviour towards Nature could produce a negative impact. Just as Thomas Malthus[29] saw overpopulation as having a negative effect on the amount of food available, Humboldt could demonstrate how deforestation through the

[25] Published in German as *Ueber die Verhältnisse der organischen Kräfte unter einander in der Reithe der verschiedenen Organisationen, die Gesetze und Folgen dieser Verhältnisse* (Stuttgart, 1793; reprinted Tübingen, 1894).

[26] According to Humboldt's book dedication (Humboldt, 1806), this essay made Kielmeyer 'the first physiologist of Germany'. Goethe had met Kielmeyer at Tübingen in September 1797 (details cited by Richards, 2002, pp. 238-9).

[27] 'The number of humble-bees in any district depends in a great degree on the number of field-mice, which destroy their combs and nests; and Mr H. Newman, who has long attended to the habits of humble-bees, believes that 'more than two thirds of them are thus destroyed all over England.' Now the number of mice is largely dependent, as every one knows, on the number of cats; and Mr Newman says, 'Near villages and small towns I have found the nests of humble-bees more numerous than elsewhere, which I attribute to the number of cats that destroy the mice.' Hence it is quite credible that the presence of a feline animal in large numbers in a district might determine, through the intervention first of mice and then of bees, the frequency of certain flowers in that district!' (Darwin, 1985, p. 125).

[28] Bumblebee Conservation Trust, 2013, p.1.

[29] Humboldt had read Thomas Malthus's 1798 *Essay on Population* which stated that population growth would outstrip food supply and that the only course of action to counteract this was sexual abstinence or birth control (McCrory, 2010, p. 27).

felling of trees reduces the supply of fuel and creates a scarcity of water, and as such he could be seen as an early ecologist (coming from his notion of interdependent unity):

> Thus, the clearing of forests, the absence of permanent springs, and torrents are three closely connected phenomena. Countries in different hemispheres like Lombardy bordered by the Alps, and Lower Peru between the Pacific and the Andes, confirm this assertion (Humboldt, 1995, pp. 150-1).

This unifying interconnectedness of Nature in which no species is isolated (including Man) is what we would now call ecology.[30] This is what Humboldt meant by the term 'cosmos'. In *Cosmos,*[31] he reminds his readers that no species, whether plant or animal, are isolated. All things make up the web of life and even the mosquitoes that plagued him are 'an important point in the economy of nature':

> [We need] to recognise in the plant or the animal not merely an isolated species, but a form linked in the chain of being to other forms either living or extinct. They aid us in comprehending the relations that exist between the most recent discoveries and those which have prepared the way for them. Although fixed to one point of space, we eagerly grasp at a knowledge of that which has been observed in different and far-distant regions (Humboldt 1997, p. 42).

Again in the above Humboldt passage a hint of Darwin can be seen in making a link 'between the most recent discoveries and those which have prepared the way for them', that is, changes that have taken place between the species in the past and the present. These changes show that the interconnectedness of things in Nature is more than a passive web of relationships that do not have an effect on each other; it is an active web made up of processes, interactions and transformations, and these are the same things that Darwin wanted to interrogate in his *Origin*. Humboldt's motto for this in *Cosmos* is 'everything is interaction' (*Alles ist Wechselwirkung*) (cited by McCrory, 2010, p. 172). Importantly Man needs to not only understand the connectedness of things in Nature between each other but their connections to the 'laws of the physical world':

> Man cannot act upon nature, or appropriate her forces to his own use, without comprehending their full extent, and having an intimate acquaintance with the laws of the physical world (Humboldt, 1997, p. 53, also cited by Sachs, 2007, p. 78).

Humboldt's belief in the unifying force of the interconnectedness of everything in Nature can be seen in his enthusiastic and scientific rigour of collecting samples of everything he

[30] That is, the relationship between organisms and their environment.

[31] 'The first volume of *Cosmos* was published in 1845 when he was seventy-six, the second volume when he was seventy-eight, the third when he was eighty-one, and the fourth when he was eighty-nine, but the fifth volume was only half done when he died and had to be completed from his notes and provided with an index over a thousand pages long' (Botting, 1973, p. 259).

was studying at the time to get a 'total picture' of the world.[32] This conviction of the interconnectedness of Nature was also reflected in his belief that all the academic disciplines of human knowledge should be connected. When delivering his inaugural Berlin Academy of Sciences speech in 1805 he predicted the 'interaction of all aspects of human knowledge harmonising in one organic whole' (cited by McCrory, 2010, p. 116). He believed that the study of one discipline would lead to another due to their interconnectedness. In addition to seeing this in Nature and in the disciplines, he also saw this interconnectedness between the scientists and strongly believed that they should work together as a team and share their knowledge[33] (McCrory, 2010, p. 116). This teamwork through 'organic' collaboration and the sharing of knowledge from different scientific disciplines is another example[34] of Humboldt's philosophy of the interconnectedness[35] of Nature, its disciplines, its naturalists and scientists. This can be seen in the writing of *Cosmos*[36] in which he interrelates the work of other scientists such as Sabine (astronomer, geophysicist and ornithologist), Arago (mathematician, physicist, astronomer and very close friend of Humboldt's), John Herschel (astronomer) and Buch[37] (geologist and palaeontologist) amongst others (McCrory, 2010, pp.174 – 77). Darwin met Herschel on 3 June 1836 while on his voyage of the *Beagle* and in the opening lines of the introduction to *Origin of Species* writes that his intent is 'to throw some light on the origin of species — that mystery of mysteries, as it has been called by one of our greatest philosophers', referring to Herschel (Darwin, 1985, p. 65). Herschel's *A Preliminary Discourse on the Study of Natural Philosophy* (1830) made a deep impression on Darwin (McCrory, 2010, p. 175;

[32] This would include notes, ideas, letters, newspaper cuttings, notes from colleagues, excerpts from books and lectures and would all be filed in boxes according to topics (McCrory, 2010, p. 106).
[33] In 1828 Humboldt arranged the very first international Natural History convention (today known as a 'science' conference). Six hundred took part including the German mathematician Gauss, the Swedish chemist Berzelius, the Danish physicist Ørsted and Charles Babbage, who invented the mechanical computer. Goethe was invited, but could not attend (McCrory, 2010, p. 135).
[34] That is, international 'scientific conferences' and international scientific collaborations are indebted to Humboldt for initiating this cooperation.
[35] This view of the interconnectedness of nature was partly inspired by the Roman statesman and scholar Plinius (Pliny the Elder) who wrote *Natural History* in A. D. 77. Humboldt used a sentence from the text as a motto for his *Cosmos* on the title page*:'Naturae vero rerum vis atque majestas in omnibus momentis fides caret, si quis modo partes ejus ac non totam complectatur. – Plin., Hist, Nat., lib. Vii, c. 1.'* This translates as: 'The power and majesty of things in Nature lose their credibility if one's mind embraces parts of it only and not as a whole' (cited and translated by McCrory, 2010, p. 161).
[36] McCrory believes that *Cosmos* stands between the *Encyclopédie* (1751) by Jean le Rond d'Alembert and Diderot, and Darwin's *Origin of Species*, and that Darwin's later works can be seen as supplements to Humboldt's vast body of published work (McCrory, 2010, p. 213).
[37] Such was their close friendship and association that Humboldt dedicated his *Kleinere Schriften* (Miscellany) (1853) to von Buch, and in return he bequeathed his walking stick (Wanderstab) to Humboldt upon his death.

Holmes, 2009, pp. 445, 461). Herschel was also recommended as a role model for Darwin by Charles Lyell[38] as an independent 'scientist' who was able to determine his own programme of research by not being constrained by working for organisations such as the Royal Society (Holmes, 2009, p. 463).

Darwin shared his knowledge in the same way with Charles Lyell,[39] Joseph Hooker[40] and many other scientists both at home and overseas.[41] Pre-eighteenth-century voyages were mainly concerned with trading in spices, silks and other goods. Humboldt (and Darwin after him), however, was now part of a group of European explorers such as Cook, La Condamine, Bougainville, Baudin and Malaspina who wanted the results of their scientific expeditions made available for the benefit of all.[42] The aim of this new group of explorers was to interrogate Nature to reveal her secrets in order to help society progress (McCrory, 2010, pp. 67 – 69,130).

Kielmeyer would have exerted another influence on Humboldt. Through his study of physics and chemistry, Kielmeyer saw organs as the product of a developmental force. The history of the earth reflected this developmental force and therefore could only be understood if it dealt with the past, the present and the future. So too with Darwin; his *Origin* could also be seen as a 'History' of species as it studies their development over time.

[38] In a letter from Lyell to Darwin on 26 December 1836: 'Don't accept any official scientific place, if you can avoid it […]. Fancy exchanging Herschel at the Cape, for Herschel as President of the Royal Society, which he so narrowly escaped being […]. At least, work as I did, exclusively for yourself and for science for many years, and do not prematurely incur the honour or penalty of official dignities' (Burkhardt, 2009a, p. 532).

[39] In a letter to Lyell dated 19 February 1840, Darwin discusses his work on coral formation and the classification of reefs (Burkhardt, 2009b, p.253).

[40] In a letter from Hooker to Darwin dated 28 November 1843, Hooker refers to their discussion of Arctic and Antarctic flora and agreed for the plants, as well as those from the Galapagos, to be forwarded by Professor Henslow (who took receipt of them from Darwin when on the *Beagle*) (Burkhardt, 2009b, p.410 - 12).

[41] Just one volume of Darwin's letters between 1837 – 1843 reveals approximately 600 references to those he either corresponded with or referred to in his correspondence. See the *Biographical register* in Burkhardt, 2009b, pp. 504 - 44).

[42] For example sea charts were made available to other countries, astronomical and natural history data was exchanged, museums and observatories founded and extended, Royal Societies created and botanical gardens established, as well as international conferences inaugurated. The first was set up by Humboldt in Berlin in 1828 (Encyclopaedia Britannica, 2015, unnumbered page; McCrory, 2010, p. 68, but incorrectly dated as 1836). He also maintained contact with fellow scholars writing about two thousand letters a year. He shared his findings and encouraged others to make use of them, and this included Lyell, Hooker and Darwin who read his works. Both Humboldt and Darwin were interested in the 'noble science of geology' because it provided knowledge of the distant past helping the reconstruction of the history of life (McCrory, 2010, pp. 131 - 3).

Each individual and each species has its own history and each is linked together through the 'web of affinities'[43] making up Darwin's narrative.

Darwin portrays Nature as organic throughout the *Origin* through detailed examples of Nature's 'web of affinities'. The next thesis-section demonstrates that Darwin's organic view of Nature is not mechanistic; that is, Nature can be seen as self-purposive according to its needs without the need for a creative deity. He does this by merging the identity of God with Nature. The concept of an independent God creating Nature could now be seen as an unnecessary explanation as the natural processes of Nature are varied and develop themselves over long periods of time (Richards, 2002, p. 516 and p. 539).

1.03 Darwin's 'Organic' Nature

This section will examine Darwin's development of Humboldt's organic concept of Nature. In Darwin's discussion of the 'conditions leading to dominant species and incipient species', he refers to organic constructs using such terms as 'diverse', 'competition', 'struggle', 'incipient species or varieties' and 'relationships' (Darwin, 1985, pp. 108-9). In this section, my argument will demonstrate that Darwin's presentation of causes and effects seen in Nature can be interpreted as coming from within Nature rather than being caused by a divine Creator.

Darwin had studied William Paley's *Natural Theology or Evidences of the Existence and Attributes of the Deity* [1802][44] (Paley, 2005) in which God is depicted as a grand designer with a purpose, likened by Paley to a watchmaker:

> When we come to inspect the watch, we perceive – what we could not discover in the stone – that its several parts are framed and put together for a purpose, e.g. that they are so formed and adjusted as to produce motion (Paley, 2005, p. 7).

For Paley the intricacies of the eye and the interrelated workings of the organs of the animal and human body showed that this was proof of intelligent design, just as the function and complexity of a watch imply a watchmaker. In his *Autobiography*, looking back at his time at Cambridge, Darwin states that he took Paley's arguments 'on trust' and did

[43] Darwin, 1985, p. 415.

[44] In a letter to his cousin W. D. Fox dated 25 - 9 January 1829, Darwin refers to 'the little Go' (Burkhardt, 2009a, p.74) which is an undergraduate name for the University 'Previous Examination', taken in the second year: 'The subjects of examination are one of the four Gospels or the Acts of the Apostles in the original Greek, Paley's Evidences of Christianity, one of the Greek and one of the Latin Classics' (*Cambridge University calendar,* 1829, p. 169). (Cited in Burkhardt, 2009a, footnote 7., p. 75).

not question them, although he admits that this part of his BA course[45] 'was of the least use to me in the education of my mind' (Darwin, 1995, p. 18).[46] But when Darwin went on his voyage on the *Beagle* he began to question this view of Nature. His 'scientific' naturalist research was now looking for other explanations that did not ask the question of how a Deity could be involved in the design of Nature. Rather than looking at what the prime cause of Nature was, Darwin was more interested in what the laws of Nature were and how they worked.[47] His theory of 'Natural Selection' proposed that animate and inanimate Nature 'evolved' and developed their laws without the *need* of a Creator creating them although he did not believe that it was impossible that a Creator could have created those laws responsible for the creation of Man. No wonder this contradiction made him feel 'bewildered'.[48] His *On the Origin of Species* (Darwin, 1985) is actually not an attempt to find

[45] It is worth noting that like contemporary gentlemen of his time, it was fashionable to study for an Arts degree covering such subjects as Natural Theology and Philosophy in order to become a clergyman and gain a living and then be able to follow one's interest in Nature by studying ornithology, collecting records of plant and animal species or writing Nature journals like Gilbert White before him.

[46] 'In order to pass the B. A. examination, it was also necessary to get up Paley's *Evidences of Christianity*, and his *Moral Philosophy*. This was done in a thorough manner, and I am convinced that I could have written out the whole of the *Evidences* with perfect correctness, but not of course in the clear language of Paley. The logic of this book and, as I may add, of his *Natural Theology*, gave me as much delight as did Euclid. The careful study of these works, without attempting to learn any part by rote, was the only part of the academical course which, as I then felt, and as I still believe, was of the least use to me in the education of my mind. *I did not at that time trouble myself about Paley's premises; and taking these on trust, I was charmed and convinced by the long line of argumentation'* [emphasis mine] (Darwin, 1995, p. 18).

[47] In his introduction to the *Origin*, Darwin says that 'In considering the Origin of Species, it is quite conceivable that a naturalist, reflecting on the mutual affinities of organic beings, on their embryological relations, their geographical distribution, geological succession, and other such facts, might come to the conclusion that each species had not been independently created, but had descended, like varieties, from other species. Nevertheless, such a conclusion, even if well founded, would be unsatisfactory, *until it could be shown how the innumerable species inhabiting this world have been modified, so as to acquire that perfection of structure and coadaptation which most justly excites our admiration'* [emphasis mine] (Darwin, 1985, pp. 66 – 70). The 'how' used here places the emphasis on the processes in Nature used to achieve that state of perfection. This is what Darwin is mainly concerned with in uncovering, rather than the origins.

[48] In a letter to his friend Asa Gray written on 22 May 1860, Darwin says that although he does not believe in a God designing parasites or the eye, he says he can see no reason why Man should not have been created by laws created by a Creator and that he 'had no intention to write atheistically': 'I cannot see […] evidence of design & beneficence on all sides of us […]. I cannot persuade myself that a beneficent & omnipotent God would have designedly created the Ichneumonidæ with the express intention of their feeding within the living bodies of caterpillars, or that a cat should play with mice. Not believing this, I see no necessity in the belief that the eye was expressly designed. On the other hand I cannot anyhow be contented to view this wonderful universe & especially the nature of man, & to conclude that everything is the result of brute force. I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance. Not that this notion *at all* satisfies me. I feel most deeply that the whole subject is too profound for the human intellect […]. I can see no reason why a man, or other animal, may not have been aboriginally produced by other laws; & that all these laws may

the origin of all species (that is, the origin of life) but rather an examination of the process of transmutation or 'evolution' that leads to new species. In looking at the processes in this sense, Darwin was looking at the wider notion of what brought about diversity, which included races as well as species.

Darwin dealt with the problem of referring to 'some unknown plan of creation' by concentrating on the 'web of affinities', on the system that made up Nature rather than its cause:

> We can clearly see how it is that all living and extinct forms can be grouped together in one great system; and how the several members of each class are connected together by the most complex and radiating lines of affinities. We shall never, probably, disentangle the inextricable web of affinities between the members of any one class;[49] but when we have a distinct object in view, and do not look to some unknown plan of creation, we may hope to make sure but slow progress (Darwin, 1985, p. 415).

Showing that members within a class are related in some way makes any talk of a divine creator as a *necessary* cause redundant; this is not to say that relatedness within a taxonomic group precludes a divine creator, only that talk of a divine creator is not *necessary* when talking about Nature.[50] These tangled affinities make it difficult to isolate individual elements of Nature and therefore make it difficult to identify individual divine causes.[51] This in itself does not *necessarily* disprove a divine creator but makes it impossible to scientifically discover a first cause. What Darwin is saying here is that we only need to look at what is before us in Nature. What the observer can see is a 'web of affinities' making up a 'great system', and that is all that is required as a starting point to discovering

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have been expressly designed by an omniscient Creator, who foresaw every future event & consequence. But the more I think the more bewildered I become […] (Burkhardt, 2009h, p. 224).

[49] Present day DNA technology now makes it possible to 'disentangle the inextricable web of affinities' between many groups.

[50] This point is made by Darwin when he argues against a deity creating species independently of each other: 'He who believes that each equine species was independently created, will, I presume, assert that each species has been created with a tendency to vary, both under nature and under domestication, in this particular manner, so as often to become striped like other species of the genus; and that each has been created with a strong tendency, when crossed with species inhabiting distant quarters of the world, to produce hybrids resembling in their stripes, not their own parents, but other species of the genus*. To admit this view is, as it seems to me, to reject a real for an unreal, or at least for an unknown, cause. It makes the works of God a mere mockery and deception;* I would almost as soon believe with the old and ignorant cosmogonists, that fossil shells had never lived, but had been created in stone so as to mock the shells now living on the sea-shore' [emphasis mine] (Darwin, 1985, pp. 201-2).

[51] That is, the notion of a divine power creating each species independently and the impossibility of scientifically establishing a separate divine cause responsible for each creation.

the laws of Nature. For Darwin, therefore, there is no need to look to 'some unknown plan of creation'.[52]

The theory of Natural Selection in which diverse species and varieties transmute without the help of a Creator God, can be regarded as materialist. But as Darwin's 'tree diagram' shows (Darwin, 1985, pp.160-1), everything in Nature is related to everything else through eventual shared common ancestry, and this concept of Nature can be seen as something more than just 'material' or 'physical'. Darwin described this interrelatedness as 'the inextricable web of affinities' (Darwin, 1985, p.415) or the 'community of descent' (Darwin, 1985, p.404).[53]

As Humboldt has already demonstrated, Nature is all about relationships within Nature; for example, how certain plants compete with each other for growing space, light and water; how they provide food for animals, and how both depend on bees to pollinate them to produce further seeds for propagation. The relationships in Nature are also about how changes in one species of plant or animal can lead to changes in another. Those species that are unable to adapt may become extinct. A reduction in rainfall, for example, can lead to greater competition between species that rely upon the same food source. The advantages of one species, through better adaptation and modification can therefore lead to the disadvantages and inevitable extinction in another, and likewise the disadvantages and extinction in one can lead to the diffusion of the other over a greater area and in greater numbers. These advantages are then inherited and passed on to the next generation, both in plants and animals. This perpetual flux and tension between relationships is aptly expressed through the terms 'flourishing', 'dominant', 'struggle' and 'modified':

> Hence it is the most flourishing, or, as they may be called, the dominant species, - those which range widely over the world, are the most diffused in their own country, and are the most numerous in individuals, - which oftenest produce well-marked varieties, or, as I consider them, incipient species. And this, perhaps, might have been anticipated; for, as varieties, in order to become in any degree

[52] As expressed by Darwin: 'The natural system is founded on descent with modification; that the characters which naturalists consider as showing true affinity between any two or more species, are those which have been inherited from a common parent, and, in so far, all true classification is genealogical; that community of descent is the hidden bond which naturalists have been unconsciously seeking, and *not some unknown plan of creation*, or the enunciation of general propositions, and the mere putting together and separating objects more or less alike' [my emphasis] (Darwin, 1985, p. 404).

[53] In this respect Darwin seems to be saying that the laws of Nature can be discovered not only by looking to the physical aspects of Nature but also from looking to something metaphysical in the relationships within the 'web of affinities'.

> permanent, necessarily have to struggle with the other inhabitants of the country, the species which are already dominant will be the most likely to yield offspring which, though in some slight degree modified, will still inherit those advantages that enabled their parents to become dominant over their compatriots (Darwin, 1985, pp. 108-9).

This lush diversity of Nature is the one Humboldt had identified. For Darwin diversity depended on struggle in order for species to take advantage of their environment and their relationship to other species. The hardship of struggle forced change and modification. The term 'incipient species' is key here as it is a link in the chain between past and present, between an old form and a developing new form, and through this transformation-step represents all that is historical in Nature. Yet there is nothing permanent about it; it still has to 'struggle' to achieve its goal of becoming a fully-fledged species as it is competing against other incipient species doing the same thing. Those that succeed are those that have inherited the best advantages from their parents.

Darwin's organic concept of 'relationships' inspired by Humboldt is not only central to his argument of the freedom of Nature to create itself as product and creator, but is also used to demonstrate that, if species and varieties of species in a large genus are related to each other, then each species cannot be seen to be created by God. Darwin believes that if the characteristics of some species revert back to the characters of early progenitors, for example, a white stripe on a horse coming from its zebra forebears,[54] this is a reflection of a genealogical lineage developing over time and not one of God creating fixed species in time. The reversions are like faint watermarks running through a species revealing past and present genealogical structures, relationships and connections, with an inner core that remains structurally constant and an outer framework that is forever changing and developing. According to Darwin, development and diversity do not fit with the notion of 'a special act of creation' for if species were created by a God the assumption is that they would have been created for a special purpose.[55] If other species developed over time, this would show that the species created by God were not fulfilling their purpose, which would indicate that their original creation by God would have been created for 'no apparent reason':

[54] Darwin, 1985, p. 201.

[55] However, Richard Owen's view was that God created forms which *could* then change and develop and called this on-going event 'ordained continuous becoming' or, as Desmond and Moore put it, 'a sort of providential evolution'. In 1857 Owen presented the discovery of the hippocampus minor in humans as evidence to show that Man was different from a chimpanzee and so should belong to a special sub-class of mammal (Desmond and Moore, 2009, pp. 452 – 3).

> If we look at each species as a special act of creation, there is no apparent reason why more varieties should occur in a group having many species, than in one having few (Darwin, 1985, p. 111).

Darwin's concept of 'relationships' is also emphasised in his principle of Divergence of Character which is one of the pillars that underpins his theory of natural selection. Species and varieties that develop those characteristics beneficial to their reproduction and survival will spread and reproduce the most and thereby pass these advantages down to their offspring. This whole process is organic in that the tensions that make this possible come from within Nature and not from some unknown external cause such as God. In this sense selection is natural in that it does not come from God but comes from Nature, from its organic 'web of affinities'. Put simply, the closer varieties or species are related, or converge, the more limited their range[56] of spread; the more they differ or diverge, the greater their range of spread. This emphasises the importance of organic relationships within Nature and demonstrates that convergence and divergence are the effects of changes within Nature due to its dynamic relationships, each acting on each other (as posited by Kielmeyer, mentioned earlier). It is the relationships that create Nature, not an unknown divine creator:

> Species very closely allied to other species apparently have restricted ranges. In all these several respects the species of large genera present a strong analogy with varieties. And we can clearly understand these analogies, if species have once existed as varieties, and have thus originated: whereas, these analogies are utterly inexplicable if each species has been independently created (Darwin, 1985, p. 113).

The concept of change or development is central to Darwin's organic theory of natural selection. As already mentioned, reversion to characteristics of early progenitors reveals the hidden threads or vestiges of change 'over thousands on thousands of generations' (which Darwin alludes to when he talks about the incipient species which are varieties forming a bridge between species in the past and new species in the future). This tendency to produce the long-lost character Darwin calls the 'tendency hypothesis' and uses it to support his view that species were developed over time from primordial progenitors within Nature and not externally from God. Unlike Paley's intricate mechanisms put together by the divine watchmaker, all the relational parts are self-created by the parts that make up Nature. Through his powers of perception and aesthetic understanding through personal experience, Darwin is able to piece together these underlying relationships which only create the whole picture when put together. It is also Darwin's use of his imaginative

[56] In his *Origin of Species* Glossary, Darwin defines 'range' as 'The extent of country over which a plant or animal is naturally spread' (Darwin, 1985, p. 474).

powers that enables him to penetrate the veil of Nature to discover its secrets; he frequently does this by arguing from analogy, that is, by making logical hypotheses based on personal experience or the experiences related by others in order to talk about the possible:

> I have stated that the most probable hypothesis to account for the reappearance of very ancient characters, is – that there is a *tendency* in the young of each successive generation to produce the long-lost character, and that this tendency, from unknown causes, sometimes prevails […]. In several species of the horse-genus the stripes are either plainer or appear more commonly in the young than in the old […]. For myself, I venture confidently to look back thousands on thousands of generations, and I see an animal striped like a zebra (Darwin, 1985, p. 201).

Darwin then asserts that an argument stating that God created species with a tendency to vary does not explain anything; it does not explain the laws that make this happen or how they happen and is therefore not an argument at all (Darwin, 1985, pp. 201-2).

Nature is a perpetual cycle of organic change feeding off itself creating difference through struggle, tension, adaptation and modification. The differences and diversification are created through natural selection. The relationship of species from different areas cannot be explained by the theory of independent creation but only through common progenitors and migration. Darwin refers to this when comparing the similarity of nearby island inhabitants to mainland Africa and South America showing that this does not support the view of independent creation (Darwin, 1985, pp. 385-6). Darwin's theory of natural selection promotes the view that species could not have been created uniquely and in isolation from other species, and, that through their development over generations and generations, they all share a common ancestry. The relationship between species from different areas and his examples of migration show that the independent creation of species cannot be possible.

Darwin's theory of natural selection encapsulates all that is organic and involves interdependent relationships, whether this be the increase and spread of one species and its varieties (its incipient species or intermediate forms), or the reduction and ultimate extinction of one in competition with its stronger more advantageous form. Therefore there can be 'no sort of explanation on the ordinary view of independent creation' (Darwin, 1985, p. 386). A more justifiable explanation is to look at the similarities of species in different areas as being due to colonisation and then adaptation to their environment. Individuals having the best advantage and the most favourable variations then survive, and those having the most injurious get destroyed:

> Let it be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life […]. Individuals having any advantage, however slight, over others, would have the best chance of surviving and of procreating their kind […]. Any variation in the least degree injurious would be rigidly destroyed. This preservation of favourable variations and the rejection of injurious variations, I shall call Natural Selection (Darwin, 1985, pp. 130-1).

Again, Nature is all about interdependent relationships between species, for example the bee relying on clover to make honey, as well as species competing with each other for resources, and species struggling for survival in their physical environment; all these demands and struggles necessitate modifications in order to secure an advantage over others, applying equally to young or adult animals and insects (although modifications in larvae may not be advantageous in the adult and therefore may not be carried over). Natural selection in the structure of the young (through the laws of correlation) will modify the structure of the parent and modifications in the parent will modify structures in the young but ensure they are not injurious for this would result in its extinction (Darwin, 1985, p. 135). In addition, species either prey or are preyed upon and are related to other species genealogically in time, all of which can be represented as a grand family tree. The dispersal and range of species depends on the range of other species. The look and feel of a geographical area (as experienced by Humboldt) therefore depends on these interdependent relationships: 'each organic being is either directly or indirectly related in the most important manner to other organic beings' (Darwin, 1985, p. 208).

The character of a geographical area therefore not only depends on the species, the terrain and the climate but the relationship between the species themselves: for example, the act of preying or being preyed upon, the competition between them, their numbers and range of habitat. These relationships are also reflected historically in time through fossil remains of extinct and incipient species, through reversions of characteristics in existing species and similarities of species between different regions showing migration. The tension and struggle in Nature between the strong and the weak is also reflected by distinct species that occupy large areas and intermediate varieties that occupy smaller areas and are in the process of becoming extinct:

> The two [distinct species] which exist in larger numbers from inhabiting larger areas, will have a great advantage over the intermediate variety, which exists in smaller numbers in a narrow and intermediate zone (Darwin, 1985, pp. 209-10).

Under certain conditions, natural selection will modify the structure of beings to improve their advantage over others, but they do not necessarily produce the best structures under

all conditions. So although the beings within a species may have improved themselves, thereby giving them an advantage over other species in the same habitat, they do not necessarily achieve absolute perfection. In a sense, there is a teleological pull towards improvement in that all successful species move along a developmental line, but the archetypal forms they seem to be moving towards cannot be known in advance as the struggles they face in the future are unknown. The unknown reflects the freedom of Nature to develop, produce and create in its own way that is most advantageous to itself. If everything were a simple act of creation by the divine Creator, everything would be fixed. Yet Darwin notes animals that have changed their habits without changing their structures; for example, woodpeckers that live where there are no trees or upland geese with webbed feet that rarely go near water. Rather than bring in a divine Creator as the cause of these anomalies in Nature, it is easier to explain them as a result of a struggle where creatures have had to move on to new habitats but have not found it injurious to keep their present structures (the effort of change and the corresponding use of resources is only used if it is absolutely necessary for its survival and advantage over other species):

> If about a dozen genera of birds had become extinct or were unknown, who would have ventured to have surmised that birds might have existed which used their wings solely as flappers, like the logger-headed duck (Micropterus of Eyton); as fins in the water and front legs on land, like the penguin; as sails, like the ostrich; and functionally for no purpose, like the Apteryx. Yet the structure of each of these birds is good for it, under the conditions of life to which it is exposed, for each has to live by a struggle; but it is not necessarily the best possible under all possible conditions (Darwin, 1985, p. 214).

As demonstrated at the beginning of this section, Darwin had been influenced by Humboldt's organic view of Nature in which the conditions leading to species-change came from inter-relational causes and effects *within* Nature, a Nature that is both producer and product. Change occurs within Nature due to species, habitat, climate, food sources, etc. all acting on each other. Where species have improved their structure for living in a certain habitat their intermediate stages will have been replaced by the improved form, and so the intermediate forms will have become extinct. As there will have been less of them there will be less chance of their being discovered as fossils. Darwin therefore has no problem with the possibility of an insect-eating bear taking to water developing into a whale (misunderstood by his readers as happening over a short period of time and therefore being a ridiculous idea):

> In North America the black bear was seen by Hearne swimming for hours with widely open mouth, thus catching, like a whale, insects in the water. Even in so extreme a case as this, if the supply of insects were constant, and if better adapted competitors did not already exist in the country, I can see no difficulty in a race of

> bears being rendered, by natural selection, more and more aquatic in their structure and habits, with larger and larger mouths, till a creature was produced as monstrous as a whale (Darwin, 1985, p. 215).

The diversity in the number of species conforms to Darwin's theory of natural selection in which one species, through modification, gives rise to two or more varieties (or 'incipient species'), which are then converted into species in turn producing further species[57] 'like the branching of a great tree from a single stem' (Darwin, 1985, p. 321).

This 'web of affinities' includes life and death, whether this is 'budding' life reproducing itself, or 'dead and broken branches' representing extinct species:

> The affinities of all the beings of the same class have sometimes been represented by a great tree […]. The green and budding twigs may represent existing species; and those produced during each former year may represent the long succession of extinct species […]. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear all the other branches; so with the species which lived during long-past geological periods, very few now have living and modified descendants […]. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever branching and beautiful ramifications (Darwin, 1985, pp. 171-2).

The image of the tree is a useful one as it can incorporate the living branches with the dead branches. The dead branches show where the living ones have come from and the living ones show the present results of past transformations. This is life and death in equal balance, as equal partners in the creation process. This mix of life and death can be seen in the words used from the passage above, such as 'green and budding', 'extinct', 'existing', 'produced', 'flourished', 'grown', 'survive', 'bear', 'lived', 'vigorous', 'branch out and overtop', 'feebler' and 'dead and broken'. This argument for an organic Nature forever recreating itself is repeated again and again throughout the *Origin*. All the parts of Nature through their relationships and influences create life and death through modifications to maintain survival and continued reproduction. Central to this is 'connection' between the parts making up the 'grand system':

> We can understand how it is that all the forms of life, ancient and recent, make together one grand system; for all are connected by generation (Darwin, 1985, p. 342).

[57] This is not to suggest that species have been forever creating further species with the number of species getting larger and larger. Natural selection means that those species that are the most successful through their modifications will survive and multiply, but those that are not successful will go into decline and eventually become extinct. So with increase, there is also decrease.

Darwin also uses the image of an 'entangled bank' to express the tension and mutual relationships between the life forces in Nature. On one of his walks Darwin noticed how a bank was filled with competing life, consisting of bushes, plants, snails and birds. This concept of the entangled bank and its entangled relationships is spelt out in the very last paragraph of the *Origin*:[58]

> It is interesting to contemplate an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent on each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth with Reproduction; Inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the external conditions of life, and from use to disuse; a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less-improved forms. Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved (Darwin, 1985, pp. 459-60).

This last paragraph articulates the concept of organic Nature on two levels. First on a simple level, it describes a bank in nature overgrown with bushes providing a habitat for wildlife all competing with one another in various ways yet furthering life: worms breaking up the earth helping plants grow but at the same time providing a source of food for the birds. All species in Nature are in relation to their habitats and each other form a unified whole. Through their adaptations to each other and their environment they shape the colour and texture of their existence, whether they are competing against each other or working together to create a mutually beneficial state of Nature. This is Humboldt's unified Nature. But at another more complex level, the concept of organic Nature is also the interrelationship of the laws of Nature that make this possible: namely, 'Growth', 'Reproduction', 'Inheritance', 'Variability', 'Ratio of Increase' leading to a 'Struggle for Life'[59], and, consequently, 'Natural Selection entailing Divergence of Character and

[58] This last paragraph of Darwin's *Origin* is 150 years before its time in summing up modern ecology as well as the central importance of evolution in the understanding of life and death in Nature. With these points in mind there is indeed a 'grandeur in this view of life'.

[59] When discussing Darwin's language of 'struggle' and 'competition', it is worth considering Karl Marx's view, in addition to Humboldt's view of organicism, that what Darwin discovers in Nature and informs his theory of natural selection is a mirror image of what exists in society, namely, capitalism: 'In 1862, Karl Marx, in a letter to his collaborator Friedrich Engels, wrote: 'It is remarkable how Darwin recognises among beasts and plants his English society with its division of labour,

Extinction of less improved-forms' (Darwin, 1985, pp. 459-60). These constructs that make up Darwin's theory of natural selection form an interrelated chain, each link being a part of the whole, collectively and necessarily creating the power or force of Nature through its core forms or archetypes. There is difference and diversity between the species and the individuals that make up the species, and there is difference and tension between the laws, yet they are all 'dependent on each other in so complex a manner' (Darwin, 1985, pp. 459-60). There is an intricate, finely-balanced tension between divergence and extinction, between life and death; an increase in life on one side, creating a decrease on the other.

Viewing Nature as an organic whole made up of its parts creates the view of a single reality. There are no hidden mechanisms creating Nature or its laws *outside* Nature. Any laws or mechanisms are parts of Nature, and, as such, contribute to making up the whole. The next thesis-section examines the concept of One Reality Nature, in which no external power is required to explain Nature's laws.

1.04 Humboldt's One Reality Nature

Humboldt's oneness of Nature can be seen in *Cosmos.*[60] In this work he captures every aspect of natural science in the whole universe. Humboldt used the term 'Cosmos' to combine the physical laws of the universe with the terrestrial world of biology and chemistry and in this sense 'Humboldt's cosmology brought spirituality down to earth' (Sachs, 2007, p. 75).[61] Humboldt wanted his readers to recognise that despite the difficulty of discovering the laws of biology compared with the mechanical sciences, there was a certain order in the terrestrial and celestial realms and that just in the same way as the earth and sky were one, so too were human beings a part of this union. In his Berlin lectures, Humboldt wanted his audience to be freely 'astonished' by the Cosmos, thereby creating a society free from authoritarianism and Christian orthodoxy. It is important to mention Emerson in this context as there is evidence to show that Humboldt got the concept 'Kosmos' from Emerson (see footnote 61). In his book *Nature*, in 1836, Emerson

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competition, opening up of new markets, 'inventions', and the Malthusian 'struggle for existence'. It is Hobbes' 'bellum omnium contra omnes' ['the war of all against all'] (Radick, 2003, p. 143). However, Marx and Engels saw Malthus as 'a bourgeois fraud' as they believed that it was the political system rather than natural laws that created poverty and prevented progress (Young, 1985, p. 53). Marx sent Darwin a copy of his *Das Kapital* in 1873 with the inscription 'Mr. Charles Darwin on the part of his sincere admirer Karl Marx', but it remained uncut and unread (Browne, 2003, p. 403).

[60] Published in five volumes between 1845 – 62.

[61] Humboldt's use of the word 'Cosmos' came from Emerson who took it from the Greek meaning 'celestial bodies'. Emerson lost his religious faith after the death of his wife, Ellen, in 1830 but regained his spirituality through Nature (he read Humboldt's *Personal Narrative*) (Sachs, 2007, p.75).

developed his form of transcendentalism in which Man can regain his loss of spirituality through the contemplation of Nature in solitude (Sachs, pp. 73 – 4). Like Emerson, both Humboldt and Darwin were aware how Nature leaves evidence of its work in rock and species, and that Man as he makes his own journey of life through Nature is able to view his own past connections and leave a further trail both individually and as a species. For both Man and Nature this is the history of Nature or 'Natural History'. Emerson[62] aptly describes this when he says:

> We walk on molten lava on which the claw of a fly or the fall of a hair makes its impression, which being received, the mass hardens to flint and retains every impression for evermore […]. Is it not better to intimate our astonishment as we pass through this world if it be for a moment ere we are swallowed up in the yeast of the abyss? I will lift up my hands and say 'Kosmos' (Ferguson, 1964, 4:16; cited by Sachs, 2007, p. 74).

This oneness can be seen as both the impression and the thing making it, both contributing to its history. In Darwin this unity can be seen in both the physical instance of an individual tree and its history through the line of its species, but also in the metaphorical tree of life representing the development of all species in space and time, both past and present. For Humboldt this oneness or 'Cosmos' is about 'mutual dependence and connection' and about the mysterious occult relations that exist between its parts. The haunting melody of Humboldt's favourite *capirote* bird on the Canary Islands would not be possible without a particular plant the bird lives off which only grows on volcanic soil at a particular altitude (Sachs, 2007, p. 76).

Humboldt sums up this communion with Nature as 'order and harmony' and the contrast 'between the narrow limits of our own existence' and infinite Nature. This goes to the heart of Darwin's theory of natural selection – these laws are natural laws developed by Nature and in harmony with Nature. They include the development and the demise of species through selection, thus representing both infinity and 'the narrow limits of our own existence' both individually and as a species. This unity expressed by Humboldt is a hint of a theme later taken up by Darwin:

> The earnest and solemn thoughts awakened by a communion with nature intuitively arise from a presentiment of the order and harmony pervading the whole universe, and from the contrast we draw between the narrow limits of our own existence and the image of infinity revealed on every side, whether we look upward to the starry vault of heaven, scan the far stretching plain before us, or

[62] When Emerson lifted up the tomb of his wife and saw her ashes, he realized the importance of contemplating Nature as we make our way through life (that is, by being 'astonished' by it) Sachs, 2007, p. 74).

seek to trace the dim horizon across the vast expanse of ocean (Humboldt, 1997, p. 25).

1.05 Darwin's One Reality Nature

Darwin finds no evidence of a Creationist explanation (of Divine creation) in Nature. The only explanation is that of natural selection which is the product of Nature's own creation. For Darwin, rudimentary, atrophied or aborted organs do not offer an explanation for the Creationist view of Nature as this does not give an explanation but only restates fact (Darwin, 1985, p. 430). The evidence of Nature recreating itself can be seen in living species as well as their fossilised remains; as in a stick of rock the inner writing runs through time and is the history of time, the history of Nature. The rudimentary, atrophied or aborted organs are the traces of this history.

In support of this, Darwin gives examples of snakes with rudimentary pelvis and hind limbs, beetles with mere rudimentary membranes as wings, and teeth in the upper jaws of unborn calves. When reading these examples, it must be remembered that the argument for there not being a Creator having a hand in the creation or development of species is not a theological debate about the existence of God. It is an argument stating that the laws of Nature exhibited through natural selection are forces within Nature; that Nature is both creator and product. It is an argument presenting a unity of Nature which is organic; a unity in which all the parts are interrelated and make up the whole; a Nature which is one reality. A number of Romantic[63] British poets before Darwin have taken up this theme, such as Samuel Taylor Coleridge and William Wordsworth. For example, in Coleridge's *The Eolian Harp* [1795], the lines, ' And what if all of animated nature / Be but organic Harps diversely framed, / That tremble into thought, as o'er them sweeps/ Plastic and vast, one intellectual breeze, / At once the Soul of each, and God of all?' (Coleridge, 2013, lines 45 - 9) reflect the idea of Nature being composed of music created by a collection of 'organic Harps', 'one intellectual breeze', one Soul or God (and like Humboldt and Darwin), gaining an understanding of the essence of Nature through the imagination (although unlike Humboldt, Coleridge's vision is implicitly Unitarian, and hence inspired by religious thought). In Wordsworth's 'Love of Nature Leading to Love of Mankind' (1805)[64], the

[63] The concept of Romanticism and the influence the Romantics may have had on Darwin is examined in Chapter Two. However, this thematic link to Wordsworth's concept of 'one reality' could be used to support the claim that both Humboldt's and Darwin's notion of 'one reality Nature' is Romantic.

[64] This poem is part of *The Prelude* (Wordsworth, 1970, Book viii). It was unpublished during Wordsworth's life-time, and was not read by Darwin during his formative youth.

poem shows how, in different ways, the external Nature experienced by Man and his own nature are one reality as this is experienced through his senses (the object experienced and the sense of experiencing it through the senses makes it one – an unknown Nature does not exist independently of the observer's senses as it can do in Kant).[65] This oneness with Nature could also be seen as similar to Humboldt's aesthetic experience of Nature through the senses, and similar to Darwin's experience of Nature through his 'imagination'. One section of Wordsworth's poem reminds the reader of Plato's 'The Simile of the Cave' in *The Republic* (Plato, 1971, pp. 278 – 286) in which the prisoners (imprisoned since childhood) cannot distinguish the shadows from the objects in reality. As Wordsworth puts it:

> Substance and shadow, light and darkness, all
> Commingled, making up a Canopy
> Of Shapes and Forms and Tendencies to Shape
> That shift and vanish, change and interchange
> Like Spectres, ferment quiet and sublime (Wordsworth, 1970, Book viii, lines 719 – 723).

Just as a traveller learns about Nature and life through his experiences (and needs to distinguish between the real and the unreal, the substance and the shadows), Man (as a traveller through life) interprets Nature through his senses, and as he matures in time he learns (through knowledge gained through 'past and present') to understand the individual characteristics of Nature and the interconnected whole. Like Darwin and Humboldt who discover the power of Nature creating itself, so too with Wordsworth who (looking back at his youth) finds the power of Nature in things and in Mankind:

> I sought not then
> Knowledge; but craved for power, and power I found
> In all things; nothing had a circumscribed
> And narrow influence; but all objects, being
> Themselves capacious, also found in me
> Capaciousness and amplitude of mind (Wordsworth, 1970, Book viii, lines 754 - 759).

Although on the one hand Wordsworth can be seen to regard shepherds and country folk (common man) as the closest to Nature and therefore nobler than those of the cities having developed fewer vices (as with Rousseau's 'noble savage'), he is nevertheless

[65] This independence of the thing-in-itself, independent of 'necessity' and 'appearances', is expressed by Kant in his *Critique of Pure Reason*[1769 – 1780] as follows: 'Inasmuch as it is *noumenon*, nothing *happens* in it; there can be no change requiring dynamical determination in time, and therefore no causal dependence upon appearances. And consequently, since natural necessity is to be met with only in the sensible world, this active being must in its actions be independent of, and free from all such necessity. No action begins *in* this active being itself; but we may yet quite correctly say that the active being *of itself* begins its effects in the sensible world' (Smith, 1970, p. 469).

inspired by the experience of London which can both develop knowledge in the individual and create a unity of humanity. Just as Darwin saw a unified Nature in which all races of Man came from the same origins and should therefore be treated with the same humanity, so too did Wordsworth see 'the unity of man' (through his inspiration from the people of London) with a single 'spirit', a single 'moral sense', a 'soul' that is a part of God breathing through the whole of Nature:

> Of that great City, oftentimes was seen
> Affectingly set forth, more than elsewhere
> Is possible, the unity of man,
> One spirit over ignorance and vice
> Predominant, in good and evil hearts
> One sense for moral judgements, as one eye
> For the sun's light. When strongly breath'd upon
> By this sensation, whencesoe'er it comes
> Of union or communion doth the soul
> Rejoice as in her highest joy: for there,
> There chiefly, hath she feeling whence she is,
> And, passing through all nature rests with God (Wordsworth, 1970, lines 824 - 836).

However, unlike Wordsworth's form of God breathing life through Nature or 'Nature [resting] with God', Darwin questions God's single-handed creation of Nature by showing that species-change is a slow and gradual process and that therefore it is impossible for a God to have created all species at the same time. This is demonstrated by fossil remains being more closely related the closer their formations are to each other; the more distant they are from each other the more they will differ, showing that they have changed over time (Darwin, 1985, p. 440).

These changes indicate the need for species to modify themselves to maintain an advantage in a world in which existence is a struggle. But they 'have changed slowly and in a graduated manner' as change is a slow step-by-step process. Natural selection demonstrates that the slightest advantage of one species over another leads to a successful increase in one and a decrease and extinction in the other. Dominant species become more divergent and the less dominant become extinct. This shows that existence is not static and that Nature could not have been made by a God all at the same time (Darwin, 1985, p. 444).

Darwin refers to the occasional stripes on a horse explaining that this is due to the species having descended from a striped progenitor. This demonstrates change over a long period of time and shows how several species can branch off from a common progenitor. Fossil

remains do not reflect special creations by God but reflect descendants that existed before the first Silurian[66] system of beds (Darwin, 1985, p. 458).

Darwin's view that the production and extinction of inhabitants, both past and present, is due to 'secondary causes' rather than a Divine first cause accords with the empirical view that Nature is both product and creator.[67] Fossils indicate the chain of descent running through Nature rather than pointing to a realm beyond Nature. The existence of fossils of intermediate groups found between formations demonstrates their intermediate positions in the chain of descent indicating their descent and the descent of extinct species from common parents (Darwin, 1985, p. 448). Also the existence of allied species from two different areas shows that they must have come from the same parents. This does not support the theory of creation (Darwin, 1985, p. 450) and again reflects the notion of Nature through the wholeness of its parts (Nature creating itself), its interconnected diversity and mutual interdependence of struggle for existence and survival. In a sense, this going back to the same beginnings is a paradox since it is expressed as the opposite of diversity; yet going forward through space and time in the face of struggle creates the development of diversity and adaptation (as well as extinction). Aesthetically[68] this diversity is represented in the sketches made by naturalists and reproduced in their plates;[69] the images represent an intimate union and relationship between the observed and the observer, between the intellectual ideas of the naturalist and the species and individuals that make up the tapestry of Nature. The sketches and experiences of Nature capture its wholeness and in so doing bring out the spirit of the relationship between naturalist and Nature (its inner secrets and its outer appearances).

Dispensing with the need to talk about first causes enabled Darwin to look at Nature as a self-contained entity. This enables Nature to be viewed as both mechanistic (in that Nature

[66] The Silurian period (443.8 - 419.2 million years ago) was when the first fish and land plants formed alongside the formation of mountains and new land areas.
[67] Darwin does not actually personify the laws of natural selection as a 'creator' but his argument is that if Nature is both creating species through its laws and at the same time is the product of its laws, it could be seen as the personification of a God-like creator (but yet not a God).
[68] Aesthetically rather than visually since the sketches and plates represent the interrelationship of the viewer and the object. The representations are not merely factual but also represent how the subject perceives Nature using the Humboldtian Method.
[69] The first permanent photograph was not made until 1827 by Niépce (Bellis, 2013, p.1). Naturalists in the early nineteenth century, therefore , had to send specimens back to their respective countries as proof of what they had observed. However, the colour of pressed plants would fade and specimens would get damaged. Taking sketches and writing notes of their observations was at the time the only way of making a permanent record, and this information was important for the lithographers making the plates for the naturalists' publications.

conforms to its own laws) and telic or purposive (in that Nature creates its own laws). This is something which is examined in the next section of the thesis.

1.06 The Forces of Nature in Humboldt

One of the fascinations that drew naturalists and chemists in the late eighteenth century towards the desire to discover the secret forces of Nature was the discovery of electricity. By the time Humboldt was 26, in 1795, he was already very interested in the experiments in electricity conducted by Galvani and Volta. Galvani had demonstrated that you could make frogs legs convulse by applying two different metals to the muscles and nerves of the leg. Galvani believed this was because the electricity was contained in the nerves, calling it 'animal electricity', publishing his experiments in *Commentary on the Effect of Electricity on Muscular Motion* (1791). He believed 'animal electricity' was an additional form of electricity to natural electricity such as lightning and 'artificial electricity' such as friction (static electricity). Volta (who coined the term 'galvanism'), on the other hand, believed that the electricity was created by the contact between the two metals. Humboldt conducted electrical experiments on himself but came up with his own hypothesis that 'the metals intensified the convulsions but were not the cause of them' (Botting, 1973, p. 33 and McCrory, 2010, p. 41). Humboldt published the results of 4,000 experiments in his *Experiments on the excited muscle and nerve fibre with conjectures on the chemical process of life in the animal and vegetable world* (1797). But his hypothesis was discredited when Volta published his own experiments showing how electricity could be produced without any tissue by putting two metals together with a damp cloth or liquid (Botting, 1973, p. 33). The experiments Humboldt conducted on himself show how intensely he experienced the forces of Nature and the extreme measures he took in order to experience them regardless of pain, or risk to life or limb. One particular experiment is worth quoting at length to make this point:

> I raised two blisters on my back, each the size of a crown-piece and covering the trapezius and deltoid muscles respectively. Meanwhile I lay flat on my stomach. When the blisters were cut and contact was made with the zinc and silver electrodes, I experienced a sharp pain, which was so severe that the trapezius muscle swelled considerably, and the quivering was communicated upwards to the base of the skull and the spinous processes of the vertebra. Contact with silver produced three or four single throbbings which I could clearly separate. Frogs placed upon my back were observed to hop. Hitherto my right shoulder was the one principally affected. It gave me considerable pain, and the large amount of lymphatic serum produced by the irritation was red in colour and so acrid that it caused excoriation in places where it ran down the back. The phenomenon was so extraordinary that I repeated it. This time I applied the electrodes to the wound on

> my left shoulder, which was still filled with a colourless watery discharge, and violently excited the nerves. Four minutes sufficed to produce a similar amount of pain and inflammation with the same redness and excoriation of the parts. After it had been washed my back looked for many hours like that of a man who had been running the gauntlet (cited by Botting, 1973, p. 34).[70]

This experiment shows Humboldt's almost obsessive desire to experience the raw forces of Nature within his very own body so that he is almost indistinguishable from them. It is as if by experiencing the pain, the objective cause and the subjective affect become one. The pain is not described in a personal way but in a way that is defined objectively, as if it were a part of the natural force observed by him through seeing the muscles swell. The number of throbs are counted rather than described as horrible. Although his shoulder was in pain he is more interested in the production of the serum. He even repeated it despite the pain. The use of the frogs hopping on his back underlines this almost mad obsession with wanting a direct, unfiltered communion with the secret forces of Nature. The experiments of Galvani and Volta undoubtedly inspired a fascination in the chemical processes of life and this in turn made him want to study plant and animal life and what their similarities and differences were (McCrory, 2010, p. 41). Humboldt was familiar with Priestley's 'phlogiston theory'[71], and, especially, Lavoisier's[72] work, having read his *Traité élémentaire de chimie* (1789) three times, and this added to his enthusiasm in the study of the hidden forces of Nature[73] (McCrory, 2010, p. 53). Darwin would have been familiar with these experiments not only through his reading of Humboldt, but also through the work and life of his grandfather Erasmus Darwin, who, through his membership of the Lunar Society, was an ardent follower of Galvanism (Uglow, 2003, pp. 428 – 9). Although Charles Darwin declared that he had not been influenced by his grandfather, Erasmus Darwin had an influence 'on the Romantic poets [such as Wordsworth, Coleridge and Shelley] and the cultural paradigm of Romanticism from which Charles Darwin's intellectual life was formed' (Page, 2012, p. 6).

[70] Unfortunately no references are given for this quote.

[71] According to this theory, Phlogiston was a substance created during combustion.

[72] Lavoisier repeated Priestley's experiments and discovered that the active 'principle' of the atmosphere was oxygen and was present in both the processes of combustion and respiration, i.e. oxidisation.

[73] Humboldt gave demonstrations of Galvanism on the nerves of frogs whilst in South America. He was also amazed to see the electric eels that stunned and resulted in the drowning of horses used to fish them. He found it 'remarkable that these animals with electromotive organs are found not in the air but in a fluid that conducts electricity […]. Torpedoes and electric eels cause a twitching of the tendon in the muscle touched by the electric organ, which reaches one's elbow. With each stroke you feel an internal vibration that lasts two or three seconds, followed by a painful numbness.' (Humboldt, 1995, pp. 170 – 1).

These measurements of the forces of Nature in Humboldt's own body are again referred to in his *Personal Narrative* when he ascends Mount Chimborazo, the highest ascent up a mountain anyone had made at that time. He had no special clothing or equipment as climbers would have today. He had to climb along narrow ledges with bottomless depths – one false move and he would fall thousands of feet. At the same time he experienced the tremors of the erupting volcano and took measurements with his instruments on the lip of the crater. On 23 June 1802 he climbed to a height of 20,702 feet above sea-level, experiencing nausea, giddiness, breathlessness, bleeding of the lips and gums and bloodshot eyes:

> But in the same individual they constitute a kind of gauge for the amount of rarefaction in the atmosphere and the absolute height he has reached (cited by Botting, 1973, p. 153).[74]

As the above experiments on Humboldt's own body indicate, the natural forces and processes of Nature can create both pain and amazement. So too can the experience of jungles create the feeling of disorientation and beauty. The wonders of Nature with all its diversity, whether this be of species or of climate and terrain, create the image of a Garden of Eden, with both its beauties and life-threatening dangers; whether this be the amazing variety of plants, colours, aromas and wildlife, or the dangers of poisonous snakes, crocodile-infested rivers or clouds of mosquitos (McCrory, 2010, p. 74). The forces of Nature are not all for good and its beauty is a veneer covering a darker side:

> You find yourself in a new world, in a wild, untamed nature. Sometimes it is a jaguar, the beautiful American panther, on the banks; sometimes it is the hocco (Crax alector) with its black feathers and tufted head, slowly strolling along the sauso hedge. All kinds of animals appear, one after the other. 'Es como en el paraíso' ('It is like paradise') our old Indian pilot said. Everything here reminds you of that state of the ancient world revealed in venerable traditions about the innocence and happiness of all people; but when carefully observing the relationships between the animals you see how they avoid and fear each other. The golden age has ended. In this paradise of American jungles, as everywhere else, a long, sad experience has taught all living beings that gentleness is rarely linked to might (Humboldt, 1995, pp. 178-9).

This mixture of innocence and viciousness in which Nature can be 'at once wild and tranquil, gloomy and attractive' is a reminder that although the world of the jungle is different from our own, it 'is where we come from' (Sachs, 2007, pp. 62 – 3). Humboldt not only experienced this darker side in the form of mosquitoes, dangerous seas where he nearly lost his life or even the smoking volcanoes that had already taken many lives, but in the way Man treated Man in the form of slaves:

[74] Unfortunately no reference is given for this quote.

> It is distressing to think that still today in the Spanish West Indies slaves are branded with hot irons to identify them in case they escape. This is how one treats those 'who save other men from the labour of sowing, working in the fields and harvesting' (Humboldt, 1995, p. 67).

Both Humboldt and Darwin abhorred slavery and their voices echo Rousseau's when he says [in 1762] that 'Man was born free, and everywhere he is in chains' (Rousseau, 2008, p. 45) and 'To renounce our freedom is to renounce our character as men, the rights, and even the duties, of humanity' (Rousseau, 2008, p. 50). Humboldt learned from Rousseau[75] that travelling, especially in South America, was the best way to 'shake off the yoke of national prejudices' (Wilson, 1995, p. xlix). Darwin could understand the struggle between different species of animal but not between Man and Man, as his moral upbringing,[76] learning taxidermy from a 'blackamoor' whilst at Edinburgh University, travelling with native guides and seeing first-hand the appalling treatment of slaves in South America, had taught him to regard all men as *potentially equal*;[77] for Darwin, regardless of race, all men came from a common progenitor.[78] Later in life when writing the first volume of *Cosmos*

[75] From reading Rouseau's *A Discourse on Inequality* (1755) in which he says that the book of Nature 'never lies' (Wilson, 1995, p. xlix).

[76] His whole family and his wife Emma's Wedgewood family were actively against the slave trade. The Wedgwoods gave financial support to the Anti-Slavery Society (Desmond and Moore, 2010, pp. 60 - 1).

[77] Although Darwin can historically be regarded as a man of his time, by today's moral standards a certain degree of racism and sexism can be detected in his writings. For example, sexism can be seen in the *Descent of Man* when comparing the mental powers of Man and Woman: 'Woman seems to differ from man in mental disposition, chiefly in her greater tenderness and less selfishness; and this holds good even with savages […]. Woman, owing to her maternal instincts, displays these qualities towards her infants in an eminent degree […]. Man is the rival of other men; he delights in competition, and this leads to ambition which passes too easily into selfishness […]. He may be said to possess genius – for genius has been declared by a great authority to be patience; and patience, in this sense, means unflinching, undaunted perseverance […]. These […] will have been developed in man, partly through sexual selection […]. *Thus man has ultimately become superior to woman*'[emphasis mine] (Darwin, 2004, pp. 629 - 31). Racism can be seen in *The Descent of Man* when Darwin expresses the view that some races such as the 'negro' or 'Australian' are nearer to the ape than 'man in a more civilized state', and that therefore there is a hierarchy of races although they all belong to one species and all come from the same origins: 'At some future period, not very distant as measured by centuries, the civilised races of man will almost certainly exterminate, and replace, the savage races throughout the world. At the same time the anthropomorphous apes, as Professor Schaaffhausen has remarked, will no doubt be exterminated. The break between man and his nearest allies will then be wider, for it will intervene between man in a more civilised state, as we may hope, even than the Caucasian, and some ape as low as a baboon, instead of as now between the negro or Australian and the gorilla' (Darwin, 2004, pp. 183 – 4; also Lyons, 2013, p. 1).

[78] 'All the races agree in so many unimportant details of structure and in so many mental peculiarities, that these can be accounted for only by inheritance from a common progenitor; and a progenitor thus characterised would probably deserve to rank as man' (Darwin, 2004, p. 678). That all men and women were *potentially equal* did not mean that Darwin regarded them as equal in his lifetime; only that they *could* rise up to develop *his* and *his society's* definition of what it was to be a cultivated individual. As summed up by Desmond and Moore: 'For it was *his* class Darwin was talking to: 'savages' and the 'uneducated' knew what they liked but lacked any higher aesthetic refinement.

(1845), Humboldt reiterates the assumption that all men are born equal but cultivate themselves according to where men find themselves:

> While we maintain the unity of the human species, we at the same time repel the depressing assumption of superior and inferior races of men. There are nations more susceptible of cultivation, more highly civilized, more ennobled by mental cultivation than others, but none in themselves nobler than others. All are in like degree designed for freedom (Humboldt 1997, p. 358).

Humboldt acknowledges that not all men treat each other as equal and that therefore humanity is not unified but he believes that men should work together to try to achieve it. At the end of *Cosmos* Humboldt quotes directly from his brother Wilhelm the goal of achieving a 'common humanity':

> It is that of establishing our common humanity – of striving to remove the barriers which prejudice and limited views of every kind have erected among men, and to treat all mankind, without reference to religion, nation, or colour, as one fraternity, one great community […]. This is the ultimate and highest aim of society, identical with the direction implanted by nature in the mind of man toward the indefinite extension of his existence (Humboldt 1997, p. 358).

'The direction implanted by nature in the mind of man' is part of that force in Nature that determines the perpetuation of Man's existence. For this to work Man needs to listen to the forces of Nature that govern his existence to ensure that his actions mirror them. To do this he needs to understand his 'common humanity' and that Man is part of 'one great community'.[79] There are many paradoxes here concerning the forces or laws of Nature that determine his nature. On the one hand, as Darwin shows through his 'tree' of life, all races of Man come from a common progenitor.[80] In this respect, despite adapting to their own environments, they are all equal in terms of their 'common humanity'. Yet, as in the animal world, there is that darker side of humanity in which Man fights against Man to take advantage, and slavery is an example of this. Although Man is mentally aware of his

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Again, he was intimating the steps of evolutionary ascent through savagery towards a Victorian gentleperson's taste for the beautiful, whether in landscapes, music or adornment' (Desmond and Moore, 2010, p. 374). It is also difficult for society today to comprehend how a Victorian gentleperson's tastes could include support for 'humanity towards other peoples and species' yet at the same time be 'disparaging the 'lower' races (even as colonists displaced or exterminated them) (Desmond and Moore, 2010, p. 370).

[79] Humboldt practised what he preached. On the ascent of Chimborazo, he refused to be carried by the *cargueros*, the Indian man-carriers or human mules. Despite having injuries to his feet, he preferred to suffer himself than to see others suffer (Botting, 1973, p. 149).

[80] Darwin's breeding experiments with pigeons showed they came from a common stock and that the different pigeons were different varieties rather than different species. By analogy Darwin believed the same applied to human races as they could interbreed without causing sterility as is generally the case between different species. As summarised by Desmond and Moore (2010, p.258): 'The pigeon family tree became a Darwinian paradigm and a perfect metaphor for mankind's family tree'.

actions, his freedom to choose can be used to distort the facts to justify actions to his advantage. In the case of natives their 'primitive' cultures are demonstrated as proof that their cultures are 'inferior' to European civilizations, giving the Europeans the right to use them as slaves. Even in the 1820s in Jamaica and Brazil black people were regarded as a separate species 'merely an intermediate step between man and the brute creation' (Desmond and Moore, 2010, p. 10). This view was also reinforced by 'phrenology' in which the size of a person's head was said to determine their intelligence, meaning that education played little part in the development of a person's mental abilities.[81] Yet naturalists such as Humboldt and Darwin and political reformers such as William Wilberforce demonstrated that there was also a moral and enlightened dimension to Man's reasoning.[82] Just like Darwin's 'web of affinities', Humboldt believed in 'the ties of consanguinity', that is, the descent from the same ancestor. These ties link together those races speaking different languages with different cultures. Humboldt wanted his readers to look beyond those differences 'to discover some of those family features by which the ancient unity of our species is manifested' and to see unity in diversity (Sachs, 2007, p. 67). Humboldt expresses this view of 'the possibility of common descent' in *Cosmos*:

> Man every where becomes most essentially associated with terrestrial life. It is by these relations that the obscure and much contested problem of the possibility of one common descent enters into the sphere embraced by a general physical cosmography (Humboldt, 1997, p. 351).

Both Humboldt and Darwin shared an understanding of what Nature's dark secrets meant, both in terms of the workings of Nature and their own personal lives. They not only understood through their travels what was 'distant, foreign, different and abnormal' but also understood this in terms of being on the margins of society. For Humboldt, he was forever on the move like an exile, for Darwin, keeping his ideas secret and avoiding publication for twenty years, a kind of literary exile (Sachs, 2007, p. 63).

[81] George Combe was a leading exponent of phrenology.

[82] Except that there is a paradox here in that in his notebooks during the *Beagle* voyage, but not published in his *Journal*, he finds it quite acceptable for Indians to be butchered in warfare if it means a more progressive civilization takes over from a more primitive one, as in the Cape and in Australia. This indicates the extension of the Malthusian principle to Man in seeking perfection by gaining advantage over other species, in this case through brute force and warfare: 'If this warfare is successful, that is if all the Indians are butchered, a grand extent of country will be gained for the production of cattle: & the vallies of the [Argentine rivers] will be most productive in corn' (*Diary,* 180 – 81; Barta, 'Mr Darwin's Shooters', 118; cited in Desmond and Moore, 2010, p. 148).

1.07 The Forces of Nature in Darwin

For Darwin, this tension between the internal and external forces is expressed in the struggle for existence and the destruction of life. This 'struggle' represents the interrelationship of all the parts that make up Nature whether this is the competition between species or the conditions that are favourable or unfavourable to them, such as drought, flood, different terrains, abundance or shortages of food types necessary for survival. All these factors are interrelated and make up the organic whole of Nature. Humboldt was perhaps the first ecologist (in today's language) in understanding these relationships, but he also had an understanding of Man's aesthetic appreciation of the beauty of Nature as well as his ability to have a destructive influence on it. As discussed earlier, he was amazed by the difference and variety of Nature and its habitats from region to region, but also Man's impact on Nature through agricultural development and Man's impact on Man through slavery. Like Humboldt, Darwin was ahead of his time in recognising the power of *intra-specific* competition (which is a dominant theme in modern ecology that can be expressed in an animal's struggle against drought), as well as *inter-specific* competition (that can be expressed by different species of plant struggling to cover the ground) (Darwin, 1985, p. 116). It is also expressed by the Malthus doctrine in which competing numbers for limited supplies of food affects survival of individuals and species (Darwin, 1985, p. 117).

Although a balance is maintained through the laws of compensation, a constant struggle ensues between the internal and external forces in Nature to maintain it and this can be seen in the struggle of species to reproduce in order not to become extinct. In particular it can be seen in the destruction of eggs and young. Darwin sees this destructive element of Nature as quite violent, as if its face has been hit by thousands of 'sharp wedges' again and again:

> The face of Nature may be compared to a yielding surface, with ten thousand sharp wedges packed close together and driven inwards by incessant blows, sometimes one wedge being struck, and then another with greater force (Darwin, 1985, p. 119).

But when reading this description of Nature being hit by 'wedges', it must be remembered that Nature is attacking itself; it is Nature's internal and external forces that determine natural selection that thereby maintain Nature's own survival. The 'wedges' in a masochistic kind of way help maintain the balance between the species, helping the most successful survive. This also supports the concept of Nature as one reality (as already

outlined in the section on 'one reality nature') in which Nature is both creator and product, that is, in Spinoza's terminology, 'nature natured' (Nature as product) and 'nature naturing' (Nature as infinitely productive, infinitely becoming).[83] Darwin had already seen examples of the violent forces of Nature time and time again on his sand walk at Down House past the 'entangled bank', and this contributed to his reflection on the forces of Nature. In addition to his analysis of the data and specimens collected during his voyage on the *Beagle*, Darwin also conducted experiments in his own garden. One such experiment was on seedlings in his Down House garden, showing that the destruction of most was due to predators such as slugs and insects, indicating that the struggle for survival is not always due to the competition between species or the struggle to obtain food (Darwin, 1985, p. 120). In viewing this organic whole of Nature with its interrelated parts, the human mental understanding of it is necessarily included as an integral part just through the process of thinking about it. This can be seen in the use of words that Darwin uses to describe the struggle for survival: 'destroyed', 'enemies', 'choking' and 'prey' (Darwin, 1985, p. 120). All these words indicate a human perspective or interpretation of Nature experienced by Man, representing a personal as well as a scientific narrative of the results of his experiment.

According to Darwin, the inner structure of organic beings is determined by their archetypal forms[84] passed down from 'the ancient progenitor' and the laws of Nature, such as natural selection, and the laws of compensation. As later discussed in the chapter dealing with the concepts of 'Mind' and 'Archetype', these forces or laws can only be seen and understood in the mind's eye through reflection. The sense experiences of Nature do not always appear to provide a direct experience of Nature's 'inner kernel'; the senses or the ideas are experienced as if Nature is providing a veil over its pure Nature making it appear hidden. Yet the mind's eye does provide an insight into the secret forces of Nature if it is seen as organic and made up of the interrelatedness of all other organic beings:

[83] See Richards, 2002, p. 211 and Miller, 2009, p. 106 for their discussion of Spinoza's terms *Natura naturans* and *Natura naturata*.

[84] As expressed by Darwin, 'If we suppose that the ancient progenitor, the archetype as it may be called, of all mammals, had its limbs constructed on the existing general pattern, for whatever purpose they served, we can at once perceive the plain signification of the homologous construction of the limbs throughout the whole class' (Darwin, 1985, p. 416). Darwin takes his idea of archetypes from Richard Owen. Darwin cites Owen's 1849 *'Nature of Limbs'*: 'The archetypal idea was manifested in the flesh under diverse modifications, upon this planet, long prior to the existence of those animal species that actually exemplify it. To what natural laws or secondary causes the orderly succession and progression of such organic phenomena may have been committed, we, as yet, are ignorant'. Darwin, however, objected to Owen's view of a 'continuous operation of creative power' which he expressed in a paper given after the joint Darwin-Wallace paper in 1858 and implied that species were immutable (Darwin, 1985, pp. 58-9).

> The structure of every organic being is related, in the most essential yet often hidden manner, to that of all other organic beings, with which it comes into competition for food or residence, or from which it has to escape, or on which it preys (Darwin, 1985, p. 127).

Darwin's theory of natural selection is undoubtedly his best example of the hidden forces of Nature. His theory banishes the view of the sudden or 'special act of creation'[85] of species. Darwin's forces of Nature come from Nature and act upon Nature, and do not come directly from an external power. This inner law of striving to modify an organic being's structure to gain an advantage does not occur in isolation in Nature and is often achieved in tandem through the mutual support of other organisms. For example, flowers producing the most nectar get visited by the most insects, ensuring their pollination and fertility, and, likewise, insects take advantage of this for their own survival:

> Those individual flowers which had the largest glands or nectaries, and which excreted most nectar, would be oftenest visited by insects, and would be oftenest crossed; and so in the long run would gain the upper hand. Those flowers, also, which had their stamens and pistils placed, in relation to the size and habits of the particular insects which visited them, so as to favour in any degree the transportal of their pollen from flower to flower, would likewise be favoured or selected […] and those individuals which produced more and more pollen, and had larger and larger anthers, would be selected (Darwin, 1985, p. 140).

But natural selection does not just stop at producing one organism to provide that advantage. Through the 'physiological division of labour' of producing male and female organs, plants (as well as animals) are able to strengthen this process of producing the most efficient outcome of a species' survival. Importantly, Darwin demonstrates how this end result can be achieved through many intermediate steps leading up to this state of perfection (Darwin, 1985, p. 141).

Once this state of near perfection has been achieved (through producing the most efficient outcomes), Darwin can see no difficulty in imagining 'humble-bees' adapting their structures to enable them to visit red clover flowers to get the nectar, thus demonstrating the mutual dependency of red clover flowers and 'humble-bees':

> Hence, again, if humble-bees were to become rare in any country, it might be a great advantage to the red clover to have a shorter or more deeply divided tube to its corolla, so that the hive-bee could visit its flowers. Thus I can understand how a flower and a bee might slowly become, either simultaneously or one after the other, modified and adapted in the most perfect manner to each other, by the

[85] 'If we look at each species as a special act of creation, there is no apparent reason why more varieties should occur in a group having many species, than in one having few' (Darwin, 1985, p. 111).

> continued preservation of individuals presenting mutual and slightly favourable deviations of structure (Darwin, 1985, p. 142).

In having earlier discussed the concept of organic Nature in terms of the 'web of affinities', it should now be apparent that Darwin's theory of natural selection has its own 'web of affinities' with 'natural selection' forming the centre of its own web. Although Darwin principally uses the concept of the 'web of affinities' to refer to the genealogical relationship between the species, this thesis extends his use of the term to cover the 'web' of related laws making up his theory of natural selection. It can be argued that the natural law of natural selection, as already discussed, can point to both the past, genealogically in terms of nature's progenitor heritage, and to the future, teleologically in terms of self-improvement[86] (which can be understood reflectively or imaginatively as the 'chain of affinities'). At the same time there are ancillary natural laws that feed into the law of natural selection, as for example with the law of compensation previously mentioned (where the 'laws' are those laws governing the forces of Nature); at times they seem to be one and the same, but this is dependent on the degree of closeness Man can get to this knowledge of Nature through his limited direct empirical experience and his reflective experience. For the most part Man only experiences the forces and can only imagine what the laws might be.

The following are examples of what might be regarded as additional laws forming the 'web of affinities' surrounding his law of natural selection. The law that intercrossing increases vigour (regarded by Darwin as 'a general law of nature'): fertilisation between different varieties within species increases vigour but inbreeding between close varieties diminishes vigour and fertility (Darwin, 1985, p. 143). This is an example of the organic notion of Nature on an abstract level; abstract because Darwin is referring to assumptions about the interrelatedness of the constructs that make up the hidden laws of Nature. The law 'that no organic being self-fertilises itself for an eternity of generations' and 'that a cross with another individual is occasionally indispensable' is an assumption based on empirical

[86] Although 'self-improvement' strictly means no more than 'increasingly effective adaptation to the conditions', Darwin is suggesting that in his view the adaptations can only develop according to predetermined pathways that emanate from the archetypal forms. In this sense, rather like embryonic forms, they can be seen to develop teleologically according to pre-determined rule-governed behaviour. But perhaps in a stronger sense, these predetermined pathways are governed by archetypes that are striving to improve themselves because this is *necessary* for their survival (they have to adapt in order to survive) and in this sense natural selection could be seen to be teleological. Additionally this thesis is also suggesting that the development of the rule governed archetypes could be interpreted as *necessary* and that therefore the pathways of the archetypes that make up Darwin's 'Tree of Life' are teleological. The ends of each branch end up that way because their structures have predetermined, or programmed them, to do so.

evidence, but the law itself cannot be seen. Yet notions of 'vigour' and 'fertility' and the notion of what constitutes a variety enable the scientist to work out what may be a law operating behind the empirically perceived specimens that have been crossed. As Darwin admits, this assumption can only be regarded as a 'may be' as we are 'utterly ignorant […] of the meaning of the law'.

The same rule applies to hybrids. Crosses between different plant species tend to create sterile hybrids due to a disturbance in their reproductive systems. The concept 'disturbance' is a mental construct encompassing the interrelationship of variables affecting the development of a species (Darwin, 1985, p. 280). The concepts 'unnatural conditions' and 'unnatural crossing of two species', and even 'sterility', are abstract in that they are mentally created and are not physical entities as individual plants are. Yet they are important descriptions that help the scientist imagine what underlying variables may be at work, creating change, and, as such, help the construction of assumed laws to form an hypothesis about the forces of Nature. For Darwin the concept of sterile hybrids is an important pillar in his theory of natural selection and his argument for the origin of species being a common progenitor. Species that are related form a common chain on the genealogical tree as breeding between species produces sterile hybrids, which means that those varieties cannot continue on the tree to produce another branch. Only those varieties within the species that are fertile keep the species reproducing.

Darwin's discussion of the law of isolation also reflects this interrelatedness of mentally-created abstract concepts. Isolation, due to land size or to oscillation of land level, can ward off immigration of better-adapted organisms and allow varieties to slowly improve without the competition from other species. On the other hand, if the isolated area is very small it can 'retard' the production of new species since the lack of competition and external influences do not create a need for change. The idea of 'isolation […] checking the immigration of better adapted organisms' is a complex notion constructed from data gathered from the internal and external terrains, the corresponding species and the relationship between them, and other variables such as climate and elevation. The concepts, for example, of 'isolation', 'immigration', 'retarding' and 'better adapted organisms' depend not only on the relationship between them but on the relationship between Darwin the scientist collecting the data and the data collected; that is, between the data and the interpretation of the data. In this respect Darwin's law of 'natural selection' can be seen as not only a law but an interrelated set of mental constructs that

include Man's perception and intellectual interpretation of the secrets of Nature (Darwin, 1985, p. 150).

Darwin's law of extinction and diversification is the law that determines that the most distinct varieties have the greatest chance of succeeding and increasing their numbers; that is, the greater diversity, the greater the amount of life that can be supported. This also applies to the diversity of habitats, for the greater the variety the greater the number of diverse species can occupy them. Those species that do not increase will become extinct (Darwin, 1985, pp. 153-4).

The law of diversification derives from the law of divergence of character: the more different a species is the greater the chance of success in reproducing itself and covering a large area. The least different stand the least success in reproducing, with the eventual risk of becoming extinct. Larger groups continue to expand while smaller groups decrease in numbers and disappear (Darwin, 1985, pp. 158 - 163).

All these laws are about relationships that depend on each other in order for their laws to work. Some are mutually dependent on each other in a positive sense, such as diversification and divergence as outlined above. Others are opposites, positives and negatives, such as diversification and extinction: one produces the other, both counterbalancing each other. Like life and death, the idea of diversification cannot exist without extinction: the spread of one species (life) at the expense of the other results in eventual extinction (death). This is another example of the web of interrelatedness that forms the organic whole of Nature. Nature consists of forms, objects and laws bathed not only in dazzling light but also in shadows of murky grey. A good example of this can be found in Darwin's law of use and disuse in which the increased use of one organ will increase its size or strength, whereas decreased use will weaken it or reduce its size or make it disappear altogether. Darwin gives many examples of this. The ostrich increased its body size so it could no longer fly, but increased the strength of its legs so it could run away at a fast speed as well as using its legs to protect itself (Darwin, 1985, pp.175-6). Some cave animals in Kentucky, for example, no longer needed good vision with their eyes but instead required an increased length of antennae to compensate for their blindness (Darwin, 1985, p. 179).

The law of modifying instincts, if advantageous, can help a species take advantage of the instincts of other species. Ants removing the sweet juice from aphids, or cuckoos laying

their eggs in other birds' nests (because laying their eggs at intervals of two days make it difficult to bring up their young of different ages), are good examples of this (Darwin, 1985, p. 242). The modified individual instinct of hive bees to produce a collective hive rather than individual cells is another example of this, but this time within the same species. Darwin works backwards from the collective hive reflecting on how this occurred. He imagines that originally bees made their own cells, but through constantly working alongside each other found that producing shared walls required less work; more importantly, this required less sugar to produce the wax for the cell walls. This cooperation meant they could produce more honey to support a larger number of bees, enabling them to protect their colony better. These modified instincts were then passed on to the next generation of bees.[87] The driving force behind all this is once again natural selection that ensures that the economy of the use of wax creates 'the best chance of succeeding in the struggle for existence' (Darwin, 1985, p. 256).

The importance of this illustration of the law of modifying instincts is that it perfectly mirrors the actions of individuals and species, constantly finding ways of modification for improvement and advantage to enable successful reproduction, the spread of the species and variations to larger areas, and the passing on of the advantages to the next generations. At each stage of development there is a fine tuning. Throughout these developments are the hidden laws that work with natural selection to make it work, that in a sense are evolving themselves in tandem with each other as part of the 'web of affinities'. They are hidden, yet become uncovered as Darwin teases them out from under the veil through his reflections. Like a jig-saw puzzle, all the interlocking pieces make sense once pieced together in reflection to enable the picture to be seen as a whole.

This law of modifying instincts can also be seen in the development of neuter worker ants. Again this is a law developed to maximise the advantage and success of the species in the most economical way. Natural selection over time selects those females able to produce the most neuters who specialise in protecting the nest and feeding the young, leaving the job of reproduction to the fertile ants. The division of the sexes into male, female and neuter has another advantage; as neuter ants are unable to reproduce, their structures and those of the fertile ants are not blended thereby ensuring that the structures of all castes are maintained for the tasks for which they were developed (Darwin, 1985, pp. 260 - 2). Natural selection would achieve this state through many gradual modifications:

[87] Darwin's hypothesis was corroborated by a Cambridge professor, Professor Miller (Darwin, 1985, pp. 248 – 9).

> We may safely conclude from the analogy of ordinary variations, that each successive, slight, profitable modification did not probably at first appear in all the individual neuters in the same nest, but in a few alone; and that by the long-continued selection of the fertile parents which produced most neuters with the profitable modification, all the neuters ultimately came to have the desired character (Darwin, 1985, p. 260).

To test out his theory of natural selection on the development of neuter ants, he dissects them and discovers two castes of neuter ants working in the same nest with a difference in their size and their organs of vision. He also discovers some ants in an intermediate condition between the two. This confirms Darwin's theory of intermediate steps in modifications as species 'progress towards perfection'[88] (Darwin, 1985, p. 260).

From this Darwin concludes that eventually more and more of the preferred caste are produced 'until none with an intermediate structure was produced' (Darwin, 1985, p. 261). Darwin uses this argument to argue against Lamarck's theory that modification in species was produced by individual habit (for example, giraffes gaining long necks by continually stretching them in order to reach branches high up, as opposed to Darwin's theory that long necks were gradually selected as being of greater advantage to the species):

> [This case] proves that with animals, as with plants, any amount of modification in structure can be effected by the accumulation of numerous, slight, and as we must call them accidental, variations, which are in any manner profitable, without exercise or habit having come into play […]. I am surprised that no one has advanced this demonstrative case of neuter insects, against the well-known doctrine of Lamarck (Darwin, 1985, p. 262).

1.08 Conclusion

This chapter has provided strong evidence to suggest that Humboldt was one of the most important naturalists of his time to have exerted a significant influence on Charles Darwin, whether this be in Darwin's thought processes, his texts or his research methods. Humboldt's concepts of unifying processes and interrelationships in Nature making it 'organic' can be seen in Darwin's examples of struggle and mutuality found in the 'entangled bank' of Nature from as far afield as the Galapagos to his own garden at Down House.

[88] As stated by Darwin: 'And as natural selection works solely by and for the good of each being, all corporeal and mental endowments will tend to progress towards perfection' (Darwin, 1985, p. 459). This could be interpreted in two ways: 1. The road to perfection at any one time is the sum total of modifications made at each stage of development (that is, the term 'perfection' is merely describing each step in the process as being better than the previous one); 2. The steps in development could be seen as teleological in that there is a hidden law in Nature that is driving species to become perfect - that archetypal forms are driving species towards the realisation of perfection.

Humboldt's concept of the 'one reality of nature' can be seen in Darwin's theory of natural selection in which Nature creates itself through its own natural laws. Species selection reflects Nature's split between the finite and the infinite, between diversity and extinction over time in which individuals and individual species die off due to more successful competitors that are better at adapting and diversifying.

Although Darwin's antipathy towards slavery was developed at an early age through his free-thinking family and relations, he was additionally influenced by his reading of Humboldt who also believed in a common humanity (like Wordsworth). This belief that Man was part of one community can be seen in his view that all men, regardless of race, came from the same origins.

Finally, and perhaps most importantly, Humboldt helped Darwin develop a new imaginative way of thinking, enabling him to step outside of his Victorian time warp (if only with one leg). Humboldt enabled him to develop his mind's eye through reflection and imagination. Like Humboldt before him, Darwin was able to step back from the collection of his 'scientific' data and relate them to the context of the impressions made by the sense data on his mind. In the same way as the plant life at different altitudes gave Humboldt an idea of the characteristics of a country's region, so too did the rock strata, petrified trees and location of sea shells give Darwin an idea of the natural history of a region and how life might have developed – it helped spark his imagination and helped him consider the impossible: that things had not always been fixed in time, that they could change.

CHAPTER 2: COULD DARWIN'S THEORY OF NATURE BE REGARDED AS ROMANTIC?

2.01 Introduction

In order to determine whether Darwin had been influenced by any Romantic ideas, the chapter first defines Romanticism and then traces the historical origins of the term looking at those German Romantics that can be identified as having had an influence on Humboldt and consequently Darwin. There is evidence to show that Humboldt influenced Darwin and as Humboldt was widely recognised as a Romantic, having associated with the German Romantic school, this chapter looks at both Humboldt's work and his contemporaries to determine whether they could be regarded as Romantic and whether their brand of Romanticism informed Darwin's work.

In examining Romanticism, the chapter will look at the relationship between literature and science and how they are used to describe the experience of Nature. In so doing this will give some background in understanding Humboldt's method of incorporating aesthetic experiences into his interpretation of Nature and how this in turn sparked Darwin's own imagination enabling him to see natural selection in Nature.

The chapter also looks at how Nature can be seen optimistically in terms of its reproduction but also pessimistically in terms of its competition and struggle, as struggle shapes species through natural selection leading to new varieties, or to extinction. The chapter will provide evidence to show that Darwin was influenced by Malthus in terms of struggle and this can be shown to be linked to Townsend's essay on the Poor Laws at the time, which he believed prevented a balance in human nature being maintained: for Townsend, hunger maintained a balance by encouraging poor people to work. For him hand-outs only encouraged laziness. Malthus and Townsend are not claimed to be Romantics, but are referred to in order to highlight the drivers of Struggle for survival (through overpopulation, famine, poverty and hunger).

The concept of struggle will be examined in terms of what it means for Darwin's theory of natural selection and what it means in terms of an understanding of Nature. Is 'struggle' an example of the force of Nature and is this Romantic? Is it an example of a mental experience reflected through mankind's relationship with Nature? Does it represent a set of objective laws? Or is it a combination of subjective mental experiences and objective laws?

In trying to answer these questions, the chapter traces the influence of Humboldt on Darwin whilst he was on the *Beagle* and which informs his later work such as the *Origin*. It looks at Humboldt's organic view of Nature in which everything is related to everything else. This view can be seen to help Darwin formulate his theory of natural selection which does not require a Creator to create individual species as Nature is self-creating (but this view is not an argument for the non-existence of a God).

In discussing natural selection, the question of self-improvement is raised and the debate about whether this can be seen as teleological is revisited (first raised in Chapter One). Are the laws governing Nature necessary and therefore predetermined? Is Nature mechanistic and purposive? Goethe is examined as he is able to make the link between the genealogical past and the teleological future. He does this through his 'genetic method' of thinking about Nature as well as his identification of the unchanging 'inner kernel' that runs through past and present: that is, the internal pattern of a creature remains constant through time, but its outward appearance adapts according to particular environments.

The concepts of metamorphosis and archetype are traced to Darwin's work and are shown to be central to his concept of change as well as the endurance of species. In analysing the concept of Mind in Humboldt and Darwin, reflection and communion with Nature are seen to help the observer to go beyond his own individuality to experience the sublime, and, in so doing, make a contribution to both science and literature that goes beyond the self. Thus through Darwin's imagination and reflection he is able to discover the laws of natural selection.

2.02 What is 'Romanticism'?

It is important to define what is meant by the terms 'Romantic' or 'Romanticism' if an influence on Darwin is to be traced. The Romantic era is generally thought to cover the period 1770 – 1870, and the movement's strongholds were mainly in England (Wordsworth, Coleridge and Blake), Scotland (Scott and Burns) and Germany (Friedrich Schlegel,[89] Novalis, Goethe, Schelling and Schiller), influenced by the writings of the French Rousseau (Melani, 2009, pp.1- 6). So what was Romanticism? Kreis (2009a, pp.1- 17)

[89] Schlegel was the first to use the term 'Romantic' about himself and his German contemporaries (Richards, 2002, pp. 20 – 23).

defines it as a reaction to the Enlightenment,[90] in which Newtonian natural philosophy was considered to have stifled individuality, freedom and creativity, imposing materialism and robotic sameness. Influential Enlightenment thinkers, such as Locke, did not see Man as a sinful creature to be saved by the Church; it replaced the view of Man's fundamental fallen condition with a view of Man's nature starting out as a blank slate or *tabula rasa* moulded by sense impressions making up experience. The Romantics did not want to be controlled by the established church but saw the Enlightenment's attack on religious superstition as taking away Man's spirituality and morality (Kreis 2009b, pp. 1 - 10). Voltaire, a French philosopher and advocate of civil liberties, believed that Christianity was supernatural and 'infamous', and only science could lead the way to truth and improvement. For the Romantics, science could not be used to describe the reality of experience whereas poetry, art and music could.

To fully understand the Romantic influences that led to Darwin's 'Great Idea', the ideas of the father of the Romantic movement, Rousseau need to be considered. Although Darwin and Rousseau's underlying philosophies were different, there were similarities and they shared common fears. Both were afraid of chaos, revolution and a world without structure. For Rousseau, Man was naturally good (divine) and close to his Creator, but had been corrupted by society. Rousseau was attacked by the clerical establishment[91] with the publication of *Emile, or, on Education* [1762] (Rousseau, 1993) in which the Vicar in the story stated that the Gospel was full of unbelievable and repugnant things. This demonstrated that belief was not rational (that is, one could still believe in a divine Creator even if it permitted earthquakes, famine and disease), although this did not make Rousseau an atheist (Qvortrup, 2003, p. 6). Darwin was also struggling with his faith in later years, although he went along with the views of Paley in his *Evidences* (Paley, 2005) whilst a student at Cambridge 1828 -31.[92] Although Darwin was replacing the divine structure of

[90] The Age of the Enlightenment or the Age of Reason was a movement in the seventeenth and eighteenth centuries which promoted scientific thought to counteract superstition and abuses of power by the church and state.

[91] P.D. Jimack (1993) pp. xxxvi – xxxviii.

[92] Darwin's religious background is rather complicated by the fact that his father Dr. Robert Waring Darwin, as a respectable gentleman, had his son baptised at St Chad's Anglican Church on 17 November 1809 because the country was still at war with France and he did not want to be seen as a conspirator. His mother Susannah, on the other hand, took the children to the local Unitarian chapel (Desmond and Moore, 2009, p. 12), and when Charles went to study medicine at Edinburgh he became friends with William Greg, who had been to a Unitarian school (Unitarians believe in the oneness of God rather than the Trinity, and as such are free thinkers encompassing different forms of belief in God). One of Darwin's most important mentors at Edinburgh was Robert Grant, the sponge expert. He was a free thinker and believed that all life was due to physical and chemical forces, not spiritual powers (Desmond and Moore, 2009, pp. 32 – 4).

Nature with a self-contained structure through Natural and Community Selection, he could not go so far as to say there was no God. At most he was an agnostic[93]. Most scholars would no doubt make a clear distinction between Rousseau's 'Noble Savage' (or Man born with goodness but corrupted by society), and Darwin's natural Man developing his moral social instincts over time through natural selection.[94] As discussed in Chapter Three, Darwin's theory of 'Community Selection' develops the idea of evolving moral instincts that over time become inbuilt in Man through his moral conscience. So the containment required is self-contained. In that sense this instinct could be regarded as divine (if seen as a manifestation of Mind), although Darwin would not describe this as a cause created by God. Although Rousseau was against rationalism because philosophy (the sciences) demystified the world through mathematical truths (thereby killing off God), there is a certain irony in that it took Darwin, a scientist, to put the mystery back into Nature – maybe not with a God from the scriptures but another self-contained spiritual entity that made up the laws of Nature. This suggests that certain aspects of Darwin's theory could be regarded as firmly in the Romantic's camp.

Another important 'political' dimension to understanding the 'soul' or power of Nature in terms of its self-generating laws is the ugly side of its conflicts and competitions within and between species. Darwin was well aware of this when he went on his walks, noticing plants competing for light and space in which to grow. This was highlighted by his reading of Malthus, and, although there is no proof that Darwin had read Townsend, he would have been aware of the debates. Although superficially these views may seem to be in conflict with Rousseau's, they in fact reinforce the view of a complex organic Nature with an inner power both beautiful and ugly, with an attempt by Man to control it, whether through farming, breeding animals and pigeons, managing zoos or botanical gardens, medicine, economics or politics.

Malthus' (2008) *An Essay on the Principle of Population* is an example of the latter two. When he wrote it in 1798, it is important to understand that it was written nine years after the first year of the French Revolution in 1789 and eight years after Edmund Burke's speech (February 9th, 1790) in the House of Commons in which he spoke of his fears of anarchy, violence and atheism, followed by his *Reflections on the Revolution in France* [1790] (Burke,

[93] A term coined by Thomas Huxley.
[94] 'The first foundation or origin of the moral sense lies in the social instincts, including sympathy; and these instincts no doubt were primarily gained, as in the case of the lower animals, through natural selection' (Darwin, 2004, p. 682).

2010). With the subsequent beheadings in France, the upper classes in Britain feared for their own lands and lives.[95] Against this backdrop, Malthus wanted to demonstrate that unchecked populations continued to expand as they had no internal constraints to control them. Malthus would have been influenced by the debates swirling around at the time concerning the *Poor Laws,* and although there is no evidence that he had read Townsend's *Dissertation* of 1786 (1971), his father, Daniel, would certainly have been familiar with it, and so therefore would his son Thomas (Ashley Montagu, 1971, p. 10). Townsend refers to the Juan Fernández island off the coast of Chile which had been left to goats to over-run. The Spanish introduced a greyhound dog and bitch to help reduce the British sailors' food supply. The result was that the weakest of both species perished with the most 'active' and 'vigorous' surviving. Townsend's following principle is the same as expressed in Darwin's *Origin* seventy-three years later:

> The weakest of both species were among the first to pay the debt of nature; the most active and vigorous preserved their lives. It is the quantity of food which regulates the numbers of the human species (Townsend, 1971, p. 38).

For Townsend, 'hunger' should keep the human species' appetite for reproduction in check, or at least the fear of hunger for his offspring:

> There is an appetite, which is and should be urgent, but which, if left to operate without restraint, would multiply the human species before provision could be made for their support. Some check, some balance is therefore absolutely needful, and hunger is the proper balance; hunger, not as directly felt, or feared by the individual for himself, but as foreseen and feared for his immediate offspring (Townsend, 1971, p. 44).

Malthus too made the general assumption that the sex drive knows no constraints and that this applies equally to the human race. For the race to survive, humans had to be kept in check by famine, disease or war, or by the intervention/non-intervention of an ethical elite (Hall, 1995). When Darwin read Malthus' *Essay* in 1838 he was living against a similar backdrop of political and social turmoil with similar fears of anarchy and atheism. The *Essay* (and perhaps subconsciously this backdrop) gave him this idea of the struggle for existence which he could see in Nature. It should also be pointed out here that Townsend was widely read in the literature of the Physiocrats, led by François Quesnay and followed by Rousseau and the Romantics as stated earlier. Quesnay was inspired by William Harvey's demonstration of the circulation of the blood and saw economics, as represented by production, exchange and distribution, as a natural law of science maintaining the wealth of the nation in the same way as the heart maintains the health of the individual.

[95] Hall (1995).

Townsend was opposed to the poor laws as he believed they discouraged the poor from working – for him the poor's work in agriculture (on the land) was essential for the creation of the nation's wealth. As summarised by Montagu (1971), the Physiocrats' belief was that

> the poor are necessary to co-operate with nature in making its wealth available, by extracting it from the soil so that it can then be converted into consumable form (Montagu, 1971, p. 7).

This emphasised the holistic, interrelated,[96] organic, Romantic view of Nature, which can also be found in Charles Darwin's works. From the above, we can see that Rousseau (via the other Romantics of the age), in addition to Malthus and Townsend (from the pessimistic standpoint of struggle and competition), had a significant impact on Darwin's moral stance thereby influencing the development of his theory of 'Natural Selection'.

As demonstrated by the above, the Romantics were relativists in that Nature (including Man) was not fixed, not governed by universal laws, was diverse and forever evolving and improving, as with Darwin's theory of 'transmutation' (now known as 'evolution'). We can already see the seed for this theory being developed when Darwin was on the *Beagle.* Although at this stage he has not yet consciously articulated the question as to whether species are mutable or immutable, he has in a sense started the debate by casting doubt on the widely held view at the time that the extinction of species is due to sudden catastrophic events:

> In some countries, we may believe, that a number of species subsequently introduced, by consuming the food of the antecedent races, may have caused their extermination; but we can scarcely credit that the armadillo has devoured the food of the immense Megatherium, the capybara of the Toxodon, or the guanaco of the camel-like kind. But granting that all such changes have been small, yet we are so profoundly ignorant concerning the physiological relations, on which the life, and even health (as shown by epidemics) of any existing species depends, that we argue with still less safety about either the life or death of any extinct kind (Darwin, 1989, p. 164).

This release from mathematical reasoning freed the mind to be creative and imaginative, as we can see from the above example of Darwin using observed data to stretch his imagination to its limits. The imagination becomes the synthesis of reason and feeling, enabling us to reconcile opposites, or what Coleridge calls 'intellectual intuition' (cited by Melani, 2009, p. 2). An example of Charles Darwin's imaginative synthesis to develop his idea of natural selection can be seen in his 'tree' diagram; this demonstrates the transmutation of species from their origins, showing Nature as an interrelated organic

[96] Young argues that Darwin synthesises Paley's interpretation of Malthus as re-establishing harmony, with Malthus' concept of 'struggle'. Thus for Darwin 'struggle both explains and produces adaptation' (Young, 1985, p. 69).

whole, not as a machine governed by fixed mechanical laws (Melani, 2009, p. 2). The paradox of the tension between reason and feeling can be seen in Darwin's work on barnacles and worms, ugly perhaps on the outside, but beautiful within when one understands the intricacies of the workings of Nature. Other British naturalists, such as Henry Walter Bates and Alfred Russel Wallace, were also examining these intricacies on the River 'Amazons', experiencing Nature in the raw with dangerous alligators, snakes and, in Wallace's case, malaria. It was during one of Wallace's fevers while thinking about Malthus' *Essay* that he hit upon his version of the theory of 'Natural Selection' in 1858 and sent it to Darwin:

> There is a tendency in nature to the continued progression of certain classes of *varieties* further and further from the original type – a progression to which there appears no reason to assign any definite limits – and that the same principle which produces this result in a state of nature will also explain why domestic varieties have a tendency to revert to the original type (Wallace, 1858, p. 62).

That is, varieties bred in captivity and let loose in Nature will revert to their original types as Nature selects those that adapt best to their environment. Wallace's paper, along with pressure from Huxley, Lyell and Hooker, led to the joint Wallace-Darwin paper presented by Charles Lyell and Joseph Hooker to the Linnean Society of London on 1st July 1858,[97] finally leading to Darwin publishing his own work, the *Origin,* in 1859.

In giving a definition of 'Romantic', 'Nature' has been included but its definition depends on whether we regard mankind, animals or plants as starting off with a blank slate and developing towards an ideal state through experience or interactions with their environment (the 'nurture' debate), or whether the essence of mankind, plants, etc. is already fully formed (as its 'nature'). Wordsworth, for example, sees himself as both an objective observer of Nature describing 'the physical environment around him', and as a 'subjective shaper of experience', mind therefore being seen as 'creator and receiver both'[98] (Nichols, 2004, p.160). For Goethe, Nature can only be experienced through the collective experience of Man through incremental research in infinite time; Nature cannot be viewed at any single point in time (Hadot, 2006, p. 179) as the status of scientific knowledge only represents that moment. New elements are forever being 'discovered', which in turn rewrite earlier states of 'knowledge', and this expansion of our understanding never stops and is therefore infinite. The difficulty with the concept 'Nature' is that it can have very many different meanings: do we mean individual natures corresponding to

[97] Darwin, and Wallace, 2008, pp. 6 - 16.
[98] This is best exemplified in Wordsworth's poem, 'Tintern Abbey'.

distinct species or variations each with their own forces, or do we mean one Nature with one force or set of laws flowing through all the species? Are all these natures or species equal on the same level or are they arranged hierarchically? These are issues that need to be examined alongside the questions, 'Is there any evidence to show that Darwin viewed Nature as objectified on the one hand, or divine on the other?' and 'were these views influenced by the Romantics, and Humboldt in particular?'.

As already discussed in Chapter One, Darwin modelled his work on Humboldt's *Personal Narrative* of his expedition through the rainforests of the Orinoco and the River Negro and states this debt of gratitude in his autobiography (written in 1876). From this he learnt the art of accurate and vivid descriptions of his observations:

> During my last year at Cambridge, I read with care and profound interest Humboldt's *Personal Narrative*. This work, and Sir J. Herschel's *Introduction to the Study of Natural Philosophy*, stirred up in me a burning zeal …No one or a dozen other books influenced me nearly so much as these two (Darwin, C. 1995, p. 23).

This influence is apparent when reading Darwin's diary of his voyage:

> I believe from what I have seen Humboldt's glorious descriptions are & ever will be forever unparalleled: but even he with his dark blue skies & the rare union of poetry with science which he so strongly displays when writing on tropical scenery, with all this falls far short of the truth. The delight one experiences in such times bewilders the mind,-if the eye attempts to follow the flight of a gaudy butter-fly, it is arrested by some strange tree or fruit; if watching an insect one forgets it in the stranger flower it is crawling over,- if turning to admire the splendor of the scenery, the individual character of the foreground fixes the attention. The mind is a chaos of delight, out of which a world of future & more quiet pleasure will arise.- I am at present fit only to read Humboldt; he like another Sun illuminates everything I behold.- (Keynes, R. D. 1988, p. 42)

This could be interpreted as an example of 'the rare union of poetry and science' in Darwin's own writing inspired by Humboldt. Is this also an example of the Romantic union between the subject (the beholder) and the object of Nature (that which is observed), or is it merely an enthusiastic description of Nature? Can the two be distinguished and how would one go about distinguishing them? The blurring between the two makes this difficult. There are hints of this with the use of the words 'bewilder' and 'chaos' expressing a mass of sensations that the subject has difficulty in organizing, yet at the same time a feeling of delight that could be seen as an internal sensation within Nature itself. But like any scientist dealing with a mass of data, it has to be organized and classified in order to make sense of it, and this is perhaps what Darwin is alluding to when he refers to 'a world of future & more quiet pleasures will arise'. This could be an example of Humboldt's Romanticism in poetry and science – the ability to capture the sensations of a holistic

Nature where the edges of subjectivism and objectivism blur, yet, at the same time, being able to make sense of them scientifically through classification and analysis but without diminishing the beauty of the butterfly.

The view of interrelatedness referred to in Humboldt's famous watercolour (referred to in Chapter One) is also expressed in Darwin's grandfather's work *Zoonomia (*1794*)*. Here Erasmus Darwin noted that the Mimosa plant was sensitive to touch, extending this to infer that a plant's life was governed by pleasure and pain (Nichols, 2004 p. 16). By 1790 this view of interrelatedness between humans, animals and plant life was a widely held one; a view that saw Nature as an organic whole with roots going back to interrelated ancestors. Erasmus Darwin extended this to geology as evidence of past remains reflecting past pleasures, feeding present organisms, evolving and improving their happiness (Nichols, 2004 p. 160). As pointed out by Ashton Nichols, the literature on sensitive plants and new species

> indicate(s) a pervasive paradigm shift, away from a nature that was static and unchanging towards a nature characterized by dynamic links among living things (Nichols, 2004 p. 19).

This paradigm shift 'challenged the hierarchy of the Great Chain of Being' with a 'less – stratified model of organic order' (Nichols, 2004 p. 9) leading to all sorts of debates about the self, the soul and whether the loss of God meant a mechanistic, materialistic Nature. As a materialistic view of Nature included Man as an animal, one can perhaps understand the horror at the time of Darwin's publication of the *Origin* (1859) in which Man's origin can be traced right back to primitive beings. The very thought of Man being related to the ape was totally anathema to a view in which Man was created by God and not transmuted from lesser, ungodly beings.

The Romantics believed that the rational scientific mind could be complemented by an aesthetic judgment able to penetrate 'the deep structures of reality, a path overlooked by most Enlightenment thinkers' (Richards, 2002, p. xvii). The Romantics attacked the mechanistic view of science, replacing it with an 'organic' interpretation in which their conceptions of Nature were not just formulated from abstract numbers but were created from their immediate scientific experiences and intimate relationships inspired by love and hate (Richards, 2002, p. xviii). Richards argues against the view that poets, artists and scientists can 'formulate conceptions unmarked by their own lived experience' [and that the mind can] 'float free, detached from the imperfect life that produced it' (Richards, 2002, p. xviii). This is an example of the Humboldtian Method discussed in Chapter One in

which the scientists include their emotions and personal experiences when describing Nature and do not simply write down the data provided by their scientific equipment.

Historically it is useful to understand where the term 'Romantic 'comes from. *Naturphilosophie* is 'focused on the organic core of nature, its archetypal structure, and its relationship to mind', and 'Romanticism' is *Naturphilosophie* with the added ingredients of aesthetic and moral features. Friedrich Schlegel coined the term *romantisch* 'to indicate a specific kind of poetic and morally valued literature' which 'distinguishes a type of science that retains this aesthetic and moral heritage' (Richards, 2002, pp. 6 – 11). This distinction is essential to understanding an 'aesthetic' and 'moral' analysis of Darwin's work if Darwin's biology is to be seen as 'Romantic', and, therefore, not mechanistic. Richards argues that Darwin was profoundly influenced by the German Romantics, principally Goethe and Alexander von Humboldt and that 'his theory functioned not to suck values out of nature but to recover them for a de-theologized nature' (Richards, 2002, p. 516). Richards' key argument is that

> Darwin's Romantic inclinations led him to attribute to human beings a moral conscience that sought not selfish advantage but one that would respond altruistically to the needs of others (Richards, 2002, p. 516).

Gillian Beer also sees Darwin as an example of a 'Romantic materialist' in which the instruments of science through speculation complement the mystery of nature:

> [The microscope and the telescope] were permitting factors in that particular strain of Romantic materialism […]. Far from eschewing mystification, the extension of possibility through scientific instruments and scientific hypothesis-making actually gave at this time a fresh authority to the speculative and even to the fictive. Projects cannot rest in the present – they rely upon extension and futurity (Beer, 1983, p.152).

Gillian Beer (1983) sees Darwin's works as an example of 'Romantic Materialism'. The observation of Nature is at the heart of any discussion of whether Darwin was a Romantic.[99] What is observed and captured through the senses may be material but the pleasure of the experience is Romantic, whether optimistic or pessimistic:

> Observation is charged with sensory power. In both [Darwin and Hardy] the material world is described simultaneously in terms which may lend themselves to an optimistic or pessimistic interpretation, but which function as terms through the pleasures of observation (Beer, pp. 244-5).

Here the material instruments of science enable the scientist to look towards the future without destroying the mysterious qualities of Nature. Paley's Creator or Deity as the prime

[99] Whether Darwin should be seen less as a Romantic and more of a Victorian will be examined in Chapter Three.

cause of Nature may have been removed, but it can be argued that the materialism of science has not removed its mystery, its 'Romanticism', but has added to it. My use of the term 'Romantic' therefore incorporates the definitions used by Richards and Beer[100] and indicates a fundamental epistemological and methodological orientation that allows for uncertainty and awe.

In using the term 'Romantic materialist' as above, this also includes the time of Darwin's grandfather, Erasmus, in which matter was regarded as synonymous with energy, and, spiritual, in terms of its primeval force (as exemplified through experiments with electricity). In the age of the industrial revolution with experiments in chemistry, electricity and the development of the steam engine, this led to an even greater awe of the forces of Nature (as already discussed in the chapter on Humboldt dealing with galvanism). Although the concept 'Romantic materialism' seems to be an oxymoron, the terms can be seen to complement each other. Although mind is not seen as existing independently of matter as in Cartesian dualism, the spiritual still exists in terms of defining the experience of the forces of Nature even if the causes are not known. The material world can therefore be seen as Romantic.

Darwin uses many metaphors in his texts and these reflect Beer's argument above that the pleasures of observation, whether optimistic or pessimistic, are Romantic. The most common metaphor used is 'struggle'. On one level it depicts plants and animals fighting for survival both as individuals and as species. The consequent violent destruction of individuals through this struggle is represented by his use of the 'wedge' metaphor[101] (already referred to in Chapter One) and is an extreme example of pessimism. Although the notion of the 'entangled bank' (that is, species of vegetation competing for light, nutrients and space) expresses the pessimistic struggles of individuals and species, it also expresses the optimistic pleasure of observing the varied forms of life that reproduce themselves, adapt to their environment and to each other in living in mutual harmony.

The concept of 'struggle' in Darwin, the man and his works, is multi-layered. In Darwin's theory of natural selection he is grappling with the struggle in Nature between individuals within and between species, all struggling to survive. It could be argued that in his writing he is struggling to express his own meaning through the existing Victorian creationist vocabulary of 'select', 'create', and 'design'. Beer, for example, argues that 'his description

[100] Richards places more emphasis on the German Romantics.
[101] Darwin, 1985, p. 119.

is necessarily conditioned by the assumptions and beliefs condensed in the various kinds of discourse active at the time he was writing' (Beer, 1983, p. 51). Additionally she states that as 'natural history was still imbued with natural theology, […] Darwin was therefore obliged to dramatise his struggle with natural theological assumptions within a language weighted towards natural theology [and that therefore] he must write against the grain of his discourse' (Beer, 1983, p. 53).

As a writer and scientist, Darwin struggled with his conscience to publish the *Origin* knowing the concerns his views would raise within the church.[102] For example, how could Man be made in the image of God if he shared a common progenitor with primates, and where would that leave morality if it did not emanate from a transcendent Being? Darwin's view in *The Descent of Man* that Man's morality developed naturally only added to the fear that if Man were no different from animals he may behave like them. Having design come from within Nature rather than from a Divine being made his work seem atheistic. Also Darwin's tree diagram used to illustrate the development of species could be seen as demolishing the idea of an unfolding Divine plan (Brooke, 2003, pp. 192 – 5). Could Darwin's 'struggles' be regarded as Romantic? Some of the struggles could be seen as the consequences of being a scientist in Victorian England at a time of change. But they could also be seen as a consequence of his Romantic way of experiencing and interpreting Nature. To what extent were his own personal struggles a reflection of an awareness of himself as an active participant in the 'struggle' of Nature? – for example, is there evidence to show he was aware of the problems of ill health associated with in-breeding in humans as well as animals? If so this would be another example of Beer's 'pessimism' forming part of Darwin's 'Romantic materialism'. Likewise, is there any evidence to show that this Romantic 'pessimism' in Darwin's life is offset by Romantic 'optimism'? T. E. Hulme (Hulme, 1911, pp. 1-3) believes there is (although he objects to Romantic verse). He argues that Darwin's theory, as with the Romantics, represents a progressive view of nature. This could be seen as entailing optimism as it 'regards man as a well, a reservoir full of possibilities', evolving and adapting incrementally (and is therefore 'intrinsically good').

[102] Robert Chambers' anonymous publication in 1844 of his *Vestiges of the Natural History of Creation* had already created a storm by putting forward the view of the transmutation of species (bringing together the views of other naturalists at the time). For example, 'The whole train of animated beings, from the simplest and oldest up to the highest and most recent, are, then, to be regarded as a series of *advances of the principle of development*, which have depended upon external physical circumstances, to which the resulting animals are appropriate' (Chambers, 2010, p. 64).

As already defined, Nature can be seen as Romantic if its structure is seen as consisting of an archetypal organic core, and having a relationship to Mind (the 'imagination') with aesthetic and moral features. These aspects of Romanticism will be analysed to see what influences they may have had on Darwin and his work.

2.03 Man as Part of Romantic Nature

Darwin's example of the possibility of an insect-eating bear (Darwin, 1985, p. 215)[103] taking to water and developing into a whale, is very similar to Goethe's example of the descent of the modern sloth. Goethe[104] supposed the giant sloth had first been a whale that got trapped along a swampy, sandy beach and to bear its weight developed large limbs passing these on to its descendants (Richards, 2002, p. 485). Both these examples from Darwin and Goethe can be seen as Romantic examples of Man being part of Nature through his ability to stretch his scientific imagination (his Romantic mind) through argument by analogy. This is not the creation of a fanciful world but one created out of perceptions being related logically through a mentally constructed history of Nature; a timeline constructed from the evidence, for example, of rock formations, present species' behaviours and characteristics. Although scientific, these hypotheses could also be seen as aesthetic due to the way Nature impresses itself on Man's senses and how Man responds to these perceptions, how he experiences the interrelationships of, for example, the sea, the sky, the mountains and the forests – the poetic context of the experience adds to the scientific. The whole experience is objective yet subjective, public yet personal.

If the intricate eye of Man or any animal is not seen as the design of a Creator but as the product of Nature as producer (from its own archetypes) perfected through development over time, then this could be seen as Romantic. It could be a Romantic idea because Nature could be seen as the designer; but not in the sense of Nature having the idea of the perfect eye as one design and then creating it. From the first development of a simple light-sensitive cell, the eye is developed over hundreds of millions of years, going through many, many stages, each stage fitted for its function at that time until the present stage is reached. The development of the eye, as with all other organs, could be seen as Romantic because it has developed organically; organically in the sense that its development is due to its interrelationships and interactions within Nature (for example between the eye and other species and habitats) as well as within the eye's owner (for example between the

[103] Referred to in Chapter One.
[104] In Goethe (1985 – 98, 12:246 – 47), cited in Richards, 2002, p. 485 footnote 218.

eye, the brain, the heart). The evolutionary development of the intellect in Man can also be seen to be Romantic in the sense that it is part of Man's organic reflection[105] on the perception of the relationships in Nature such as that between fossils, rock formations and time lines of species as well as the aesthetic appreciation of beauty in Nature.

Darwin was very concerned that the creation of the eye could be used as an argument against his theory of natural selection and he admitted that initially it did seem absurd to imagine that this could have developed in this way. Whilst at Cambridge, Darwin had read Paley's account [106] of the intricate creation of the eye as an argument for a divine Designer and this seemed difficult to argue against. For Paley the eye was an example of 'creative intelligence' constituting 'the order and beauty of the universe' (Paley, 2005, p. 26). However, Darwin then went on to argue that this did not seem to be so absurd if one imagined it being developed slowly over a very long time span in which each slight development had been of use to its owner:

> To suppose that the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest possible degree. Yet reason tells me, that if numerous gradations from a perfect and complex eye to one very imperfect and simple, each grade being useful to its possessor, can be shown to exist; if further, the eye does vary ever so slightly, and the variations be inherited, which is certainly the case; and if any variation or modification in the organ be ever useful to an animal under changing conditions of life, then the difficulty of believing that a perfect and complex eye could be formed by natural selection, though insuperable by our imagination, can hardly be considered real (Darwin, 1985, p. 217).

For Darwin the development of the eye is an important example against the Creationist view, as the present state of the eye is the result of many, many intricate steps of development over a period of time in which all the steps collectively make up the whole eye. All the steps are interdependent along the chain making up the present eye. The eye is its historical makeup and is therefore organic. So too with all other organs and creatures. All their structures both past and present reveal some purpose and these reflect the laws of growth that are part of the principle of natural selection (Darwin, 1985, p. 228).

[105] This intellectual (or imaginative) reflection on Nature is organic due to all the interrelationships and interactions that make this possible: sense data received through the eyes, the ears, touch, taste, smell and their processing by the brain; the further intellectual processing of these experiences and emotional interpretations, and comparisons made between experiences and the experiences of others both in present and historic time.

[106] William Paley's *Natural Theology or Evidences of the Existence and Attributes of the Deity* [1802].

For Romantic naturalists such as Humboldt this constant flux of life and death, of constant change, of constant development, highlighted the tension between the finite and the infinite; the infinite representing all finite beings, all change. For both Humboldt and Darwin, experiencing the volcanoes, earthquakes and jungles of South America was an experience of the sublime,[107] filled with trepidation in which their feeling of the infinite power of Nature was tempered by their own insignificance as mortal human beings. As scientists (in the modern sense of the word) they were able to describe and measure Nature with their elaborate scientific equipment, yet were unable to totally control it (despite Man's commercial exploitation of forests, plants and plantations, trade routes and slavery).

This experience of Nature of which Man is a part is self-contained. Nature creates itself from its own archetypes and is not created by some external Creator. This is the 'One Reality Nature' discussed in the next section.

2.04 One Reality Romantic Nature

The idea of there being one reality goes back to Spinoza. He believed that the whole of Nature could be regarded as Divine and that God was therefore not separate from Nature but *was* Nature; all the parts of Nature made up the whole which was God.[108] There was no external creator. Nature created itself. It was both creator and product. As Spinoza put it, nature was *natura naturata* or 'nature natured' (that is, it was the product) but also nature was *natura naturans* or 'nature naturing' (that is, it was infinitely productive, infinitely becoming).[109] Individuals who experienced this whole of Nature were able to experience the intellectual love of God which was an understanding beyond reason (Richards, 2002, p. 211).

This wholeness of Nature was taken up by Schelling who believed that the forms in Nature were the same as in the self (that is, they were isomorphic). A genius who was able to achieve this intellectual understanding of the whole of Nature would therefore meet his

[107] This is the quality of greatness, whether physical or spiritual which is beyond all possibility of measurement.

[108] According to Clement Carlyon (who met Coleridge in Germany in 1799), Coleridge was influenced by a Priestleyian interpretation of Spinoza's materialism, in which our own thought should be seen in terms of the properties and powers of matter. This followed Priestley's view that the 'Divine Being' had to be material if it was to act on the world. This meant that every thing was the divine power. As this included Man, every consciousness had to be one with the world and therefore God (Halmi, 2012, unnumbered page, l.l. 1-31).

[109] Spinoza's identification of God with Nature was explained in his posthumously published *Ethica Ordine Geometrico Demonstrata* in 1677.

double.[110] Schelling believed that this way of thinking about Nature was a necessary therapy for the time in which he was writing as he felt that Man had made a separation between the self and the world, from a time when Man was in a state of Nature in which there was no division between ideas (perceptions) and objects (things) (Richards, 2002, p. 136).

Through the adventurous explorations, experiences and scientific works of Humboldt and Darwin, this separation between the self and the world is removed. Both Humboldt's *Personal Narrative* and Darwin's *Voyage of the Beagle* (also a personal narrative) show the explorer immersing himself in the experience of Nature both as an individual and as a scientist through measurement, data collection and analysis. In both, they narrow the division between their ideas and the objects of their perceptions. Both experienced the incredible diversity of Nature and its corresponding habitats as well as the personal dangers and illnesses associated with the rawness and closeness of Nature. Darwin was able to take one step back and observe a greater wholeness of Nature through having more data to hand (through more knowledge being made available to him from other naturalists as well as his own additional data and experiences). Also, through his understanding of archetypes, Darwin was able to apply his knowledge genealogically to evidences of the origins of Nature (for example, fossils and similarities between species). Both Humboldt and Darwin had perceived Nature aesthetically and intellectually, feeling at one with Nature through their experiences, but Darwin was one step ahead in that he was able to schematise it through his theory of natural selection, capturing the essence of the secrets of Nature.

Goethe also took up the idea that God and Nature were one and that therefore there was both a material and spiritual side to Nature, and that the intellectual understanding or soul could lead to the uncovering of the secrets of Nature. Goethe and Schelling both believed that if archetypes were necessary for our experience of Nature then they must also be part of that experience and therefore help create that experience. God, Nature and the intellect must therefore be one and the same thing. Richards (2002, p. 490), calls this a reaffirmation of 'a Schellingian Spinozism'.[111] The notion that Nature can be both material

[110] Richards, 2002, p. 116, cites Humboldt as an example of this.

[111] Richards states 'that in such mental creations, we share in nature's own generative power. Goethe thus reaffirms a Schellingian Spinozism: God, nature, and intellect are one' (Richards, 2002, p.490).

and spiritual, that is, that Nature can have self-contained structures and laws that it can freely develop itself, is discussed in the next section.

2.05 Mechanistic and Purposive Romantic Nature

Kant thought that telic (that is, purposive) laws could not explain natural phenomena scientifically since first causes could not be proved. However, at the same time he did not believe they were purely mechanistic since he believed they had a purpose. In his *Critique of Judgement* (Kant, 1957, 5:526, A 346 – 47, B 350 – 51), Kant got around this dilemma by stating that natural phenomena could only be explained mechanistically *if* we reflectively viewed Nature *as if* it were mechanistic. He also believed that we *ought* to reflectively view Nature in this way.[112] But Kant felt that organic Nature had to be treated differently from the rest of Nature. He felt that organic phenomena such as reproduction could only be understood teleologically, implying that biology could not be viewed as a science (Richards, 2002, pp. 230-1). For Darwin, on the other hand, reflecting backwards in time genealogically enabled him to make biology a science.[113] For Schelling,[114] the ideal or absolute self is absolutely free, but also absolutely necessary. Like an artist that has the freedom of how to paint the canvas but at the same time conforming to the underpinning forms and laws governing painting, so too with the self that has to conform to the laws of Nature (Richards, 2002, pp. 161-2). Schelling expressed this as Nature having to be 'lawless in her lawfulness and lawful in her lawlessness' (cited by Richards, 2002, p.294). In essence this expressed the notion of the freedom of Nature to create its own laws, as with Darwin's natural selection. But to be free, Nature had to come from organic self-consciousness. This self-consciousness can be seen in Darwin's conceptual reflections on Nature (discussed in the section on Mind), in which his overview of the history of Nature enables him to relate geological changes to changes in species' development; in which each flower's petal, each bird's beak, each tree's leaf, each mountain's top and fossil shares an historical relationship. The necessity-freedom paradox can be seen in Darwin's genealogical 'tree of

[112] Kant makes this point clear in his third *Critique*: 'This moral argument should not be taken to provide an objectively valid demonstration of God's existence, not an argument that might prove to the sceptic that there is a God – rather that if he wishes to think consistently about morals, he must assume this proposition [that God exists] among the maxims of his practical reason' (Kant, 1957, 5:577 (B 424 – 25). Cited by Richards, 2002, p. 490 , footnote 228.

[113] Darwin did not leave out the concept of teleology completely as he included this in his discussion on archetypes (Darwin, 1985, pp. 58 – 9 and pp. 415 – 9), and, as discussed earlier, natural selection can be viewed teleologically if it is seen as a law governing the development of species to adapt, improve and survive, or become extinct. This essential force of life striving to improve in order to survive can therefore be seen as teleological.

[114] Schelling, 1927, 59: 2:616 – 17 [III:616 – 17].

life' in which the archetypal necessary forms run through the species, and the freedom to adapt and change run through the variations/incipient species or intermediate species (yet conforming to necessary laws on how to do this). The necessity-freedom paradox is a Romantic interpretation of Nature as it treats it as an historical vein running through all beings bound by the laws of Nature yet free to develop and change. As reflective beings, humans are able to experience this over and above the passive impressions of sense data. Through reflection humans can experience their own part in Nature's historical development, through its flux, its laws, and through a glimpse of its secrets.

2.06 Mechanistic and Purposive Romantic Nature in *On the Origin of Species*

Darwin's genealogical classification through his 'tree of life'[115] gives a true plan of creation through his own self-reflective consciousness based on personal empirical experience of Nature but also the collective understanding based on his own and other naturalists' reflections and concepts. Man's understanding of the history of Nature can be seen as a mental reconstruction of its organic whole: its laws, its genealogy, its relationships (between laws and laws, between species and species, between individuals and individuals, between past and present). This can be regarded as the face of Nature's self-consciousness if Man's Mind through his scientific and aesthetic 'reflective' understanding is seen as reflecting this organic whole. For without any experience or reflection of Nature there is no Nature. Our human knowledge and understanding of the world only exists as a result of our experience of it (unless one believes in Kant's 'noumena', or thing-in-itself,[116] existing independent of human consciousness). Collectively, and therefore organically, the history of Nature provides a science of the origin of species and this is achieved through its fossil and geological remains, its revelations of causes and laws of growth and variation, as well as the concepts of migration and climate change:

> When we regard every production of nature as one which has had a history; when we contemplate every complex structure and instinct as the summing up of many contrivances […]. A grand and almost untrodden field of enquiry will be opened, on the causes and laws of variation, on correlation of growth, on the effects of use and disuse, on the direct action of external conditions […]. Our classifications will come to be, as far as they can be so made, genealogies; and will then truly give what may be called the plan of creation (Darwin, 1985, p. 456).

[115] His 'tree of life' diagram in Darwin, 1985, pp. 160 – 61.

[116] Kant defines the 'thing-in-itself' as follows: 'The existence of things, that which appears, is not destroyed as in real idealism; rather it is only shown that we cannot know anything about them, insofar as they are things in themselves, through the senses' (Kant, *1957b,* 6:153 (A 64). Cited and translated by Richards, 2002, p. 63).We only experience the *appearance* of the *noumena* through our senses without experiencing the *noumena* itself, as, according to this view, it is forever hidden.

Once again the 'history' of Nature is key here, in which modifications can help the scientist understand the 'laws of variation'; in which this genealogical view of Nature can be used to classify its species not in isolation but according to their historical relationships.

As a Romantic, Schelling's 'Dynamic Evolution'[117] argued that Nature achieved its absolute state through self-conscious expression (creative mind), that Nature was never at rest and was always seeking perfection. Darwin could also be read in this vein if the perfection aimed at by species is seen as the struggle to achieve the best form in life to achieve an advantage over other species. Although teleologically nothing specific may be sought, the seeking of perfection produces the same result, creating the illusion that evolution is teleological. For Schelling, the organic unity of Nature was achieved teleologically as opposed to genealogically (Richards, 2002, p. 297). Superficially this might seem to indicate that Darwin's theories were opposed to the Romantics as his theory of Nature was principally genealogical, that is, facing backwards in time towards a primordial progenitor (*vis a tergo)* rather than facing forwards towards an archetypal attracting force (*vis a fronte*).[118] Yet there does seem to be a telic element in Darwin's theory when it comes to his genealogical 'tree of life', since although it is stretching backwards in real time, enabling the identification of past progenitors, it is also identifying timeless archetypal forms in Nature that exist beyond the original progenitors that existed in a particular point in time. These archetypal forms seem to express a timeless force in Nature, pulling species towards a greater form of perfection, and it is these forces of Nature and archetypes that are expressed in Darwin's theory of natural selection. The concept of 'archetype' will be discussed in a later section. The concept of the 'force of Nature' is discussed in the next section as this is the force responsible for change.

2.07 The Romantic Forces of Nature

One of the central arguments of this thesis is that natural selection in Darwin is a Romantic force of Nature, as the force comes from within Nature itself rather than from an external cause or divine power. Natural selection is the force producing the variation between

[117] Schelling defined 'Dynamic Evolution ' as follows: 'Since nature must be thought as infinite productivity [*unendliche Produktivität],* conceived really as occurring in an unending evolution [*in unendlicher Evolution*], so its fixity [*Bestehen*], the resting place constituting the natural product (of the organic, for example) must be represented not as an absolute rest, but only as an evolution continuing with an infinitely diminishing rapidity or with an infinite retardation' (in Schelling, 1927b, 2:287 [III:287]). Cited and translated by Richards, 2002, p. 144, footnote 67.

[118] 'Darwin presumed that organic unity could be explained by an efficient *vis a tergo*. Schelling rather conceived it as arising teleologically, as a *vis a fronte*, as it were' (Richards, 2002, p. 305).

different forms, and these forces that act as selective agents are either other organisms or 'Nature'[119] itself. The biologist Johann Blumenbach, in his *Über den Bildungstrieb und das Zeugungsgeschäfte (On the Formative Force and the Operations of Reproduction, 1781)*, argued for a epigenesist theory in which creatures and plants have a life-long active drive (*trieb*) which gives it form and preserves it and restores it when injured. This is a cause or force driving generation, nutrition and reproduction. For Blumenbach, varieties were the result of environmental factors deflecting the force from its normal path, and new species were the result of a Neptunic catastrophe[120] after which the Creator repopulated the earth using the same force (fossils were seen as proof of this). But this force is a secondary cause created by an unknown divine power 'pulling the strings' (Richards, 2000, pp. 11-32). In the section on 'Nature as Mind', Kant's '*as if cause'* is referred to in which Man's knowledge of natural phenomena is restricted to mechanical laws and that as we do not have any direct knowledge of first causes Man *ought* to talk *as if* Nature is the result of mechanical laws. That is, according to Kant, we do not have any direct knowledge of telic causes. They may exist but we have no way of knowing that they do. For Kant, Blumenbach's theory was appealing for it allowed him to apply mechanical laws to science and the concept of purposiveness or teleology to biology which for Kant lay outside science. So although there was no knowledge that natural organisms were teleologically created, Man could treat them *as if* they were which would help in the discovery of their mechanical laws.

Despite the argument for or against first causes, the similarity here with Darwin's theory of natural selection as a force of Nature is its combined mechanistic and teleological nature;

[119] The definition of 'Nature' is not an easy one and is essentially the central question running through this thesis. Is it a term that refers to the hidden forces behind the everyday perceptions of what we see in the world? Does it refer to the laws that make Nature appear the way it is, for example the laws of natural selection? Is Nature an objective entity independent of our experience of it or is it also subjective including the human mental constructs that make our understanding of it possible? These are just some of the questions that need consideration when deciding whether Darwin's concept of 'Nature' is Romantic or not. Williams (1983, pp. 219 - 224), for example, examines the overlapping definitions of 'Nature' (quality, force and material world, including or not including human beings), and concludes that 'Nature is perhaps the most complex word in the language'. After having examined the historical development of the use of the term, he comes to the use which Darwin seems to employ, namely that of goddess, 'source of original innocence […] joined by nature the selective breeder: natural selection, and the 'ruthless' competition apparently inherent in it, were made the basis for seeing nature as both historical and active. Nature still indeed had laws, but they were the laws of survival and extinction: species rose and flourished, decayed and died. The extraordinary accumulation of knowledge about actual evolutionary processes, and about the highly variable relations between organisms, and their environments including other organisms, was again, astonishingly, generalized to a single name. *Nature* was *doing this and this to species*' [last emphasis mine] (Williams, 1983, pp. 223 – 224), emphasising the notion that Nature is both creator and product of its creation as well as being subject to the laws it creates.

[120] A catastrophe due to rising sea levels.

mechanistic in that scientific laws can be used to explain natural phenomena, and teleologically as the '*as if* clause' can be used to explain the teleological nature of archetypes alongside their genealogical origins. The beauty of Darwin's theory of natural selection, is that like Goethe's 'leaf' and 'vertebrae' archetypes, they are conceptualised through the 'genetic method',[121] thereby avoiding the genealogical-teleological divide as they both exist on a continuum.[122]

Goethe developed the idea of the *Bildungstrieb*[123] in his essay 'First Sketch of a General Introduction to Comparative Anatomy' [1795].[124] Here it is seen as an inner kernel (*innere Kern*) responsible for causing metamorphic development but working against the external forces of the environment. The seal will have the same internal pattern as other land animals ('inner kernel') but will be particularised by the aquatic environment (external force). Balance between these forces is achieved through the laws of compensation, for example 'in the giraffe, the head and extremities are developed at the cost of the main body, while in the mole the reverse is the case' (Richards, 2002, p. 447).

Nature has already been referred to as 'One Reality' in which Man is a part of Nature through his mind being a reflection of mentally-created archetypes. The next section will discuss the concept of Mind in relation to Romantic Nature in greater detail.

2.08 Romantic Nature as Mind

In Darwin's analysis of the imperfect geological record at the time of writing the *Origin*, he reflects on the relatedness of organic as well as inorganic life (in this sense the inorganic is also Romantically 'organic' in terms of its wholeness). This demonstrates that Man's view of Nature does not just consist of a set of empirical perceptions of the natural world but also consists of a mental one – this is a form of rational empiricism in that the rational mind reflects on its empirical sense perceptions.[125] On a collective level of consciousness of all beings this could be seen as akin to Kant's *intellectus archetypus* (or Divine Mind). However, in Darwin's case Mind would be that of Nature without any hint of an independent God; Mind being a reflection of mentally created archetypes (as reflected by

[121] The method described by Goethe in which the mind is able to move backward and forwards between the instance of a form and its archetype, is developed further in this thesis to refer to the mental ability of moving backwards and forwards between a genealogical and a telic view of Nature. This is discussed in the section covering archetypes.
[122] This is discussed in the section on archetypes.
[123] This concept of 'formative force' is discussed in the section on archetypes.
[124] In Goethe, 1985 -98b, 12:126, cited by Richards, 2002, pp. 446-7
[125] Or in Schelling terminology, this reflecting mind could be regarded as a transcendental ego.

his mental 'tree of life', for example) as well as perceptions of individual beings taking on those archetypal forms. Darwin's own thought processes were shaped by the world he saw, both through empirical perception and through intellectual reflection. As discussed later, this can be seen in his moral upbringing, his experience of the slave trade and his wife's family's support of the anti-slavery lobby, all of which concentrated his mind on the differences in races and their origins. This mental reflective insight into the working laws and forces of Nature that became his theory of natural selection is akin to Goethe's vision of the vertebra and plant archetypes when he saw a dead sheep's skull (representing the vertebra archetype) and a 'leaf' (representing the plant archetype) on his travels in Italy. Goethe refers to the vertebra archetype discovery, made on his second Italian Journey in 1790, in his *Zur Morphologie* (1823*):*

> I had already recognised the three hindmost bones of the skull [as vertebra]. But it was only in the year 1791 [*sic,* 1790], as I lifted a battered sheep's skull from the dune-like sands of the Jewish cemetery in Venice, that I immediately perceived the facial bones were likewise traced to the vertebrae (translated and cited by Richards, 2002, pp. 491-2).

This insight of Goethe's is also reflected in a letter he wrote to Karoline Herder[126] on 4th May 1790 in which he says it enabled him 'to take a great step in explaining the formation of animals' (cited by Richards, 2002, p. 420). Over twenty-five years later he described the event in his diary[127] as seeing that the vertebrate skull 'had arisen from transformed vertebrae' (citation translated by Richards, 2002, p. 421).

Goethe's discovery of the plant archetype (the 'Primal Plant' or *Urpflanze*) was made during his first Italian journey (1786 – 1788) which he referred to in a letter to his friend Johann Herder on 17th May 1787:

> I am very close to the secret of the reproduction and organisation of plants, and that it is the simplest thing imaginable […]. To the main question – where the germ is hidden – I am quite certain I have found the answer […]. The Primal Plant is going to be the strangest creature in the world, which Nature herself shall envy me. With this model and the key to it, it will be possible to go on for ever inventing plants and know that their existence is logical; that is to say, if they do not actually exist, they could, for they are not the shadowy phantoms of a vain imagination, but possess an inner necessity and truth. The same law will be applicable to all other living organisms (Goethe, 1970, pp. 310-1).

There are various concepts here taken up by Darwin. The concept of 'primal' or first form is not an archetypal form representing one individual or species at any point in time replaced by others. It is an *underlying structure* that gives life to present and all future forms forever

[126] In Goethe, 1998, 2:126.
[127] In Goethe, 1985 – 98c, 14:17.

reproducing themselves (and in Darwin's case, forever modifying themselves). This is what Goethe means by the possibility of this form 'for ever inventing plants' and 'if they do not actually exist, they could'. These mental ideas or forms are not merely ideas but are ideas governed by laws and are therefore not merely 'shadowy phantoms of a vain imagination, but possess an inner necessity and truth'. Goethe provides natural historians such as Humboldt and Darwin with a 'model and the key' to unlock the secrets of Nature. In this sense the necessity makes the laws of Nature governing our experiences 'rational', yet as discussed in the previous chapter, through their organic nature and the nature of one reality, 'empirical'.

Darwin's indebtedness to Goethe's Romantic notion of archetypes can be seen in one of his two early essays (1842-44) where he echoes the same theory of morphology:

> There is another allied or rather almost identical class of facts admitted under the name of Morphology. These facts show that in an individual organic being, several of its organs consist of some other organ metamorphosed: thus the sepals, petals, stamens, pistils, &c. of every plant can be shown to be metamorphosed leaves … The skulls, again, of the Vertebra are composed of three metamorphosed vertebrae, and thus we can see a meaning in the number and strange complication of the bony case of the brain (Darwin, 1909, p. 215).[128]

When Darwin views 'an individual organic being,' he sees 'several of its organs consist[ing] of some other organ metamorphosed' and this is similar to Goethe's 'Primal Plant' or 'leaf' archetype. And in Darwin's 'metamorphosed vertebrae' can be seen Goethe's sheep's skull.

As previously discussed, for Kant the *intellectus archetypus*[129] was a practical way for Man to refer to Nature *as if* it were caused by God even if this could not be proved (Richards, 2002, p. 68). The *as if* clause is important since it avoids the difficulty of having to prove, or disprove, the existence of God or the first cause of the existence of beings. It is assuming a first cause but without stating it is proved. This enables him to argue for second causes to be driven teleologically by their first cause but without committing himself to its *necessarily* being God. It maintains a link between first and second causes without there having to be a *necessary* one. Treating organisms *as if* they were teleologically regulated helped the biologist in his quest for mechanistic laws to explain Nature, although Kant felt this could not explain the operation of the eye (Richards, 2002, p. 236). Just like Paley, he is assuming that because this clockwork-like-nature of Nature is so complex it must have a purpose, and, therefore, it must have a designer even though we cannot prove it is the work of a

[128] Also cited in Richards, 2002, p. 435, footnote 77.
[129] Kant first mentioned the concept of *intellectus archetypus* in a letter to Marcus Herz on 21 February 1772 (Kant, 1912, I:119, also cited in Richards, 2002, p. 68, footnote 130).

deity. The trouble with this kind of argument is that it is circular. Saying that there is a first cause that could be God does not get rid of the problem of trying to prove first causes; it only shifts it to another argument dealing with the existence of God and whether or not its existence can be proved. All Kant seems to be doing is saying 'that God's existence cannot be proved but just for the sake of argument let's just imagine that he exists'.

For Goethe, on the other hand, the structures or forms producing individual instances of life could be seen in Nature through reflective contemplation and were not seen as teleological manifestations of some external first cause. For Goethe and Schelling, this absolute mind of archetypes could also be seen as reality, as Mind and Nature mirroring each other. Communion with Nature helped develop a deeper understanding and this could be achieved through religion, art, science and love (Richards, 2002, p. 105). For Darwin communion with and reflection on Nature produced the same effect but, unlike Paley, he did not need to resort to a divine cause to aid his understanding. He saw the laws of natural selection through his reflective mind. These were mental categories constructed through reflection yet they could be perceived through the living examples of individuals and were therefore also organic (the individual instances making up the 'whole' of his understanding of Nature).

As discussed earlier, the 'entangled bank' created a vision of competing forces in Nature such as bushes, worms and birds (part of the 'web of affinities'). At a higher mental level the 'entangled bank' could also be seen as representing a web of competing and mutual natural laws such as growth, reproduction, ratio of increase, divergence of character, and extinction. This latter level could be seen as a form of mental reflection akin to Kant's 'web of interactive causes' (Richards, 2002, pp. 67-8).

Reflection is also part of the process of becoming and development of the individual in Nature. Through consciousness the self develops an understanding of the objective world but through the individual's experience also becomes part of the individual's subjective world. This view is expressed by Schelling who believes that self-consciousness and the world are one:

> With the first consciousness of an external world, there also arises the consciousness of my self; and conversely, with the first moment of my self-consciousness, the real world appears before me. The belief in a reality outside of me is established and grows with the belief in the existence of my self; one is as necessary as the other. Both – not speculatively separated but in their complete and intimate interaction – are elements of my life and all my activities (from Schelling's *Werk* (1797), cited by Richards, 2002, p. 133).

For Schelling 'with the first moment of my self-consciousness, the real world appears before me'. The belief in both the self and the outside world are necessary for the life of an individual. Both are intimately connected through their interaction, and this is a reflection of the concept of 'one reality' and 'organicism' discussed in the previous sections.

In the same way as Schelling views the self as forever becoming through experience, so too does Darwin view the world of Nature's species as forever striving to develop themselves through modifications, forever seeking advantage. For Schelling, Man's self is infinite as it is forever developing without limit, yet it produces a finite ego at every moment of time through experience of the world; each perception of an object is an experience in time and place which confirms the existence of that person's self, that person's 'I'. For Schelling, 'nature is visible spirit: spirit is invisible nature'.[130] The self's existence is therefore a form of empirical experience in time held together organically (Richards, 2002, p. 157).

The argument for an organic nature of Mind can therefore be taken to another level. Not only are the species in Nature striving for development, and not only can they be seen to be made up of a collective Mind in the form of archetypal representations, but they also play an important part in Man's development of scientific understanding through reflection. This is an intellectual mental reflective understanding, approaching Kant's *intellectus archetypus*, but not at a divine level independent of Man.

This empirical self, or finite ego, made up of empirical experiences in time and place, can be seen in Humboldt's aesthetic descriptions of Nature. For Humboldt (as discussed in Chapter One), Nature is much more than a collection of scientific data. It is an interaction between empirical experience and the Mind and the way Mind reacts to Nature. The subjective mental experience is also a form of data and should be valued scientifically. The mental reactions are like the colours on an artist's palette used to paint a landscape and are just as important as scientific measurements taken by instruments:

> The Pico de Teide is not situated in the Tropics, but the dryness of the air, which rises continuously above the neighbouring African plains and is rapidly blown over by the eastern winds, gives the atmosphere of the Canary Islands a transparency which not only surpasses that of the air around Naples and Sicily, but also of the air around Quito and Peru. This transparency may be one of the main reasons for the beauty of tropical scenery; it heightens the splendours of the vegetation's colouring, and contributes to the magical effects of its harmonies and contrasts. If the light tires the eyes during part of the day, the inhabitant of these southern regions has his compensation in a moral enjoyment, for a lucid clarity of mind corresponds to the surrounding transparency of the air (Humboldt, 1995, p. 36).

[130] As claimed in his *Ideas concerning a philosophy of nature* [1797] (McCrory, 2010, pp. 159 – 60).

Scientific measuring instruments can only go so far in describing the physical terrain. The instruments can measure the humidity, the strength of the wind and the amount of light. But it is the combination of these physical entities and how they affect the mind that creates the atmosphere and makes the region distinguishable from other regions. It is the 'transparency' which is mentally experienced and which gives the area its 'beauty' and 'the magical effects of its harmonies and contrasts'. In fact Humboldt even goes further than this: the mental experience is more than just an objective picture made up of empirical data; it is a subjective experience that goes to the core of the self but one that can be shared by others as it gives 'moral enjoyment'. And this experience is forever reciprocal as it is constantly flowing between the individual and Nature and back again between Nature and the individual. The 'clarity' produced by the experience is mirrored by the clarity of mind, which in turn is able to give the 'inhabitant' a clearer experience of Nature. But these mental images are more than mere subjective reflections; Humboldt is also intent upon sharing his experiences and knowledge with his readers, and, in so doing, is drawing the readers' own eyes to focus on the truths of Nature, in particular our own finite nature within the infinity of Nature (Sachs, 2007, pp. 47-8):

> The earnest and solemn thoughts awakened by a communion with Nature intuitively arise from a presentiment of the order and harmony pervading the whole universe, and from the contrast we draw between the narrow limits of our own existence and the image of infinity revealed on every side, whether we look upward to the starry vault of heaven, scan the far-stretching plain before us, or seek to trace the dim horizon across the vast expanse of ocean (Humboldt, 1997, p.25).

This 'communion with Nature' creates a feeling of paradox since it enables us to see our smallness, our finiteness, in relation to the vast infinity of Nature, yet we are also part of Nature in terms of our existence in present time and our heritage in past time. This whole experience creates a mixture of familiarity and strangeness (Sachs, 2007, p. 47), the same feeling of ecstasy and dizziness that Darwin experiences when he first arrives at the Tropics. Humboldt feels particularly disorientated when leaving the Canaries behind and entering the 'torrid zone'[131] as the nightly observations of the stars begin to show completely different patterns of what he is used to and he has to rethink his celestial navigation:

> A strange, completely unknown feeling is awoken in us when nearing the equator and crossing from one hemisphere to another; the stars we have known since infancy begin to vanish. Nothing strikes the traveller more completely about the immense distances that separate him from home than the look of a new sky. The

[131] Hot, dry, parched belt of earth between the Tropic of Cancer and the Tropic of Capricorn.

> grouping of great stars, some scattered nebulae that rival the Milky Way in splendour, and regions that stand out because of their intense blackness, give the southern sky its unique characteristics. This sight strikes the imagination of those who even, without knowledge of the exact sciences, like to stare at the heavens as if admiring a lovely country scene, or a majestic site. You do not have to be a botanist to recognize immediately the torrid zone by its vegetation. Even those with no inkling of astronomy know they are no longer in Europe when they see the enormous constellation of the Ship or the brilliant Clouds of Magellan rise in the night sky. Everything on earth and in the sky in the tropical countries takes on an exotic note (Humboldt, 1995, pp. 41-2).

The openness of Humboldt's 'imagination' enables him to 'see' beyond his immediate surroundings. He is able to understand the changes in vegetation that give each region its characteristics, not only in terms of its position on earth but also in relation to the stars and constellations. Here is a paradox which probably contributes to his disorientation. On the one hand Man's view of the universe is subjective, giving him experiences which spark off his imagination. It is this egocentric view of the universe that gives Man his identity, which creates the 'I' that experiences and interprets all the sensations he receives. Yet as soon as Man moves to a different part of the world and experiences it in a different way, the solidity of his identity seems to crumble. It is as if the laws of Nature themselves have changed and that which was previously certain is no longer certain. Yet there is no fear here, just wonder and the need to adapt to this new environment.

Humboldt also sees Nature differently as he steps into the South American jungle and sees both the diversity and the lack of space for plants to develop, which Darwin echoes when he experiences the same scenes. He is again 'shocked' by what he sees and 'confused' as to what is leaf or fruit (Humboldt, 1995, pp. 83 – 40). On 7th February 1800 Humboldt travelled from Caracas to the interior as if in a time machine. His journey took him through space and time, seeing inhabitants in the coastal towns living in the eighteenth century and those in the interior living in ancient times as savage Indians (Botting,1973, pp. 93 – 4). This strangeness of diversity in different stages of development opened up his mind to the concept of development in time and place, the very concept of natural history itself.

This disorienting mixture of familiarity and strangeness creates an openness of mind that enables the observer, through his communion with Nature, to learn from Nature. Instead of the explorer penetrating Nature to exploit it for his own self-interested purposes, Humboldt is opening himself up to be penetrated by Nature in order to learn from its innermost secrets and truths (Sachs, 2007, p. 60). Becoming disorientated through the experience of strangeness and difference (or diversity) helps the observer to learn to 'see'

Nature. It enables the observer to break through the filters imposed on him through his own culture and by questioning them is able to develop a fresh understanding of the world. Disorientation through travel enables this opportunity. This way of looking at the world was one that Humboldt learnt from his mentor George Forster.[132] The comingling of the familiar and the strange can be seen in Humboldt's experience of the trees that produce sap-like milk,[133] the man who was able to feed his motherless child with milk from his own nipples[134] and the Ottamac Indians who 'swallow a prodigious quantity of earth' to prevent the feeling of hunger.[135] In this 'new world […] of untamed and savage nature' (Humboldt, 1995, p. 178), Humboldt finds that Nature speaks to the soul (Sachs, 2007, p. 61). In allowing Nature to overcome the traveller, he does not impose his expectations onto Nature and is therefore better able to be inspired to describe it more accurately (Sachs, 2007, p. 95). As expressed by Humboldt:

> [I have always] considered Nature in a two-fold point of view. In the first place, I have endeavoured to present her in the pure objectiveness of external phenomena; and, secondly, as the reflection of the image impressed by the senses upon the inner man, that is, upon his ideas and feelings[136] (Cited by Sachs, 2007, p. 43).

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[132] In *A Voyage Round the World* (1777), Forster commented: 'the first discoverers and conquerors of America have often, and very deservedly, been stigmatised with cruelty, because they treated the wretched nations of that continent, not as their brethren, but as irrational beasts, whom it was lawful to shoot for diversion; and yet [even] in our enlightened age, prejudice and rashness have often proved fatal to the inhabitants of the South Sea' (cited by Sachs, 2007, p. 57).

[133] 'Of all the natural phenomena that I have seen during my voyages few have produced a greater impression than the *palo de vaca*. What moved me so deeply was not the […] jungles, nor the […] rivers, nor the mountains […], but a few drops of a vegetable juice that brings to mind all the power and fertility of nature. On a barren rocky wall grows a tree with dry leathery leaves; its large woody roots hardly dig into the rocky ground. For months not a drop of rain wets its leaves; the branches appear dry, dead. But if you perforate the trunk, especially at dawn, a sweet nutritious milk pours out' (Humboldt, 1995, p. 158).

[134] 'Francisco Lozano, a labourer […] breast-fed a child with his own milk. When the mother fell ill, the father […] took it to bed and pressed it to his nipples. Lozano […] had never noticed before that he had milk, but the irritation of the nipple sucked by the child caused liquid to accumulate […]. The father […] suckled his child two or three times a day for five months […]. We were assured that during the breast-feeding the child received no other food but his father's milk.' (Humboldt, 1995, p. 87). Humboldt found that this was not confined to American Indians and that there were other instances of this in Syria and Ireland (Humboldt, 1995, p. 302, footnote 49).

[135] 'The Otomacs eat earth; every day for several months they swallow quantities of earth to appease their hunger without any ill effect on their health […]. The earth they eat is a fine oily clay, of a greyish-yellow; they cook it slightly so that its hard crust turns red due to the iron oxide in it […]. The following are the true facts, which I verified. The Otomacs, over months, eat three quarters of a pound of slightly baked clay daily. Their health is not affected. They moisten the clay to swallow it. It was not possible to find out what other vegetable or animal matter the Indians ate at the same time; but it is clear that the sensation of a full stomach came from the clay, and not from whatever else they might eat' (Humboldt, 1995, pp. 266-7).

[136] From Humboldt, 1849 – 70, 3:I.

Here Humboldt combines 'pure objectiveness' with 'his ideas and feelings'. For him this is 'Nature'.

While at the top of volcanoes, Humboldt's feeling can be seen to swing from the Romantic sublime (admiring the beauty of the views below) to trepidation (breathing in the sulphurous fumes and seeing the 'bluish flames dancing around' him). The feelings of trepidation are not romanticized but merely confirm Man's insignificance and underline Humboldt's humility in the face of the laws of Nature which are stronger than human laws (Sachs, 2007, p. 43).

Humboldt wanted science to be available to all the people through a community of knowledge[137] that would harmonize the world. According to Welpley's[138] analysis of *Cosmos*, contemplation of Nature creates 'sensuous' enjoyment (or imagination) and 'intelligent' enjoyment (understanding Nature enabling its universal benefits to be made available to all). The reader of *Cosmos* sees the magic and wonder of Nature, its interconnectedness and thereby his own connection to Nature (like Darwin's 'web of affinities'). In this unity of diversity all are equal, and the printed text of *Cosmos*, which makes this awareness possible, shows how art and science can complement each other. Schiller[139] was critical of Humboldt for dissecting Nature rather than revering it as a God. But as Welpley has demonstrated, Humboldt can be seen as a combined Romantic poet and empirical scientist through his use of 'imagination' and 'understanding'. Schelling was also critical of Humboldt for using a mathematical system of shorthand and symbols ('pasigraphy') to describe Nature, but Humboldt believed that knowledge could only come from verifiable experience which satisfied both the mind and imagination (McCrory, 2010, p. 50). Being engaged with Nature enables the soul to be penetrated by it, passing on knowledge to the observer. Paradoxically this is a union in Nature in which the subjective and objective become one, and can be seen in Humboldt's description of his favourite creature on Tenerife:

> But the bird from the Canary Islands that has the most agreeable song is unknown in Europe. It is the *capirote*, which has never been tamed, so much does he love his freedom. I have enjoyed his sweet and melodious warbling in a garden in Oratava,

[137] Sachs calls this 'Transcendental Mind' or 'spiritual ecology' (Sachs, 2007, p. 91 -2).
[138] His analysis was published with the Latin epigraph 'Mens ingenti scientiarum flumine inundata,' translated as 'A mind inundated with a great flood of sciences', in Welpley, 1846, pp. 598 and 602 – 3(cited by Sachs, 2007, p. 396, footnote 58).
[139] Humboldt contributed an essay, 'The Life Force, or the Genius of Rhodes', (a biochemical hypothesis in the form of a poetical allegory) to the poet Schiller's philosophical journal, *Die Horen* (The Hours). Schiller saw Humboldt as merely reducing Nature to symbols and facts (Botting, 1973, pp. 339 – 40).

> but have never seen him close enough to judge what family he belongs to (Humboldt, 1995, p. 37).

It is for this reason that in *Cosmos* he disagrees with Burke that increased knowledge can ruin a person's experience of Nature[140] (Sachs, 2007, p. 48). For Humboldt, knowledge expands the imagination and enables the individual to 'see' the structure of the world; like Goethe, this can be seen as 'a microcosm in a leaf'.[141] This description of the bird that so much loves its freedom could also be seen as referring to Humboldt's desire to free Man's soul through the gaining of knowledge of Nature, but not just through the gaining of scientific data but through the sensuous delight in interacting with Nature, through the enjoyment of the 'sweet and melodious warbling' that lifts the heart through the experience of Man's oneness with Nature.

The Humboldtian Method of combining 'imagination' and 'understanding' is similar to Goethe's 'Genetic Method' (discussed in the next section on archetypes). This method expresses the mental imaginative ability of being able to move between underlying unifying archetypes and particular individuals enabling the mind to see the formative processes in Nature. Darwin often uses the term 'imagine' when making links in the processes of Nature whether past or present, and it is these imaginative links that enable him to construct his theory of natural selection.

2.09 Romantic Nature as Mind in *On the Origin of Species*

In Darwin's *Origin* this intellectual reflection can be seen in his analysis of geology in support of his theory of natural selection. One of the main difficulties facing Darwin is to prove his theory by providing evidence of intermediate forms but he openly admits that it is difficult to do this due to the very nature of development; that is, intermediate form will move to another intermediate form until a new species is formed, and, as intermediate forms are relatively short-lived, though the whole process is very slow, it will be difficult to find evidence of the whole chain of forms:

> It is just possible by my theory, that one of two living forms might have descended from the other; for instance, a horse from a tapir; and in this case direct intermediate links will have existed between them. But such a case would imply

[140] 'I cannot, therefore, agree with Burke, when he says, "it is our ignorance of natural things that causes all our admiration, and chiefly excites our passions"' (Humboldt, 1997, p. 40).
[141] In a letter to his Genèvan friend Marc-Auguste Pictet in 1805, he says he prefers writing a personal narrative that develops his imagination to a personal adventure: 'My attention was directed to phenomena of every description, and above all it appeals to the imagination. The world likes to *see*, and I there exhibit a microcosm in a leaf'. Here science and emotion are combined to enable the reader to 'see' the wonders of the world (cited by McCrory, 2010, p. 108).

> that one form had remained for a very long period unaltered, whilst its descendants had undergone a vast amount of change; and the principle of competition between organism and organism, between child and parent, will render this a very rare event; for in all cases the new and improved forms of life will tend to supplant the old and unimproved forms (Darwin, 1985, p. 293).

In the same way as nothing is fixed in the formation of species, so too with inorganic Nature. As the levels of land and sea can be shown to have oscillated over millions of years, and as generations of species must have existed over a similar length of time, the collections in geological museums inadequately represent natural history:

> During oscillations of level, which we know this area has undergone, the surface may have existed for millions of years as land, and thus have escaped the action of the sea: when deeply submerged for perhaps equally long periods, it would, likewise, have escaped the action of the coast-waves. So that in all probability a far longer period than 300 million years has elapsed since the latter part of the secondary period […]. What an infinite number of generations, which the mind cannot grasp, must have succeeded each other in the long roll of years![142] Now turn to our richest geological museums, and what a paltry display we behold! (Darwin, 1985, p. 297).

In what way can Darwin's collection of geological evidence towards his theory of natural selection be regarded as Romantic or to have been influenced by the Romantics? Although the evidence is critical to his theory, it is more the mental framework in which it is collected that makes it Romantic and this is where the influence of Humboldt can be seen (as already demonstrated in Chapter One). When Humboldt gathered his data on his South American expedition, he did so objectively through his scientific collection of data and scientific measurements, and, subjectively, through his own personal empirical experience. By 'experience' is not meant merely the perception of sense data but the overall interpretation of both the scientific data and the impressions that the perceptions made on him and how these related to other experiences he had had or others had had. Humboldt not only measured the height of volcanoes and the temperature of their rocks, not only analysed their rock structure, but literally leaned over their craters breathing in their dangerous gases. In climbing high mountains, he not only measured their height with altimeters but also measured his altitude according to the amount of bleeding his mouth was subjected to. He truly experienced Nature and science *personally* (or subjectively) as

[142] Considering that this was written over 150 years ago without the technology at our disposal today to date the age of the earth, its rocks and fossils, and measure the movement of tectonic plates, it is truly remarkable that Darwin was able to describe this so accurately. But this is not merely a description of the age of so many rocks; in stating their age it is also in parallel stating the age of the existence of species that have been found as fossils in these rocks, and in their transmutations reveal that their existence stretches back generation after generation to almost the beginning of time itself.

the title of his work *Personal Narrative* implies. But he did not stop with personal data collection – he related it to data collected in other regions and made comparisons. In this way he combined the subjective with the objective, the artistic narrator with the scientist. In this respect he could be seen as a 'Romantic empiricist'. So too with Charles Darwin. He had learnt from Humboldt how to combine the personal with the objective. He was able to rise up above the personal collection of data and relate it to other data to create a holistic view of the development of the Earth and its species. But importantly he did not allow the scientific analysis to overshadow his personal experience of the perceptions or impressions. This subjective analysis comes across through his imagination of what could be missing in the evidence before him and why it could be missing. This enables him to use this as an argument *for* natural selection rather than against it; on their own, the small number of fossils in museums might be used as an argument against natural selection. The action of the oscillations affects the preservation of the evidence of transitional species as well as the destruction and extinction of life. Such geological records of these periods are therefore bound to be imperfect:

> These periods of subsistence would be separated from each other by enormous intervals, during which the area would be either stationary or rising; whilst rising, each fossiliferous formation would be destroyed, almost as soon as accumulated, by the incessant coast-action, as we now see on the shores of South America. During the periods of subsistence there would probably be much extinction of life; during the periods of elevation, there would be much variation, but the geological record would then be least perfect (Darwin, 1985, p. 308).

From these oscillations, Darwin concludes that during periods of subsidence the number of inhabitants would decrease and the fossil remains would increase due to the preserving properties of the deposits. On the other hand, during periods of elevation of the land shallow parts of the sea would increase making it favourable for the increase in new species but not favourable for their preservation as fossils, thereby leaving a blank geological record (Darwin, 1985, pp. 301-2). Gaps in the geological record could also give the false impression of the formation of new species when species have been forced to migrate due to oscillations in land and sea, and, then, after a long period of time, migrate back to their original habitats (Darwin, 1985, pp. 308-9).

Through Darwin's reflections on Nature, from his own observations and from evidence provided by other naturalists, he is able to break with the tradition of viewing Nature as static. This is central to his argument. He is able to take this bold step by asking the question whether we have 'any right to assume that things have thus remained from eternity' and poses the possibility 'that continents may have existed where oceans are now

spread out; and clear and open oceans may have existed where our continents now stand' (Darwin, 1985, p. 315). At the same time he notes the imperfect condition of the geological record which necessitates his intellectual reflection on what the gaps in the records might tell us (Darwin, 1985, p. 316). From his knowledge of geology, Darwin is also able to explain why, apart from migration, palaeontological collections are so poor. This can be explained by the softness of organisms and the action of rainwater that can dissolve the beds in which the fossils lie (Darwin, 1985, p. 298).

This Romantic concept of mental 'reflection' contributing to Man's understanding of the world is more than just an idea; it is a mental enabler helping to bring Man closer to Nature, removing barriers and prejudices that prevent Man from seeing Nature in the raw for what it is. 'Reflection' is not just thinking about the experience of the moment but putting it in the context of all other experiences in time and place and relating them to each other. At an intellectual level this rational empiricism is Darwin's form of Romantic biology (and as such can also be called Romantic empiricism as previously suggested). As mentioned earlier with reference to Humboldt, 'reflection' is contemplating isolated data, making comparisons between data collected in different regions at different times by the same or different naturalists. But the 'reflection' is not just a reflection on data, it is also a 'reflection' on the subjective sensations and impressions received from Nature. The objective and subjective are combined to create the Romantic empiricist (or the Romantic rational empiricist as the mental faculties collect, compare and analyse data coming from both objective and subjective sources). For Darwin, reflection enables him to grasp the concepts of change, time and variations, making him move away from a 'plan of creation' that only creates a circular argument:

> The chief cause of our natural unwillingness to admit that one species has given birth to other and distinct species, is that we are always slow in admitting any great change of which we do not see the intermediate steps […]. The mind cannot possibly grasp the full meaning of the term of a hundred million years; it cannot add up and perceive the full effects of many slight variations, accumulated during an almost infinite number of generations […]. It is so easy to hide our ignorance under such expressions as the 'plan of creation,' 'unity of design,' &c., and to think that we can give an explanation when we only restate a fact (Darwin, 1985, pp. 452-3).

At the time of the publication of the *Origin*, the received view of Man's place in the world was that he was a special species higher than all others and could therefore not be included

with animal species or plants.[143] God was perfect and Man was almost perfect. He could not perfect himself anymore otherwise he would be God. From this perspective Man was not mutable and so could not change or improve himself any further.[144] On Darwin's view, however, Man is a part of Nature just as all other beings are. He is subject to the same laws of Nature and therefore subject to the same changes according to those laws. In other words he is just as mutable as other species are. He is not a higher being in this respect, although his 'reflective' powers enable him to engage in scientific research which other beings are unable to do.

The 'reflective' process is a cyclical process. Darwin's first-hand experience of Nature and his reading of geologists of the time, such as Charles Lyell's *Principles of Geology* [1830-33][145] (Lyell, 1997) which he took with him on the voyage of the *Beagle*, enabled him to put his experiences within the context of oscillations of land and the preservation of fossils, etc. This 'reflection' then created another form of 'reflective' glasses to examine Nature with, but these 'reflections' were never fixed as they were continually being adjusted according to further experiences of raw data gained from Nature. In short he was a true modern scientist testing out his theories in the field, but, at the same time, a Romantic natural philosopher, not letting his objective science become divorced from his subjective personal experiences of Nature obtained first hand (or second hand via the experiences of other naturalists and geologists). This is illustrated when Darwin refers to Lyell and Dawson's discovery of carboniferous beds with recurring deposits of the same fossil remains, making him 'reflect' and conclude that the species concerned could not have lived in the same place for the whole period and that therefore they must have appeared and reappeared

[143] Until 1859 and the publication of the *Origin*, all evolutionary theories were teleological in that development was seen as part of the chain of being's striving towards perfection. The 'Great Chain of Being' was a concept derived from Plato and Aristotle in which there was a strict hierarchical structure in Nature with God at the top working down through angels, kings, noblemen, men, animals, plants, metals and minerals. Before Darwin, there was no connection between the species. Alexander Pope's *An Essay on Man* [1734], in which all living organisms had their proper place, still reflected this view up until the *Origin* (Landow, 2013, p. 1).

[144] Owen, for example, 'abominated talk of chimpanzee-ancestry or life's self-development. With the life-force limited, no individual can stretch beyond the organization marking out its species. A mollusc cannot spontaneously increase its vital force to 'develop new organs' or 'mutate into a mackerel' (Desmond and Moore, 2009, p. 223).

[145] 'The science of Geology is enormously indebted to Lyell – more so, as I believe, than to any other man who ever lived. When [I was] starting on the voyage of the *Beagle*, the sagacious Henslow, who, like all other geologists, believed at that time in successive cataclysms, advised me to get and study the first volume of the *Principles*, which had then just been published, but on no account to accept the views therein advocated. How differently would anyone now speak of the *Principles!* I am proud to remember that the first place, namely, St. Jago, in the Cape de Verde Archipelago, in which I geologised, convinced me of the infinite superiority of Lyell's views over those advocated in any other work known to me' (Darwin, 1995, pp. 33 – 34).

many times.[146] Like Humboldt before him, he is sifting, collating and comparing data from his own experiences and the experiences of other naturalists. As a natural *historian* he is developing the *narrative* of creation from the beginning of species by theorizing on how they developed according to the probability that the evidence provides. This can be seen in the tentative use of his words such as 'probability', 'perhaps', 'if such species were to', and 'a section would probably not include'. The raw data is the 'objective science', the imaginings are the 'subjective science', yet together they create a Romantic empirical science. As explained before, Nature can be seen as 'Mind' if it is understood to be a reflection of what the perceiver sees through his sense experiences, *and* a reflection of Man's understanding through his rational powers of theorizing about the world as science; Nature can therefore be seen to be Romantically rational *and* Romantically empirical.

Darwin also gives an example of fossilised trees demonstrating the long amount of time required for the deposition process to take place which again weakens the divine creation argument (Darwin, 1985, p. 304). By travelling to far flung countries and experiencing Nature first hand, Darwin is able to see that there is no fixed law of development. He can see that species do not all modify themselves in the same way and that this depends on the conditions of the country and the relationship between the inhabitants (Darwin, 1985, pp. 318-9).

By relating these 'complex contingencies' through his 'reflective' thinking, Darwin is able to formulate his theory of natural selection. Although these are abstract mental constructs, they refer to laws in Nature enabling species to be mutable. The mental relationships of the constructs making up Darwin's theory mirror a corresponding set of laws actually existing in Nature driving changes in species to come about. In this sense Nature is organic and therefore Romantic: the abstract and the actual combine to form the whole. This interrelatedness of the parts of Nature is also reflected in Darwin's 'reflective thinking'. This conceptual framework of his thinking that makes up his theory of natural selection is also connected up to form a 'web of affinities'; for example, the concepts of time and place,

[146] 'Messrs Lyell and Dawson found carboniferous beds 1400 feet thick in Nova Scotia, with ancient root-bearing strata, one above the other, at no less than sixty-eight different levels. Hence, when the same species occur at the bottom, middle, and top of a formation, the probability is that they have not lived on the same spot during the whole period of deposition, but have disappeared and reappeared, perhaps many times, during the same geological period. So that if such species were to undergo a considerable amount of modification, during any one geological period, a section would not probably include all the fine intermediate gradations which must on my theory have existed between them, but abrupt, though perhaps very slight, changes of form' (Darwin, 1985, p. 304).

slowness of development, appearance of new forms and disappearance or extinction of old forms:

> The theory of natural selection is grounded on the belief that each new variety, and ultimately each new species, is produced and maintained by having some advantage over those with which it comes into competition; and the consequent extinction of less-favoured forms almost inevitably follows. It is the same with our domestic productions: when a new and slightly improved variety has been raised, it at first supplants the less improved varieties in the same neighbourhood […]. Thus the appearance of new forms and the disappearance of old forms, both natural and artificial, are bound together (Darwin, 1985, p. 323).

Darwin argues that his theory of slow development shows that species change over time according to advantage. They do not *necessarily* diverge from those that came before as divergence only depends on what advantages can be gained for the species. This depends upon the conditions of the habitat and its inhabitants. Therefore some are more modified than others and exist longer than others (Darwin, 1985, p. 322). On his travels to the Galapagos Archipelago, Darwin noted that not all migrant species and aboriginal species modified themselves if no advantage was required. In other words, certain aboriginal and migrant species could live side by side without being in direct competition with each other (Darwin, 1985, p. 389).

Another subtle thought process expressed in relation to the Galapagos is how migrating species from distinct genera can adapt themselves to their habitat in the same way as the aboriginal species. Some migrants may give the appearance of being related to the aboriginals, but in fact are species from different genera. This just demonstrates that both species have adapted themselves to their habitat in a way which is the most advantageous to them, and that both have found the same advantage without being related to each other.[147] This may seem obvious but actually demonstrates Darwin's 'reflective' thinking that goes beyond specific sense data. Someone comparing two similar animals or plants may assume they come from the same progenitors, but this is not necessarily the case (Darwin, 1985, p. 389). Darwin's reading of Lyell and his own experience of different geographical regions enabled him to make comparisons between species that were the same and species that had modified themselves over time. From this data he was able to determine that similarities were due to 'bonds of inheritance' and dissimilarities were due to migration with modifications as well as barriers preventing migration such as mountains and large rivers. Seeing species of the same genus in different areas convinced Darwin that they must have migrated.

[147] This is now called 'convergent evolution'.

Through his 'reflective' thinking, Darwin comes back to Nature to carry out his own experiments to test out his theories of migration. He carries out all kinds of experiments on seeds to see if they can be transported by driftwood, dead bird crops, bird excrement, beaks, feet and icebergs, and whether they can maintain their powers of germination (having been immersed in sea water for long periods of time). He does similar experiments on snails (Darwin, 1985, pp. 354-8). On reflecting on the similarities of species on mountain tops in the United States and Europe, Darwin is able to theorize on the effect of the ice age on species distribution and concludes that plant and animal species would move up and down the mountains according to the temperature changes as well as mingle with the ancient species thus creating modifications (Darwin, 1985, pp. 360-2).

These important comparisons hark back to Humboldt's establishment of plant geography in which he not only compares the vegetation at different heights on one mountain, but compares the vegetation at the same heights on different mountains, noting their similarities and differences. As he was climbing the volcano of Tenerife he realized that the principles of vertical geography were the same as the principles of horizontal geography, and this developed his 'habit of viewing the globe as a great whole' (Sachs, 2007, p. 52). His sketches and commissioned plates show the geographical distribution of plants in detail, including such factors as sea level, temperature and the exposure to other plants.[148] The plates are not just a snapshot of physical data, but a plant geography experienced personally, as his own body experienced the changes in altitude (see Appendix A, Plates 1 and 2). There is a feeling that as he experiences these changes in Nature more deeply, he becomes more subjected to Nature rather than the explorer imposing himself on Nature. In this position of immersion he is able to experience the whole, yet, at the same time, as a scientist taking measurements, he is also able to describe it objectively. Humboldt's plates can be viewed both as works of beauty and art displaying the wholeness and unity of the mountain ranges in relation to other ranges and their vegetation, and as works of scientific research displaying the detailed data of their height and plant names (Botting, 1973, pp. 207 – 8; McCrory, 2010, p. 123). So too with Darwin, but for him his imagination goes beyond the personal and objective experiences of the plant geography of mountains (whether this be in the form of art or science); for Darwin it is the uncovering of the secret

[148] First published in Paris in 1825, and reproduced in Lack, 2009, pp. 47 -8: plate 28 Geography of the Plants near the Equator, 1803, profile of the Andes from west to east, ink and watercolour on paper; plate 29 Geógraphie des plantes équinoxiales, 1807, profile of the Andes, coloured engraving, Paris; plate 30 Geographiæ plantarum lineamenta, 1815; plate 31 Vegetation profile on Chimborazo,1825, coloured stipple engraving. See also thesis Plates 1 and 2 in Appendix A.

of Nature that Humboldt only caught a surface glimpse of. For Darwin it was not the overview of Nature from the height of a mountain top (or comparatively of the mountain ranges through sketches) as with Humboldt; it was the secret of the inner force of Nature through its inner laws in the form of natural selection. For Darwin, the more he scratches away at the surface of Nature, the more its secrets are revealed.

From 'tide marks' left on mountain tops, and with inspiration from Lyell, Darwin is able to understand how species can get stranded from rising waters and how this can combine with natural selection to create great cycles of change (Darwin, 1985, pp. 372-3).

> As the tide leaves its drift in horizontal lines, though rising higher on the shores where the tide rises highest, so have the living waters left their living drift on our mountain-summits, in a line gently rising from the arctic lowlands to a great height under the equator. The various beings thus left stranded may be compared with savage races of man, driven up and surviving in the mountain-fastnesses of almost every land, which serve as a record, full of interest to us, of the former inhabitants of the surrounding lowlands (Darwin, 1985, pp. 372-3).

From the above it is clear that Darwin is not merely restating fact. By relating the stranded species to stranded 'savage races of man' he brings home the feeling of isolation and survival that is part of the struggle of existence and the concept of natural selection. In referring to the 'savage races of man' being 'driven' up the mountains there is an extra emphasis on the concept of struggle as Darwin witnessed both natives suffering hardships due to their difficult habitats and slaves suffering brutal treatment from their masters. In both cases Man could be seen to be driven away from his own habitat and into isolation. Well after Darwin, remains of isolated cavemen have been discovered supporting this very image and today, during extended periods of drought in countries such as Sudan, thousands of families die during mass migrations in search of food and water. Whereas Humboldt mapped a plant geography, Darwin mapped a genealogical plant *and* palaeontological geography revealing the history of Nature through its development in time and place. Darwin's famous 'tree diagram' showing the development of species, is in a sense a 3D version of Humboldt's plant geography plates. Darwin goes one step further by digging deeper to show their historical relationships rather than just the way they are now and extending this to cover all life. But the experience is just as Romantic, if not even more so, in relating all the mental constructs making up this image of Nature.

The next section will examine in greater detail the archetypes that make up these mental constructs comprising Nature and why they might be regarded as Romantic.

2.10 Romantic Nature as Archetype or Idea

There is a tension between two interpretations of the meaning of the concept of 'archetypes'. One interpretation is that they are pre-formed genealogically from a primordial form (or primordial forms), and the other is that they are teleological forms seeking perfection. Darwin's use of the concept is a complex mix of the two. This allows for both a material genealogically based primordial form fixed in space and time, and evolving teleological forms seeking perfection; forms that are constructed from Man's understanding of the world and therefore may be interpreted as belonging to a collective mind, whether this be in the form of God or Nature.

As a student at Cambridge, and through his friendships with academics such as John Stevens Henslow,[149] botanist and mineralogist, and Adam Sedgwick,[150] geologist, he would have socialised in intellectual circles familiar with Romantic concepts such as 'archetype'. Richard Owen, a comparative anatomist and associate of Darwin's, uses the term,[151] as does Darwin in his *Origin.*[152]

Richards (2002) argues that Romantic thinkers such as Goethe and Schelling believed that Nature was organically composed of archetypes that developed towards their ideal forms (Richards, 2002, p10). They argued against Kant's *intellectus archetypus*[153] in which the

[149] List of letters between Henslow and Darwin during *Beagle* Voyage 1831 – 1836 at Burkhardt (2009a), p. 633.

[150] Letter to Darwin from Sedgwick on 18 September 1831 giving advice on what geology books to read as well as reference to Humboldt's *Personal Narrative in* Burkhardt *(2009a), p. 157.*

[151] Owen writes about the concept of the vertebrata archetype in Owen, 1847 and Owen, 1849, cited by Richards (2002), footnote 33, p. 528. Richards summarises Owen's archetype as follows: 'The archetype of the vertebrata, in Owen's construction, was simply a string of vertebrae. According to his theory, different vertebrate skeletons manifested modifications of this basic plan. So for instance, the bones of the head would be regarded as a development of the several anterior vertebrae, and the ribs, pelvis, and limbs as developments of different processes of more posterior vertebrae' (Richards, 2002, p. 528).

[152] In his Glossary to the *Origin*, Darwin defines 'Archetypal' as follows: 'Of or belonging to the Archetype, or ideal primitive form upon which all the beings of a group seem to be organised' (Darwin, 1985, p. 464). Darwin refers to it when discussing Classification: 'If we suppose that the ancient progenitor, the archetype as it may be called, of all mammals, had its limbs constructed on the existing general pattern, for whatever purpose they served, we can at once perceive the plain signification of the homologous construction of the limbs throughout the whole class' (Darwin, 1985, p. 416).

[153] Outlined in Kant's introduction to his third *Critique*, the *Critique of Judgement* (cited by Richards, 2002, p. 68). This argument is based on their interpretation of Kant's 'noumenal' world existing separately from the human world of experience. However, it can be argued that Kant was not saying there was a separate 'noumenal' world, only that humans could not access this world through experience. Kant explains the 'Understanding' of the world (an intellectual bridge between the particular and the universal) as follows:

Divine mind was the sum total of archetypes (or ideas) and against an objective 'noumenal' thing-in-itself world of objects existing separately from the human world of experience. For followers of Goethe, such as Humboldt, who died in the same year the *Origin* was published, Nature was just the sum total of its parts. His 'cosmos' did not appear to require a Divine creator or a separate existence independent of the human experience as he did not refer to God or a Creator.[154] Despite their differences over the Divine mind and the 'noumena', they did however share their view that the parts of Nature could not be understood without understanding the whole, the 'web of affinities'[155] (using Darwin's term). As already discussed earlier in the section on the 'Romantic Forces of Nature', for Kant we have to think *as if* Nature were the product of a Divine mind for practical reasons.[156] Kant also believed that despite their differences, animals displayed common patterns or archetypes which were purposeful or teleological and had been consciously created by an intentional being or *intellectus archetypus*. However, he did not believe there was any empirical evidence to support the notion of species transition (Richards, 2002, p. 233).

Schelling's notion of evolution was developed from the notion of the evolution of the embryo, that is, the unfolding of the adult form from a form or archetype that already existed.[157] The form just required temporal development (Richards, 2002, p. 144-5). Through this notion, Schelling developed the notion of the archetype to unite the universal idea with the particular instance in Nature. Through Man's conscious experience and

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'The Understanding by the possibility of its *a priori* laws for nature, gives a proof that nature is only cognised by us as phenomenon; and implies at the same time that it has a supersensible substrate, though it leaves this quite undetermined. The Judgement by its *a priori* principle for the judging of nature according to its possible particular laws, makes the supersensible substrate (both in us and without us) determinable by means of the intellectual faculty. But the Reason by its practical *a priori* law determines it; and thus the Judgement makes possible the transition from the realm of the concept of nature to that of the concept of freedom' (Kant, 1914, unnumbered page, IX, 39).

[154] Neither the word 'God' nor 'Creator' appear in *Cosmos* and he was attacked at the time of publication for not offering any 'proofs of divine design' (Rupke, 1997, p. xxii).

[155] For Kant this 'web of affinities' can be seen in his concept of matter which is reduced to the powers of attraction and repulsion, that is 'the fundamental polarity of all beings, a polarity that penetrates and animates the infinite manifold of appearance'. Through attraction and repulsion, all parts of Nature can be seen as related through their interactions (Kant's *Metaphysische Anfangsgründe der Naturwissenschaft*, translated as *Metaphysical foundations of natural science,* cited in Richards, 2002, p. 429). Humboldt uses the term 'chain of connection' (Humboldt, 1997, p. 23).

[156] According to Kant, the human mind treats Nature *as if* it were the product of a divine mind or *intellectus archetypus*. Kant refers to this in his third *Critique* (cited by Richards, 2002, p. 68).

[157] This concept is often referred to as 'ontogeny recapitulates phylogeny' or 'recapitulation theory' and is attributed to Ernst Haeckel's use of the theory in 1866 (Encyclopaedia Britannica, 2015b, unnumbered page). However, Haeckel was influenced by Goethe's morphology and Schelling's philosophy of Nature (European Graduate School, 2015, unnumbered page).

interaction with Nature, he was able to objectively represent the deep structures in Nature. This was known as Schelling's Identity Theory (Richards, 2002, pp. 187-9). Although Darwin was using his 'tree of life' to refer back genealogically in time to common progenitors, the tree can also be seen as representing genealogical archetypes or forms that enable Man to consciously interact with and reflect upon Nature. Without these forms Man would not be able to understand Nature at all, and, as a naturalist or biologist, would not be able to construct any scientific theories.

Goethe developed the notion of *Urtypus* (or formative force or *Bildungstrieb)* which was the fundamental archetype that included the *Urpflanze*, or plant archetype, and the vertebrae archetype. The *Urpflanze* was the archetype of all plants. The idea of the 'transcendental leaf' existed in all seeds. As the plant developed from the stem so would the leaf develop into flowers and then seeds again. This involved the forces of repulsion and attraction as the leaf developed from one thing into another. A development in one resulted in a reduction in the other and Goethe called this the 'law of compensation'.

The idea of the *Urpflanze* came to Goethe while walking in the Public Gardens of Palermo, Sicily, on the 17th of April 1787 during his *Italian Journey* [1786-1788]. Seeing plants in their natural environment enabled him to see their natural forms:

> Here where, instead of being grown in pots or under glass as they are with us, plants are allowed to grow freely in the open fresh air and fulfil their natural destiny, they become more intelligible. Seeing such a variety of new and renewed forms, my old fancy suddenly came back to mind: Among this multitude might I not discover the Primal Plant? There certainly must be one. Otherwise, how could I recognise that this or that form *was* a plant if all were not built upon the same basic model? (Goethe, 1970, pp. 258-9).

During his second Roman visit on 31st July 1787, he refers back to his visit to the gardens saying that the idea of the '*leaf*' as the Primal Plant came to him 'in a flash':

> While walking in the Public Gardens of Palermo, it came to me in a flash that in the organ of the plant which we are accustomed to call the *leaf* lies the true Proteus who can hide or reveal himself in all vegetal forms. From first to last, the plant is nothing but leaf, which is so inseparable from the future germ that one cannot think of one without the other (Goethe, 1970, p. 366).

This insight made him realise that the archetype could not be seen empirically but could only be understood intellectually. He also realised that there was a commonality amongst the form of all plants that made them recognisable as plants and that all the parts of a single plant had a similar structure (Miller, 2009, p. xviii). Miller agrees with Richards that Goethe echoes Spinoza's holistic view of Nature, citing Goethe's view that we can only

understand the inner laws of Nature if we employ the eyes of the mind as well as the eyes of the body, that is, by employing 'sensory and intuitive perception', ensuring a balance between the 'human spirit' and 'the informing spirit of nature' (Miller, 2009, p. xviii). Goethe, like Spinoza, 'coupled rigorous empiricism with precise imagination to see particular natural phenomena as concrete symbols of the universal principles, organizing ideas, or inner laws of nature' (Miller, 2009, p. xviii). This is key to the understanding of the inner archetypal nature of things: starting with a sensory perception of the world (empiricism) but then 'seeing' the particular instances of objects as 'symbols of the universal principles' (imagination); that is, insight into the secret laws of Nature. For Humboldt his imagination took the form of aesthetic understanding; for Darwin it took the form of the law of natural selection. Both employed 'the eyes of the body' and 'the eyes of the mind'. In this context the physical and the mental aspects of Nature become a unified whole, striving for perfection on the one hand, yet through human imagination on the other hand bringing out the forms of the structures, almost an act of turning objects inside out revealing their hidden natures. For Goethe this revelation of their hidden natures can be seen in his understanding of the development or metamorphosis of plants; he saw this as depending on two processes, '*intensification*' (the striving for perfection) and '*polarity*' (the state of constant attraction and repulsion like electricity and magnetism) – seeds develop into plants and then form seeds again. But this process is dialectical in that the process depends on both the inner law of Nature as well as the external law of the environment[158] (as with Humboldt's 'plant geography'). The inner potential or formative force of organic beings (*Proteus in potential)* is realised or actualized through organic forms such as leaves, petals, backbones, etc. *(Proteus actus).* But the actual structures adapt to the environmental conditions (*Proteus actus adaptatus*).[159] This is the Romantic notion of wholeness and unity in Nature that involves 'the interdependence of organism and environment, as well as organism and organism' (Miller, 2009, pp. xx – xxi). This unity of Nature, according to Goethe, can also be seen as a unity of understanding in Man expressed through the union of science and poetry (also endorsed by Humboldt).[160] In

[158] Goethe gives examples of leaves adapting to different environmental conditions: 'The leaves of underwater plants likewise show a coarser structure than those of plants exposed to the open air; in fact, a plant growing in low-lying, damp spots will even develop smoother and less refined leaves than it will when transplanted to higher areas, where it will produce rough, hairy, more finely detailed leaves' (Goethe, 2009, p. 19).

[159] See Miller, 2009, p. xxi).

[160] 'The great naturalist Alexander von Humboldt dedicated an 1806 book to Goethe with an illustration featuring The Metamorphosis of Plants and imagery suggesting, true to Humboldt's

addition to his essay, Goethe also wrote a poem on 'The Metamorphosis of Plants' in which this union of science and poetry is clearly expressed through his description of the secret laws of Nature, the power of development in the seed with its pre-formed forms:

> Like unto each the form, yet none alike;
> And so the choir hints a secret law […]
> Gaze on them as they grow, see how the plant
> Burgeons by stages into flower and fruit,
> Bursts from the seed so soon as fertile earth […]
> Asleep within the seed the power lies,
> Foreshadowed pattern, folded in the shell,
> Root, leaf, and germ, pale and half-formed.[161]

This idea or archetype was not a thing that could be seen empirically in particular objects, but could only be seen by the inward eye (Richards, 2002, p. 452). This was the same for the animal archetypes but, unlike the plants, reversal in development was not possible. Vertebrae developed reciprocally in an organism at the same time, but differently modified in the neck and tail for example. Owen collapsed this distinction between plant and animal archetypes and did not see one form evolving from another as in the case of the leaf. Owen saw the archetype as a Platonic Idea coming from the mind of the Creator God. For Owen, God had the power to create new species but he did not believe that species could transmute or 'evolve' into new species (Richards, 2002, p. 531).

For Goethe, form is about becoming and transformation ('Asleep within the seed the power lies'). For him this is the key to all Nature, seen and not seen ('Foreshadowed pattern, folded in the shell'). Inorganic forms such as rocks are developed passively whereas the organic forms of Nature are able to reproduce themselves (Richards, 2002, pp. 453-4). Although Man can experience the forces of Nature empirically through experience, Goethe believed that the whole experience of life could only be experienced through the non-physical eye, and this applied both to the experience of Nature and the experience of the self. The becoming of form (for example the shape and size of an animal's neck or tail) was the result of the interaction between the archetype or *Bildungstrieb* and the external forces in the environment. Through his poem 'The Metamorphosis of Plants*'* and his essay *The Metamorphosis of Plants* [1790] (Goethe, 2009)*,* Goethe believes he can uncover the archetypes that express this force of Nature (Richards, pp. 466-7). Whereas for Goethe the force of Nature was the sum total of eternal archetypes seeking development towards their perfection, Darwin's force of Nature was natural selection. Yet there is a similarity in that

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Romantic sympathies, that poetry as well as science can succeed in uncovering the secrets of nature' (Miller, 2009, p. xxiv).

[161] Extract from Goethe, 1949, cited in Goethe, 2009, p. 1.

for both Darwin and Goethe, modifications are the result of interactions between forms and their environment. For both, despite these modifications, the essential internal forms or archetypes remain the same. As with Darwin's 'incipient species' in the development of species, Goethe identifies intermediate forms in the metamorphosis of plants in which change cannot be achieved in one step and must be produced through 'intermediate agents' as 'gradual transitions':

> However rapid the transition from corolla to stamens in many plants, we nonetheless find that nature cannot always achieve this in a single step. Instead, it produces intermediate agents that sometimes resemble the one part in form and purpose, and sometimes the other. Although they take on quite different forms, almost all may be subsumed under one concept: they are gradual transitions from the petals to the stamens (Goethe, 2009, pp. 44-5).

The notion of archetypes in Nature is now discussed in relation to Darwin's use in his work.

2.11 Nature as Archetype or Idea in *On the Origin of Species*

For Goethe the key to understanding Nature is becoming and transformation. Darwin was familiar with Goethe as he is referred to in the *Origin*, for example when discussing the 'law of compensation':

> The elder Geoffroy and Goethe propounded, at about the same period, their law of compensation or balancement of growth; or, as Goethe expressed it, 'in order to spend on one side, nature is forced to economise on the other side' (Darwin, 1985, p. 185).

Becoming and transformation are also regarded by Darwin as a key to understanding Nature and this is evident when Darwin talks about flowers being 'metamorphosed leaves', an obvious reference to Goethe's 'leaf' archetype outlined in his essay *The Metamorphosis of Plants* (and his poem of the same title):

> It is familiar to almost everyone, that in a flower the relative position of the sepals, petals, stamens, and pistils, as well as their intimate structure, are intelligible in the view that they consist of metamorphosed leaves, arranged in a spire (Darwin, 1985, p. 417).

This reference to the metamorphosis of leaves is almost exactly the same as Goethe's, showing that there is at least some influence from Goethe in terms of the archetypes of plants and animals.

For Darwin, the evidence of gradual development reveals the laws of natural selection. Gradual development can be seen through the endurance of species in time and space. Modifications over time hide the essential blood ties between species with their essential

hidden forms remaining unchanged. All are linked together through space and time, and their endurance can be seen in deposits in rock strata (Darwin, 1985, p. 395).

This endurance of species' blood ties is due to the essential hidden forms remaining unchanged and is summed up by Goethe as 'their inner essence':

> The different plant parts with their apparent variety of forms are nonetheless identical in their inner essence (Goethe, 2009, p. 54).

The 'inner essence' as archetype is the same whether the plant part is the leaf, the flower, the fruit (or the seed), and is therefore the same throughout the reproductive cycle:

> Whether the plant grows vegetatively, or flowers and bears fruit, the same organs fulfil nature's laws throughout, although with different functions and often under different guises. The organ that expanded on the stem as a leaf, assuming a variety of forms, is the same organ that now contracts in the calyx, expands again in the petal, contracts in the reproductive apparatus, only to expand finally as the fruit (Goethe, 2009, p. 100).

Central to my argument in demonstrating a link between Goethe and Darwin is the use of the Romantic concept of the archetype. But the link goes beyond the mere use of the archetype. It can also be argued that the *method* of its use is also Romantic; that is, how the mind through its overview of forms and structures is able to *imaginatively* capture the organic whole of the essence of Nature. Goethe believed that science, poetry and art could jointly uncover the secret essence of Nature. He had already written an essay and a poem on 'The Metamorphosis of Plants' and was hoping one day to illustrate his essay but never got round to it (Miller, 2009, p. xxviii). He believed that illustrators, as well as scientists and poets, could also capture the essence through light, shadow and perspective (Miller, 2009, p. xxviii). This is why Miller added his photographic illustrations to his edited edition of Goethe's *Metamorphosis of Plants* (Goethe, 2009).[162] But the illustrations do much more than just illustrate the plant. They show how the lower leaves of a plant metamorphose into the upper leaves and by the observer moving their eye up and down the plant they are able to understand the archetype or essence of *all* plants. Goethe calls the method for finding out how the diversity of physical forms emerges from their underlying unity, the 'Genetic Method'. This does not refer to the science of genes as we know it today but to 'the origin or genesis of things' (Miller, 2009, p. 105). My argument is that Darwin also uses this method when identifying common forms by winding back (genealogically) the developmental process through time and space and then forwards (teleologically), again

[162] 'It is my hope that the present illustrated edition, while not the full sequel that Goethe envisioned, will nevertheless aid the metamorphosis of that tree of knowledge toward diverse and wide-spreading foliage and particularly deep roots', Miller, 2009, p. xxix).

and again, like rewinding and forward-winding a film in order to understand its concepts better. Through seeking the origin of the creation process, both Goethe and Darwin are seeking out the steps that make the diversity of creation possible. This is summed up by Goethe as follows:

> If I look at the created object, inquire into its creation, and follow this process back as far as I can, I will find a series of steps. Since these are not actually seen together before me, I must visualize them in my memory so that they form a certain ideal whole. At first I will tend to think in terms of steps, but nature leaves no gaps, and thus, in the end, I will have to see this progression of uninterrupted activity as a whole. I can do so by dissolving the particular without destroying the impression itself (from Goethe, 1988, p. 75, cited by Miller, 2009, p.105).

This method enables the observer to move backwards and forwards between the relatively fixed forms and the formative processes, between the underlying unifying archetypal essences and the particular individuals. As previously discussed, this is the movement between producer and product, or, as Spinoza would put it, *Natura naturans ('Nature naturing') and Natura naturata ('Nature natured').* It is the imaginative ability of the 'Genetic Method' that enables the observer to understand the essence of Nature through its laws and through its unified form of creator and creation. For Goethe this imagination (of creator and creation) is expressed through the line in his poem 'gaze on them as they grow' (Goethe, 2009, p. 1) and, for Darwin, it is expressed in his description of the 'entangled bank' that sums up his theory of natural selection. Miller explains this imaginative process of the 'Genetic Method' through reference to his illustrative photos showing the metamorphic process. According to Goethe the 'Genetic Method' involves understanding the sequence of changing forms as well as the 'exact sensory imagination'. In his 'Image 55: Leaf sequence in *Sidalcea malviflora*', Miller explains the sequence of changing form by showing four leaves developing upwards from a rounded shape to a less rounded shape with incisions (see Appendix A, Plate 3). By looking at all the leaves as a whole we can see the 'sameness in the midst of the differences':

> The leaves become larger and less rounded, the incisions grow into definite divisions, but the original plan is still evident in the pattern of the veins. Thus there is sameness in the midst of the differences (Miller, 2009, p. 106).

The 'exact sensory imagination' is achieved by reviewing the sequences, then internalizing them as visual images, and then through the imagination going backwards and forwards between them. The mind is then able to transform one into the other, from formative to finished form, and, back again, from finished form to formative form. This is where the process of the metamorphosis of the plant becomes alive in the imagination of the mind, where the Mind and Nature also become unified. As expressed by Miller:

> What was successive in one's empirical experience then becomes simultaneous in the intuitively perceived idea – *Proteus in potentia*. Instead of an onlooking subject knowing an alien object, this is knowledge through participation, or even identification, of observer and observed – knowing things from the inside (Miller, 2009, p. 111).

I would like to argue, therefore, that Darwin's classification system of Nature is not just a naming system as created by Linnaeus but a system that reveals the process and community of descent through the genealogical 'tree of life' using the 'Genetic Method'. The 'tree of life', I would argue, is a 'Genetic Method' as it portrays the relationships of the morphological process going both forwards and backwards in time. The arrangements of the species in the tree reveal the degree of modifications over time and are arranged accordingly as are the intermediate groups. This is seen by moving backwards and forwards between the particular and the underlying forms. The changes over time highlight the dominant groups which make up the largest orders and these reflect those that have been successful or those that have failed and become extinct. Referring to the diagram in Chapter Four of the *Origin*, pp. 160-161, Darwin expresses this as follows:

> All the modified descendants from A will have inherited something in common from their common parent, as will all the descendants from I […]. If, however, we chose to suppose that any of the descendants of A or of I have been so much modified as to have more or less completely lost traces of their parentage, in this case, their places in a natural classification will have been more or less completely lost […]. All the descendants of the genus F, along its whole line of descent, are supposed to have been but little modified, and they yet form a single genus. But this genus, though much isolated, will still occupy its proper intermediate position; for F originally was intermediate in character between A and I […] (Darwin, 1985, p. 405).

This genealogical community of descent is both relational and reflective as previously outlined. It is relational in that all the branches making up the tree are related through space and time, and this can be seen not only in fossil deposits as a trace of their previous existence but also in their similarities to existing and extinct species (that is, similarities between fossil remains). It is also relational in terms of the traces of past migrations and habitats and co-existing species in those habitats that make up the history or narrative of their past existences. Understanding the archetypes that form the species and understanding the relationships between them requires reflection and this enables the biologist or naturalist to understand the whole. This 'reflection' is the 'Genetic Method'; it is about understanding the relationships going both forwards and backwards. In Kantian terms this reflection is looking at the structures in Nature *as if* the archetype or archetypes created them, *as if* Nature or Nature's God had created them according to some

teleological ideal. This form of reflection is pragmatic in that it is used to help make sense of the world but without assuming that the archetypes have actually caused the structures as this cannot be empirically proved (Richards, 2002, p. 489). For Kant this reflective understanding could work in two ways: from the parts to the archetypes making up the whole but also from the whole to the parts where the latter represents an *intellectus archetypus* that could be God. However, for Schelling and Goethe, these archetypal ideas necessary for our experience of Nature would not come from an external God but would come from Nature, but a Nature that Man would share in, a Nature that Man would help create through his mentally creative experiences. As already stated, for both Goethe and Darwin, as well as Humboldt, this mental toing and froing between the parts and the whole and the whole to its parts is achieved through the 'Genetic Method'. An example of this insight, equivalent to Goethe's discovery of the 'leaf' and 'skull' archetypes, was Darwin's discovery that species that were distinct from each other in adulthood were less distinct in their junior or embryonic forms. This insight came to him when examining barnacle larvae, finding that they were similar to crabs and lobsters at the same stage of development.[163] This insight is the realisation that all creatures are built from common structures or archetypes. Understanding this similarity intellectually through the 'Genetic Method' enables him to understand Man's genealogical heritage and his humble beginnings. As expressed by Steve Jones in modern language, all creatures are built using a similar modular structure which is 'shuffled around' as 'growth proceeds':

> We do not often think of ourselves as segmented creatures, but the vertebrate body is, like that of a barnacle or a lobster, also based on a series of distinct units, arranged from front to back. The human head, thorax and abdomen are obvious enough but our muscles, or our brain-case, show little sign of order. A glance at the embryo, however, reveals that men and women, like their submarine relatives, are constructed from a series of modules, neatly arranged in early life but shuffled around and modified as growth proceeds (Jones, 2009, p. 200).

Richards cites the following text of Darwin's as an example of his indebtedness to the influence of Goethe's archetypes on his own thinking in which individual organic beings are shown to have metamorphosed from an archetypal form, again highlighting the interrelatedness of Nature and the reflective nature of Darwin's thinking in understanding it:

[163] Darwin was excited by the discovery of this similarity describing one barnacle lava 'with six pairs of beautifully constructed natatory legs, a pair of magnificent compound eyes, and extremely complex antennæ'. As highlighted by Jones, 'he knew that he had hit upon a crucial piece of evidence for evolution (although his children laughed because the sentence read like a newspaper advertisement by a cirripedes manufacturer)' (Jones, 2009, p. 199).

> There is another allied or rather almost identical class of facts admitted under the name of Morphology. These facts show that in an individual organic being, several of its organs consist of some other organ metamorphosed: thus the sepals, petals, stamens, pistils, &c. of every plant can be shown to be metamorphosed leaves … The skulls, again, of the Vertebrata are composed of three metamorphosed vertebrae, and thus we can see a meaning in the number and strange complication of the bony case of the brain (Darwin, 1909, p. 215, cited by Richards, 2002, p. 435).[164]

For Darwin the archetype is seen as an unchanging form carried forwards from an ancient progenitor. The essential inner hidden form is unchanging yet the forms seen in Nature modify themselves according to competing species and environmental conditions. This seems like a contradiction. How can a form remain unchanged yet change? When talking about unchanging forms he is referring to the unchanging nature of an archetype such as a mouth. The essential underlying function of a mouth is the same whether it is of a snake, an insect, a fish or a bird. Although the structures of the mouths may vary according to the type of species, due to the things they eat and the environment in which they live, the underlying (archetypal) function is the same. Although biologically the structures of insect and mammal mouths are different, archetypally in terms of function their underlying structure can be regarded as the same. This also applies to bones and eyes. Their essential archetypes remain the same but their particular forms will also vary:

> The bones of a limb might be shortened and widened to any extent, and become gradually enveloped in thick membrane, so as to serve as a fin; or a webbed foot might have all its bones, or certain bones, lengthened to any extent, and the membrane connecting them increased to any extent, so as to serve as a wing: yet in all this great amount of modification there will be no tendency to alter the framework of bones or the relative connexion of the several parts. If we suppose that the ancient progenitor, the archetype as it may be called, of all mammals, had its limbs constructed on the existing general pattern, for whatever purpose they served, we can at once perceive the plain signification of the homologous construction of the limbs throughout the whole class. So with the mouths of insects, we have only to suppose that their common progenitor had an upper lip, mandibles, and two pair of maxillae, these parts being perhaps very simple in form; and then natural selection will account for the infinite diversity in structure and function of the mouths of insects (Darwin, 1985, pp. 416-7).

However, Darwin does admit that it is possible that the patterns of an organ may be modified to such an extent that its original form may be lost implying that it may be difficult, through these losses, to trace their origins to their archetypes and their primordial progenitors (Darwin, 1985, pp. 416-7).

[164] This is an earlier version of the concept of the archetype later developed in the *Origin* in which Darwin states that the flower 'consist[s] of metamorphosed leaves, arranged in a spire' (Darwin, 1985, p. 417).

But in the main it should be possible to trace the origins as any modifications of organs or species will have taken place very slowly over a long period of time thereby making it possible to identify these modifications in the intermediate forms, or incipient species, before becoming new species. These changes would be represented by slight successive steps leaving a thread of resemblance through each stage which would be passed on through inheritance. Darwin, like Goethe before him, stressed that both the vertebrae and leaf archetypes had homologous structures that were maintained throughout their modifications of forms for the purpose of different functions. As discussed in the section on 'The Romantic Nature of Mind', Goethe's moment of inspiration when coming across a dead sheep's skull was the realisation that the bones were in sections built up in basically the same way as the vertebrae making up the back or neck of an animal. This meant, therefore, that the vertebrae archetype was the same wherever it was located, although the form varied according to function.

Darwin shares the same insight when comparing different parts or organs in the same individual, noting how this applies to animals and plants:

> Most physiologists believe that the bones of the skull are homologous with – that is correspond in number and in relative connexion with – the elemental parts of a certain number of vertebrae. The anterior and posterior limbs in each member of the vertebrate and articulate classes are plainly homologous. We see the same law in comparing the wonderfully complex jaws and legs in crustaceans. It is familiar to almost every one, that in a flower the relative position of the sepals, petals, stamens, and pistils, as well as their intimate structure, are intelligible in the view that they consist of metamorphosed leaves, arranged in a spire. In monstrous plants, we often get direct evidence of the possibility of one organ being transformed into another; and we can actually see in embryonic crustaceans and in many other animals, and in flowers, that organs, which when mature become extremely different, are at an early stage of growth exactly alike (Darwin, 1985, p. 417).

The insight into the plant archetype is the same as Goethe's in which all plant forms develop from the leaf, whether they are roots or petals. So too for Darwin are 'sepals, petals, stamens and pistils' no more than metamorphosed leaves. And the reason that differences are created from common archetypes, whether in the form of organs in the individual organism such as petal or root, or between species, is simply one of natural selection:

> Why should similar bones have been created in the formation of the wing and leg of a bat, used as they are for such totally different purposes? […]. Why should the sepals, petals, stamens, and pistils in any individual flower, though fitted for such widely different purposes, be all constructed on the same pattern? On the theory

> of natural selection, we can satisfactorily answer these questions (Darwin, 1985, pp. 417-8).

This concept of 'natural selection' is as much a mental concept as a physical one. In the vein of the 'Genetic Method', it acts as a slide rule with a set of algorithms enabling the scientist to go forwards and backwards in time and place to calculate species type historically and contemporaneously; at the same time giving insights into the variables that affect sameness or difference of function (such as altitude, habitat, cohabiting species, migration, food sources, shelter and the struggle for survival). Importantly, as Humboldt discovered, the true picture cannot be captured unless it also includes the human scientist making the observations. Man is also part of Nature, and his observations are also a mental construct that need to be included in the observations themselves.

Man's inclusive part of Nature can be seen in his need to make sense of Nature. As a reflecting animal, Man is not just living in Nature or even observing it objectively but reflecting upon it with himself a part of it. He is forever observing himself as observer whether as scientist or mere participant. For the Romantics such as Goethe and Humboldt, this is where the overlaps of science, poetry and art are important in emphasising the interdependence of these human disciplines in making sense of the laws of Nature. In Darwin, this subjectively human, or aesthetic, way of looking at Nature can be seen in the choice of words used to describe it; words such as 'struggle' or 'advantage'. Darwin talks about the organs or species developing in one way or another according to what will produce the best advantage. Darwin's theory of descent with modifications shows that the basic archetype is unchanging but varies its form according to use and advantage in a competing world of struggle. This explains why development is gradual since organs or species adapt and modify themselves according to need, a step at a time. These needs are influenced by the conditions at the time, covering everything from the habitat, the climatic conditions and other competing species; and in the case of organs, the individual's other organs and how these work together to form the whole organism. This is why the basic structure of the bones in the hand of a man are the same as that of a bat and why therefore the organs 'were alike in the early progenitor of each class':

> The framework of bones being the same in the hand of a man, wing of a bat, fin of a porpoise, and leg of the horse, - the same number of vertebrae forming the neck of the giraffe and of the elephant, - and innumerable other such facts, at once explain themselves on the theory of descent with slow and slight successive modifications. The similarity of pattern in the wing and leg of a bat, though used for such different purposes, - in the jaws and legs of a crab, - in the petals, stamens, and pistils of a flower, is likewise intelligible on the view of the gradual modification

> of parts or organs, which were alike in the early progenitor of each class (Darwin, 1985, p. 451).

Despite being a scientist, Darwin cannot separate himself from the world of Nature and what it means to also be a part of it.[165] His own concepts of 'competition' and 'modification' are derived from his own experience of what it is to be human and to struggle in Nature; however much he wishes to be the objective observer, he is always going to be influenced by his human way of looking at the world; to an extent his analysis is always going to be in part anthropomorphic. Our own mental processes that are used in comparing objects to discover their differences and similarities are a necessary part of being human and are a part of our survival mechanism. We need to be able to distinguish between safe and dangerous foods, between safe and dangerous animals, and between friend and foe. But being aware of ourselves as part of Nature, being able to move from the particular to the universal by using the 'Genetic Method', makes the concept of Nature Romantic. This concept of 'gradual modification' can only be captured Romantically by mentally going backwards and forwards in time to 'see' the development through all its progressive stages and in reverse. This mental process also helps Darwin identify the gaps in development (or progress). In the same way as organs are developed through use, they are also reduced through disuse. Darwin gives examples of rudimentary teeth in a calf that do not cut through in the upper jaw in adulthood as they are not required (Darwin, 1985, p. 451).

This narrowing down of all living things to a limited number of archetypes from which they get their forms and structures also means that all living things must have come from a limited number of progenitors. Packed into this assertion is the assumption that all things must therefore be related through the 'web of affinities', that they developed over a very long period of time ('a hundred million years' or so), that the process is very slow as change consists of lots of steps resulting in intermediate forms before new species come into existence, and that this is not a 'miraculous act of creation':

> All the members of whole classes can be connected together by chains of affinities, and all can be classified on the same principle, in groups subordinate to groups. Fossil remains sometimes tend to fill up very wide intervals between existing orders. Organs in a rudimentary condition plainly show that an early progenitor had the organ in a fully developed state; and this in some instances necessarily implies an enormous amount of modification in the descendants. Throughout whole classes various structures are formed on the same pattern, and at an embryonic age [sic] the species closely resemble each other. Therefore I cannot

[165] Which is why Darwin prefers to refer to himself as a 'naturalist' rather than a 'scientist' as the term 'naturalist' indicates that he is not separate from Nature.

> doubt that the theory of descent with modification embraces all the members of the same class. I believe that animals have descended from at most only four or five progenitors, and plants from an equal or lesser number (Darwin, 1985, p. 454).

A close examination of this text reveals a mental reconstruction of Nature built upon Darwin's theory of natural selection using the 'Genetic Method'. His use of the term 'chains of affinities' reflects the movement from past to present and present to past as the 'chains' is a connecting term that does not point in any one direction. The term 'affinities' shows similarities but these cannot be seen in isolation – both past and present need to be brought together in classifying the classes. The 'affinities' in a sense are the 'chains' creating the bridge between past and present, creating the narrative of Darwin's *Origin* (or Genesis). The fossils and the 'rudimentary' organs also make up the chains creating a link between past and present. Only through the 'chains of affinities' can the modifications, resemblances, patterns and descent be seen by the inward eye that Goethe talks about.

This insight enables Darwin to go on to say that he thinks all animals and plants may have descended from one progenitor due to their common structures:

> […] All living things have much in common, in their chemical composition, their germinal vesicles, their cellular structure, and their laws of growth and reproduction […]. Therefore I should infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some one primordial form, into which life was first breathed (Darwin, 1985, p. 455).

It could be argued that a view holding the position that Darwin was a Romantic biologist does not square with his genealogical 'theory of descent with modifications' in which skulls, vertebrae, jaws and legs have *literally* metamorphosed from a common element, *not metaphorically*. Darwin is keen to emphasise that all forms came from a common element:

> Naturalists, however, use such language only in a metaphorical sense: they are far from meaning that during a long course of descent, primordial organs of any kind – vertebrae in the one case and legs in the other – have actually been modified into skulls or jaws […]. On my view these terms may be used literally; and the wonderful fact of the jaws, for instance, of a crab retaining numerous characters, which they would probably have retained through inheritance, if they had really been metamorphosed during a long course of descent from true legs, or from some simple appendage, is explained (Darwin, 1985, p. 419).

However, despite Darwin's insistence that all forms have *literally* metamorphosed from common elements, the archetypes representing the common elements are nevertheless mental constructs enabling Man's understanding of the world, and in particular enabling Darwin to construct his genealogical 'tree of life'. In another sense the archetypes are forward facing and can be seen to be teleological if Darwin's theory of natural selection is seen as a telic enabler. The archetypes are free in that the forms that metamorphose from

the common structures over time do so in a non-pre-determined way: they modify themselves according to the need and advantage at the time and at an intermediate step at a time. None of the steps are known in advance. Yet there is a teleological driving force at work within the archetypes ensuring that modifications in form are to the advantage of the organ or species *if survival is to be achieved*. Natural selection is therefore a force enabling archetypes to express themselves through forms that strive towards improvement. This community of form through relatedness can be seen in similar embryonic stages in animals despite their coming from different groups. This demonstrates community of descent from a limited number of progenitors:

> In two groups of animal, however much they may at present differ from each other in structure and habits, if they pass through the same or similar embryonic stages, we may feel assured that they have both descended from the same or nearly similar parents, and are therefore in that degree closely related. Thus, community in embryonic structure reveals community of descent (Darwin, 1985, p. 427).

If Darwin's method is seen as 'genetic', this eliminates the contradiction of holding both a genealogical and teleological position at the same time as both can sit on 'the chains of affinities', each being no more than opposite ends of the same continuum, a sliding scale between past and present.

2.12 **Conclusion**

Darwin's imagination can be seen to have been sparked during his voyage on the *Beagle* by the influence of Humboldt's aesthetic method in which he takes his own impressions of Nature into account when relating scientific data and constructing hypotheses. There is undoubtedly an element of Romantic processes running through Darwin's method of viewing Nature that includes an historic perspective that incorporates his own presence as a natural philosopher in the present moment (from a standpoint in which *he* looks back in time and forward into the future in order to comprehend mutability or evolution). Darwin, through his aesthetic imagination, is telling a narrative that includes himself as observer, 'scientist',[166] philosopher and naturalist.

Darwin's concept of natural selection can be seen as Romantic as it uncovers Nature's hidden secret of a self-contained force and set of laws that is forever recreating itself, existing as both creator and product, and existing whether or not there is a God as it exists independently and therefore cannot be subject to God as a first cause. The idea of natural

[166] It must also be remembered that Darwin was not only a theorist but a practical scientist, not only collecting and analysing data but also conducting his own experiments whilst on the *Beagle* and in his own house and garden with his children at Down House.

selection is also Romantic as it includes Mankind,[167] and this includes Darwin. It would be difficult to imagine that Darwin was not aware of these connections when he was obviously struggling to come to terms with the sickness and deaths in his own family and that of his friends, as well as the struggle he was facing with his own decision of whether or not to publish his *Origin*.

Darwin's ability to reflect (in the imaginative sense) on his personal experiences of Nature helped him to learn to 'see' the archetypes in the same way that Goethe did, enabling him, like a bird, to develop the freedom to fly with the flow of the experience of Nature without being constrained by the received Victorian science of the day. Nevertheless, Darwin still lived like a Victorian gentleman, and no doubt this double life contributed to his mental anguish and physical illness (vomiting, stomach pains, blisters and so on).

To conclude, this chapter suggests that there is evidence that Darwin had Romantic tendencies in his *Origin.* The next chapters will continue this analysis to see if this also holds true in his earlier work *The Voyage of the Beagle* and his later work *The Descent of Man*.

[167] As Darwin's *Origin* has shown, Man has evolved from humble physical beginnings, which means that Mind has also evolved from *physical* beginnings in which there was no Mind, no self-conscious reflection (this is taken up in Chapter Three which discusses the *Descent*). This is Romantic in the sense that when Man reflects on the beauty of Nature (the intense colour and light of the South American sky, the wonders of the animal and insect life in the extraordinary vegetation of the jungle), he sees a reflection of himself in its mirror as he, through the long process of natural selection, has been created by Nature. On the surface, natural selection may appear to be no more than a Malthusian set of self-destructive struggles, and therefore not Romantic. But when seen as the law responsible for the creation of Mind, this is truly a mystical form of Romantic alchemy in which opposites can be seen to unite.

CHAPTER 3: DARWIN'S CONCEPTS OF MORALITY AND ROMANTIC MATERIALISM IN *THE DESCENT OF MAN* AND HIS NOTEBOOKS [1836 – 1844] WITHIN THE CONTEXT OF THE VICTORIAN ERA

3.01 Introduction

The last two chapters highlighted the importance of the concept of Mind in understanding the influence of Romantic ideas on Darwin, in particular Humboldt's aesthetic method of incorporating the mind's subjective senses and emotions when measuring and interpreting Nature 'scientifically' as a natural historian. The mental concept of 'reflection' has already been referred to when considering the importance of relating data and the experiences of Nature in order to grasp its organic whole, and this is particularly important for Darwin when moving between past and present, or when moving between the extremities of the genealogical – teleological continuum showing the descent and development of Nature (its history). The last two chapters have also shown the importance of reflection and imagination through Goethe's 'Genetic Method' when conceptualising the 'leaf' and 'vertebrae' archetypes, enabling the mind to 'see' the commonality running through Nature.

The concepts of 'reflection' and 'imagination' are concepts that gain gradual development from the early Darwin and can be seen as a stronger, consolidated form in the *Descent*. The whole point of the *Origin* and the *Descent* is to show that there is development from animals to humans, and this includes mental as well as physical development. Man has a more advanced form of reflection, but this does not mean that animals have no form of reflection, as Darwin's observation of Jenny the Orang-utan at Regent's Park Zoo showed (referred to earlier). Darwin the natural historian, Darwin the writer and Darwin the moralist when expressing his views on the slave trade, is, through his reflections, demonstrating his advanced mental state as a human being. But all these forms of reflection are building up to the most important one of all for Darwin, that of Man's moral reflection that enables him to tell right from wrong, and enables him to build communities and societies for the benefit of their members. This moral reflection can be seen in Man's feeling of sympathy towards others in pain, or, of remorse when realising that the wrong course of action has been taken. Although it is this moral reflection that sets Man apart from animals, it is at the same time a reflection that over eons of time has developed from animals learning to benefit from mutual cooperation and who have gradually passed this on as an instinct, although Man's instincts are not perfect.

This chapter will show there is a Romantic aspect to the development of moral reflection, as its origin comes from deep within Nature itself and not imposed from an external Deity. If Mind can be seen as a product of Nature,[168] a product of itself, then this binds Man to Nature as he too is both its product and its creator. In this sense Mind can be seen to be composed of a mental 'web of affinities'. This brings the discussion back to the concept of 'aesthetics' which is not just concerned with beauty but with subjective reflection.[169] This can be seen on various levels. As already discussed in Chapter Two, Man processes sense data to understand the objects in Nature but at the same time by reflecting on these objects creates the 'I' or the ego that is doing the reflecting in order to be aware of the self and the world around him. These reflective processes can be seen in Darwin the man and Darwin the natural historian. As a man, like all other human beings, he makes sense of the world through his senses and understands the relationship between himself and the objects in the world by reflecting on his sensations and his thoughts of the world. On a moral level he reflects on his own actions in relation to other beings as well as the actions of others and in so doing forms a moral view, for example against slavery. On a meta level, akin to Humboldt's (aesthetic) Method, Darwin is reflecting on the reflecting process itself and how it evolved from community cooperation in animals and gradually over time became an instinct in humans. This form of 'scientific' reflection, as with Humboldt's Method, can be seen as aesthetic alongside science, poetry, literature, music and art.[170] Each reflection, at whatever level, is an example of Nature creating itself (as already discussed in the previous two chapters). Just like Descartes' *cogito ergo sum* in which the certainty of the world is founded on the self-consciousness of the 'I':

> That consciousness can be explained in the same terms as the rest of nature is therefore also regarded as *itself* the product of the subject's growing control of nature […]. German Idealism tries to prove that subject and object are identical, so that the way we think about the world and the world itself are inseparable, because *the world is in fact a subject thinking itself* (emphasis mine) (Bowie, 2003, p. 9).

Chapter Three develops this line of argument in relation to Darwin's *Descent* and his notebooks.

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[168] This is the view already discussed in Chapter One.

[169] Andrew Bowie regards 'aesthetics' as being 'a part of philosophy concerned with the *senses*, and not necessarily with beauty', as the word can be traced back to the Greek "*aisthánesthai*", meaning "*perceive sensuously*". For Bowie, aesthetics is not just 'a revival of Plato's thoughts about beauty as the symbol of the good. *The crucial new departure lies in the way aesthetics is connected to the emergence of subjectivity as the central issue in modern philosophy*' (emphasis mine) (Bowie, 2003, p. 2).

[170] This could also include religion, history, philosophy or any other forms of meta reflection that reflect upon our reflections of the world or Nature.

3.02 The Development of Man's Instinctive Intellect and Morality from Habit

Central to Darwin's concept of Romantic materialism is the notion that Man has developed over eons from simpler animals and those in turn from simpler[171] organisms. The beauty of this form of materialism was that all beings, including Man, came from the same humble beginnings, and that therefore all races and all species ultimately came from the same progenitor, and were and are subject to the same laws of natural and sexual selection. But what sets Man apart from other beings is his heightened sense of awareness of self and others in relation to his environment, his intellect and his moral being which have developed alongside his physical development and have developed from those humble beginnings: **'**the mental powers of the higher animals, which are the same in kind with those of man, though so different in degree, are capable of advancement' (Darwin, 2004, p. 679). His intellect enabled him to develop tools to provide shelter and language to interact with other humans as well as the development of social instincts to defend the immediate community. These instincts, Darwin believed, 'have in all probability been acquired through natural selection' (Darwin, 2004, p. 680). This is where Man is different from other beings. Over time he starts to take account of the feelings of others, reflecting on whether his actions receive approval or not, developing his ability to move between reflections on past actions and reflections on present feelings about those actions (the same skill Darwin develops in being able to move between reflections on fossils and their past existences, and reflections on present-day descendants related to their extinct ancestors): 'Man cannot avoid looking both backwards and forwards, and comparing past impressions' (Darwin, 2004, pp. 680 -1) and 'Past impressions were compared during their incessant passage through the mind' (Darwin, 2004, p. 123). As Man develops, his actions are governed more by the praise and blame of others rather than 'blind instinctive impulse'. For Darwin, the key to moral development is through sympathy:

> Sympathy, though gained as an instinct, is also much strengthened by exercise or habit. As all men desire their own happiness, praise or blame is bestowed on actions and motives, according as they lead to this end; and as happiness is an essential part of the general good, the greatest-happiness principle[172] indirectly serves as a nearly safe standard of right and wrong (Darwin, 2004, p. 681).

[171] But not necessarily simple in terms of structure as Darwin's study of barnacles has shown: 'This tiny creature had both a life cycle and an adaptation since prehistory […]; it also had a life history that bizarrely shadowed patterns of human life, shaped as it was by the same natural laws of survival, development and reproduction' (Stott, 2003, p. 246).

[172] Jeremy Bentham first used this term in his anonymous publication in 1776 *Fragment on Government*, having probably come across the term in Beccaria's *Dei delitti e delle pene*, published in 1768 (Burns, 2005, p. 46). In a passage in his *Constitutional Code*, written in 1822, he writes: 'The

When looking back at past actions and realising that they were the wrong actions, this 'sense of dissatisfaction' creates a feeling of 'conscience'. This is the cornerstone for determining how future actions ought to be done differently (Darwin, 2004, p. 681).

In advocating the 'greatest-happiness' principle, Darwin was supporting the utilitarian principle of creating the greatest 'general good' for the community. Whilst on the *Beagle* he was horrified[173] at the treatment of slaves, and equally horrified at the notion that 'self-interest will prevent excessive cruelty':[174]

> On the 19th August we finally left the shores of Brazil. I thank God, I shall never again visit a slave-country. To this day, if I hear a distant scream, it recalls with painful vividness my feelings, when passing a house near Pernambuco, I heard the most pitiable moans and could not but suspect that some poor slave was being tortured, yet knew that I was as powerless as a child to remonstrate […]. It is argued that self-interest will prevent excessive cruelty; as if self-interest protected our domestic animals, which are far less likely than degraded slaves, to stir up the rage of their savage masters. It is an argument long since protested against with noble feeling, and strikingly exemplified, by the ever illustrious Humboldt (Darwin, 1962, pp. 496 – 7; also cited by Richards, 2002, p. 541).

Darwin supported Mackintosh's[175] objection to Paley's utilitarianism (Richards, 2002, p. 542) in which a human being's moral action was regarded as a response to pleasure and pain in the individual. Against this view, Mackintosh believed that humans acted altruistically for the benefit of others and that this moral sense of right and wrong was part of human nature. Unlike the utilitarian who defined the right action according to how much pleasure or pain it would produce,[176] Mackintosh believed that humans just knew innately

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right and proper end of government in every political community is the greatest happiness of all the individuals of which it is composed. Say in other words, the greatest happiness of the greatest number. In speaking of the correspondent first principle, call it the greatest-happiness principle' (Burns, 2005, p. 56).

[173] As this quote also shows, Darwin's reflective consciousness expressed as both individual and community conscience, can be seen in the choice of words reflecting mental feelings of sympathy: 'painful vividness', 'pitiable moans', 'poor slave', 'tortured', 'powerless as a child to remonstrate', 'cruelty', 'degraded slaves', 'rage … of masters' and 'protested against with noble feeling'.

[174] That is, the slave owners are only refraining from excessive cruelty because sick or injured slaves would reduce their capacity to work and therefore impact on the owners' economic interests. Darwin supports the utilitarians because he wants to see the *whole* community benefit (although, as argued elsewhere in this chapter, this can be seen to be at odds with his and the Victorians' view that certain members of the community, for example the Irish, should practise 'self-help').

[175] Darwin read his *Dissertation on the Progress of Ethical Philosophy* [1837, second edition].

[176] According to Bentham's *Introduction to the Principles of Morals and Legislation* (1789), the amount of pleasure or pain produced by an action could be calculated using his 'felicific calculus' which took into account such factors as the pleasure or pain's 'intensity', and 'duration'. Bentham's philosophy was based on the premise that mankind's behaviour was governed by the desire for pleasure and the desire for the absence of pain. A right action was defined as that which increases pleasure, and a wrong action as one that decreases pleasure. But the benefit created is the one that

what the right action was. Although Darwin was hugely influenced by Mackintosh, he was critical of him providing no explanation as to the origin of the 'moral sense';[177] that is, what enabled a person to know instinctively that one action was right and another wrong (Richards, 2002, p. 543). For Darwin habits became instinctive after being practised over a number of generations. Those instincts passed on to the next generation that helped preserve family and community groups could be regarded as moral, whereas those desires that only concerned individuals could not.[178]

The feeling and the concept of sympathy can be seen to be the central plank of both Man's and Darwin's sense of morality; in terms of how one relates to others within the immediate community, society, as well as the treatment of one's environment including other species, and one's self in terms of how one views one's moral conduct in relation to the world and its inhabitants. This moral view of oneself and others in society, in terms of sympathy and conscience, would include attitudes towards slavery, treatment of workers in the towns and on the land, both at home and in Ireland and the colonies.

Darwin was a respectable gentleman whose upbringing straddled the Georgian and Victorian eras. Later sections of this chapter will examine how Darwin's own morality developed within this era and to what extent it was a reflection of the age in which he was living. In another sense the morality reflecting an era, its sympathies and conscience, can be said to evolve. Darwin's time, however, did not consist of one set of beliefs as the era was made up of different classes with different views of what was right and wrong (for example, voting rights and fair pay) and therefore their sympathies and consciences were often in conflict with each other. Nevertheless Darwin believed morality was progressive and that Man in civilized nations could achieve a high moral state 'through the advancement of his reasoning powers and consequently of a just public opinion […]

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benefits all members of the community even though not all members are pleased equally. Bentham does not elevate the community above the individuals (Zunjic, 2014, unnumbered page).

[177] That is, the theory that the rightness of an action is known innately. The 'moral sense' theory came from Frances Hutcheson who believed that the 'moral sense' was implanted by God. His theory is expounded in *An Enquiry Concerning the Original of our Ideas if Virtue or Moral Good* [1725] and *An Essay on the Nature and Conduct of the Passions and Affections, with Illustrations of the Moral Sense* (1728) (Vandenberg and DeHart, 2014, unnumbered page). James Mill attacked Mackintosh's version of the 'moral sense' because it could be seen to override the judgement of utility: if utility was the moral judgement then the 'moral sense' would have to be seen as immoral rather than moral (Coplestone, 1967, p. 36).

[178] Darwin's explanation of how instinct develops into moral behaviour is not fully worked out despite Richards' belief that Darwin had 'found a biological explanation' (Richards, 2002, pp. 545-6). But this is perhaps understandable considering the limited knowledge of inheritance that was available to Darwin at the time.

through the effects of habit, example, instruction, and reflection', conscience then becoming 'the supreme judge and monitor' (Darwin, 2004, p. 682). Darwin believes these instincts were 'primarily gained […] through natural selection' (Darwin, 2004, p. 682).

The notions of sympathy and conscience could be interpreted as Romantic in derivation because Darwin sees these reflective mental constructs as having developed over time through natural selection and, most importantly, having emanated initially through habit before becoming an ingrained instinct. These habits developed originally from habits that were non-reflective 'simpler instinctive actions' that existed before the development of a human brain that could think, before it had an intellect, and therefore material:

> Some intelligent actions, after being performed during several generations, become converted into instincts and are inherited, as when birds on oceanic islands learn to avoid man […]. But the greater number of the more complex instincts appear to have been gained in a wholly different manner, through the natural selection of variations of *simpler instinctive actions*. Such variations appear to arise from the same unknown causes acting on the cerebral organisation, which induce slight variations or individual differences in other parts of the body; and these variations […]are often said to arise spontaneously [emphasis mine] (Darwin, 2004, p. 88).

Darwin admits that these changes arise from 'unknown causes' but feels confident that there is a link between repetition (habit), which through continued use, somehow makes changes in the brain to bring about instinct. It is this mysterious notion of the Mind having been generated by natural laws from Nature that enables it to be regarded as Romantic. Darwin recognises that as primitive Man develops over time in using tools and in forming the first words of language for communication, these 'variations of simpler instinctive actions' act 'on the cerebral organisation', that is, they effect changes in the brain. This means therefore that as all creatures, including Man, developed originally from simple unthinking organisms, the mind developed from the physical being. In a nutshell, Man came from Nature, was created by Nature, and is therefore very much a part of Nature:

> When primeval man first used flint-stones for any purpose, he would have accidentally splintered them, and would then have used the sharp fragments. From this step it would be a small one to break the flints on purpose, and not a very wide step to fashion them rudely […]. The orang is known to cover itself at night with the leaves of the Pandanus; and Brehm states that one of his baboons used to protect itself from the heat of the sun by throwing a straw-mat over its head. In these several habits, we probably see the first steps towards some of the simpler arts, such as rude architecture and dress, as they arose amongst the early progenitors of man (Darwin, 2004, p. 104).

The mental development of the brain can be seen in the behaviour of primitive Man in the concept of 'purpose' and 'fashioning', and by analogy in the orang in 'protecting' itself from

the heat of the sun by using the mat as a tool. By using the orang as an example, it gives the reader an idea of how Man might have developed from an earlier branch of his own tree of descent.

The *Descent* was published in 1871, but Darwin had been thinking about these metaphysical mind-body issues for many years before and these thoughts can be clearly seen in his *Notebook M*[179], *Notebook N*[180], and his *Old & Useless Notes*[181] written between 1838 – 1840 (transcribed and edited in Barrett, 2008). In *Notebook N* these early references to conscience and instinct can be seen in '[…] any animal with social & sexual instinct <<& yet with passion>>[182] he *must* have conscience […]. Dogs [sic] conscience would not have been same with mans [sic] because original instincts different' (Barrett, 2008, p. 564). Here Darwin identifies the level of conscience with type of instinct. The type or level of conscience can be seen to be reflected in his developed view of morality in which individuals and society can be graded according to their developed moral view with the most 'civilised' being regarded as those that have progressed the most. This embryonic view in its simplest form can be seen in his 'different nations having different moral sense […]' and '[…] man moreover who *reasons* much on his actions, makes his conscience far more sensitive', the 'more sensitive' being a moral sense that could be interpreted as being more superior (Barrett, 2008, p. 564).

Also in *Notebook N*, the influence of habit is identified as having an effect on the brain: 'an habitual action must some way affect the brain in a manner which can be transmitted' (Barrett, 2008, p. 574). But Darwin also wants to emphasise his theory that habitual actions lead to instincts through natural selection; that is, those instincts which improve a species' prospects of survival will give the species an advantage over other species, or different populations of the same species in the form of tribes or races.[183] Darwin argues by analogy, using the strong arms of a blacksmith being passed down to his children as an example:

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[179] This 'is the first of several sets of notes […] on the general subject of the biological origin of behaviour' written between July 15 – 02 October 1838 (Barrett, 2008, p. 517).
[180] This 'is the second notebook on "metaphysical enquiries" and expression', the first page dated 'October 2d. 1838' and the last dated entry '28 April 1840' (Barrett, 2008, p. 561).
[181] This notebook is not actually a notebook 'but a collection of notes on miscellaneous sheets of paper […]. The title is misleading in that it reflects the dismissive attitude of an author filing away notes no longer useful […]' (Barrett, 2008, p. 597).
[182] The symbol <<>> means Darwin's insertion. See 'Symbols used in the transcriptions of Darwin's notebooks', Barrett, 2008, p. vi.
[183] 'Extinction follows chiefly from the competition of tribe with tribe, and race with race. Various checks are always in action, serving to keep down the numbers of each savage tribe – such as periodic famines, nomadic habits and the consequent deaths of infants, prolonged suckling, wars,

> An habitual action must some way affect the brain in a manner which can be transmitted. - This is analogous to a blacksmith having children with strong arms. – The other principle of those children. Which *chance*? Produced with strong arms, outliving the weaker ones, may be applicable to the formation of instincts, independently of habits. – the limits of these two actions either on form or brain very hard to define (Barrett, 2008, p. 574).[184]

Although Darwin is here using his own theory of natural selection, his example of the blacksmith can be seen to be Lamarckian[185] in terms of development being brought about by constant use but the difference here is that change, or in this case instinct, is passed on through inheritance[186] rather than the constant use of a particular part of the body. The main issue here is that Darwin wants to show that an 'habitual action […] affects the brain' thus underpinning his view that habits lead to moral instincts or moral sense, but not input by God but created by Nature. Darwin is also making the point that these instincts have not been brought about by *chance* but have been brought about by the law of natural selection created by Nature. His anthropomorphic use of 'strong [human] arms' to argue the case by analogy also helps draw in the human form of mind and body into the fold of Nature, and by association makes morality part of Nature.

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accidents, sickness, licentiousness, the stealing of women, infanticide, and especially lessened fertility' (Darwin, 2004, p. 212). This fits in with his idea of the more 'civilized' races 'exterminating' the more 'savage' races. Those that have the more 'civilized' qualities have a more selective advantage over those that do not.

[184] It is important to note that this entry in Darwin's Notebook N was written sometime between October 1838 and April 1840 (Barrett, 2008, p. 561). It is understandable, therefore, that his views at this time should lean heavily towards Lamarck's as his own theory of natural selection was still very embryonic in form. Darwin referred to this notebook in December 1856 for work on the *Origin* and, in May 1873, for the *Descent* and *The Expression of the Emotions in Man and Animals* (Barratt, 2008, pp. 562 – 3).

[185] Darwin was not consistently Darwinian in that in the *Origin* he allowed Lamarckian inheritance of acquired characteristics to run alongside his theory of natural selection offering an additional mechanism of biological evolution. Darwin called this view the 'Pangenesis hypothesis' (using the term 'hypothesis' as he was well aware that he did not have all the facts before him). This theory proposed that each organ passed information on how they were used or not used to sperm and eggs via 'gemmules'. This was done throughout an individual's life, passing information on to the next generation. So for example, men with big muscles used often would pass this on to their children (Hurley, 2009, unnumbered web page). Darwin states his hypothesis as follows: 'According to this hypothesis, every unit or cell of the body throws off gemmules or undeveloped atoms, which are transmitted to the offspring of both sexes, and are multiplied by self-division. They may remain undeveloped during the early years of life or during successive generations; and their development into units or cells, like those from which they were derived, depends on their affinity for, and union with other units previously developed in the due order of growth' (Darwin, 2004, p. 264).

[186] It was not until after Darwin's death in 1883 that August Weismann introduced his 'Germ-Plasm' Theory, in his lecture Ü*ber die Verebung* (On Inheritance), which finally laid to rest Darwin's Pangenesis theory. Weismann's theory stated that inheritance only took place by means of the gametes or germ cells (the egg and sperm cells). The other cells of the body (somatic cells) did not function as agents of heredity as inheritance only worked by going in one direction from the gametes to the somatic cells and not back from the somatic cells to the gametes. Acquired characteristics could not therefore be inherited (Hurley, 2009, unnumbered page).

The mind-brain discussion is again considered when examining the cross of instincts produced when crossing jackals, foxes, wolves and dogs. Darwin asks 'can we deny that brain would be intermediate like rest of body?' (Barrett, 2008, p. 575). In other words, can the brain adapt to its environment and change in the same way as species adapt and change to become incipient species or varieties (that is, 'intermediate' between two forms)? Not only does Darwin concede that there must be some relationship between the mind and the brain but he also believes that there is no difference between the two: 'can we deny relation of mind and brain. <<Do we deny the mind of a greyhound & spaniel. differs from their brains>>[187] (Barrett, 2008, p. 575). Darwin also feels that the instinct of digging for mice passed down from the dog to its pup offspring could come 'from some peculiarity of structure of brain', and asks 'can we suppose some *essence*' [emphasis mine] (Barrett, 2008, p. 575). This suggests that Darwin is seriously considering an archetype for the mind-brain analogous to the vertebrae and leaf archetypes discussed earlier. Although the mental concept of 'archetype' or 'essence' is at a higher level of mental reflection than the mental processing of physical and mental sensations, Darwin sees mental pain (grief) as the same as physical pain since 'tears flow from both' and that the same applies to the 'pleasure of senses' (Barrett, 2008, p. 575).

As mentioned at the start of this section, Mackintosh influenced Darwin in the development of the theory that morality came from instincts (although as already mentioned, Darwin was critical of Mackintosh in not explaining how these instincts were developed and where they resided). In *Notebook N*, Darwin refers to 'Mackintosh Ethics' and his 'Theory of Association […] when [ideas] entered brain' (Barrett, 2008, p. 575). Mackintosh was here referring to Berkeley and Hume's agreement that the intellectual operations of the mind were due to the *association of ideas*.[188] But for Darwin these 'ideas' are part of the physical make-up of the brain, and are not independent of the brain, which is why he says 'try contiguity of parts of Brain' (Barrett, 2008, p. 575). This physical location of ideas (or for Darwin, instincts) in the brain is emphasised in Darwin's own marginalia in Mackintosh's book referring to the *association of ideas*: 'try theory of place in brain' (Barrett, 2008, footnote 4, p. 587). Yet although the mind, the brain and the self can be

[187] The symbol <<>> means the text has been inserted at a later date by Darwin (see 'symbols used' in Barrett, 2008, p. vi).

[188] 'Both agree in referring all the intellectual operations to the *association of ideas*, and in representing that association as reducible to the single law, that ideas which enter the mind at the same time, acquire a tendency to call up each other, which is in direct proportion to the frequency of their having entered together' (Mackintosh, 1837, p. 248). Also cited by Barrett, 2008, footnote 4, p. 587).

seen as one, Darwin believes he has identified different layers of consciousness, or 'double consciousness', which separates the self or will from imagination. When referring to the 'peculiarity of structure of brain' he asks if this can be 'double consciousness' (Barrett, 2008, p. 575). Beer traces this influence to his reading of the Romantic poets when she states 'he was intensely aware, perhaps in part through Coleridge, of the multiple voices of consciousness' (Beer, 2010, p. 5). In this context Beer also refers to Darwin's use of the term 'double consciousness' in his *Notebook N*:

> Double consciousness only extreme step of an ideal argument held in one's own mind, & Dr. Hollands story of man in Delirium tremens hearing other man speaks. [sic] shows, that consciousness of personnal [sic] identity is by no means a necessary part of man's mind.- (Barrett, 2008, p. 593).

Beer sees this 'double consciousness' within Darwin's own thought processes. When reading, he engages in a 'conversation' (even regarding it as a kind of music) or an 'active silent dialogue in which the reader slides into the place of the writer and yet presses back into his or her own person' (Beer, 2010, pp. 5 - 10). This dialogue of a 'double consciousness' can be seen to reflect both Goethe's 'Genetic Method' and Humboldt's aesthetic method in which the imagination is given free rein to move between the particular and the universal, between the subjective observer and the observed, between empirically-based fact and the imaginative possible. This 'double consciousness' conversation is also very Wordsworthian and can be seen in Wordsworth's poem *The Excursion*, which Darwin read several times:[189]

> His reading of *The Excursion* prompted a parallel vivid 'double consciousness'. The *Excursion* is itself a poem of conversation,[190] ethical and metaphysical debate, and the telling of tales. It frames the lives of others through the recollections of those who have observed them. The philosophical musings arise out of homely instances (Beer, 2010, p. 8).

The 'homely instances' is key here, as, for Darwin, slight changes over time can 'produce great transformation'. Nothing was too trivial for Darwin – the life of a beetle, a worm or a

[189] Reference to Darwin's reading of Wordsworth's poetical works can be found *at Darwin Correspondence Project* (2014a, p.164). Also, in his *Autobiography*, he states that he 'can boast that I read the *Excursion* twice through' (Darwin, F., 1995, p. 31).

[190] The conversations in the poem are 'concerned with Wordsworth's personal conflicts, sorrows, and consolations, thinly disguised in the dialogue between his Wanderer (the "Pedlar" of *The Ruined Cottage*), the despondent Solitary, and the pious old village priest'. In one part of the poem where the Solitary sees a reflection of himself in a clear mountain stream, 'we see the very image of Wordsworth's soul, successively turbulent and peaceful; bearing even in repose the signs of former conflicts; a soul driven indeed by passion yet not enslaved by it; and, when stillness comes, reflecting in its depths all things in heaven and earth'. (Moorman, 1965, pp. 77 - 80). This inner turbulence or mental struggle, and 'a soul driven indeed by passion yet not enslaved by it', can be seen to be similar to Darwin's short-lived passions and more permanent moral instincts (referred to earlier in his *OUN*).

barnacle could unlock the secrets to the universe. The 'mind's *excursive* power' (Wordsworth, 1949, p. 119) enables the mind to move between science and empiricism on the one hand, and to imaginative 'castles in the air' (Barrett, 2008, p. 527) to form theories on the other. But perhaps most importantly, this ability of the mind to move from the ordinary to an enlarged insight of Nature, enabled Darwin to trace the morality of Man from humble physical beginnings (Beer, 2010, p. 8).[191] This 'double consciousness' conversation of the voices in the poem, or, in Darwin's case, the prose of his text, can also be seen as a textual effect of the form of writing which is 'self-conscious'.[192] Although the poet or writer creates the meaning, the poem or piece of prose also 'has a mind (and an unconscious) of its own' (O'Neill, 1997, xv). Such self-consciousness is common among the Romantic poets as they 'put in question the idea of a knowable or discoverable self', the imaginative self resting somewhere between the self made up of 'a bundle or collection of different perceptions' and an absolute self experiencing 'sublime moments' (O'Neill, 1997, p. xvii). There is frequently such self-conscious searching for knowledge in the textual forms of the *Origin*[193] and the *Descent*[194] through the use of conversational questions. This quest may be seen as Romantic because the texts of such writing reveal a mixture 'of self-assertion and self-doubt; they know of no mode of knowledge superior to their own, yet their sense of a contract with an audience is fragile' (O'Neill, 1997, p. 36). In parallel to the development of Nature that Darwin is interrogating, Darwin's own quest for the knowledge of Nature can also be seen as a form of 'becoming'.[195] In Wordsworth's *The Excursion*, which deals with the concepts of time and transience, such self-consciousness enables the

[191] Beer cites Robert Richards (1989) as placing emphasis on 'the degree to which Darwin sought to find a particular place for human morality in his argument' (Beer, 2010, p. 8).

[192] O'Neill defines 'self-consciousness' (of a poem) 'as textual effects, products of a text's procedures that may persuade the reader that they are, at least partly, agents involved in the process of the text's production'. The self-conscious form of the poem tells the reader 'what the poem is saying or finding out about itself – or not saying and not finding out about itself' (O'Neill, 1997, p. xiv). It is also about 'becoming' as perfection in the quest for knowledge is never totally achieved (O'Neill, 1997, p. xx).

[193] For example, in the chapter on natural selection in the *Origin*, the use of questions such as 'Can the principle of selection, which we have seen is so potent in the hands of man, apply in nature?' and 'Can it, then, be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life, should sometimes occur in the course of thousands of generations?' (Darwin, 1985, p. 130).

[194] For example, in the chapter on the moral sense in the *Descent*, the use of such questions as 'Why should a man feel that he ought to obey one instinctive desire rather than another? Why is he bitterly regretful, if he has yielded to a strong sense of self-preservation, and has not risked his life to save that of a fellow-creature? Or why does he regret having stolen food from hunger?' (Darwin, 2004, p. 134).

[195] O'Neill, referring to Friedrich Schlegel's account of Romantic poetry in the *Atheneäum Fragments (1798),* sees the self-conscious poem as being associated with 'becoming' as it is forever seeking perfection without attaining it (O'Neill, 1997, p. xx).

poet to get nearer to experiencing that which cannot be experienced, namely death. As pointed out by O'Neill,[196] '*The Excursion*'s awareness of itself as a poem is a means of bringing death and temporality within "the reach of reflection"' (O'Neill, 1997, p. xxxviii). With Darwin, this same type of self-conscious awareness enables him to explore the concepts of extinction and death as well as the existence of Man's progenitors before the life of Man. Another aspect of self-consciousness that flows through the writings of both Wordsworth and Darwin is that 'imagination' is linked with 'morals'. For Darwin his imaginative quest for knowledge seeks to discover the physical causes of morality in Nature, but at the same time believing in a social order that supports the equality of races in terms of their common progenitor (although the races may be at different stages of development). For Wordsworth, he 'is alive to the way language involves speakers and listeners in struggle about value', although he 'is haunted by the fear that some modes of visionary imagination are resistant to moral approbation' (O'Neill, 1997, p. 33).

For the young Darwin poetry and music played an important part in sparking his imagination (or 'castles in the air'). They cause 'the mind to create short vivid flashes of images & thoughts. – Poetry. [sic] the latter thoughts are in same manner vivid & grand' (Barrett, 2008, p. 527). Perhaps Darwin's dislike for poetry[197] in later years was a reflection of his 'fossilised' scientific mind making it difficult for him to create 'castles in the air' any more. Perhaps his scientific ideas were so well worked out that he did not have the need to stretch his imagination to the same extent to think of impossible dreams not grounded in empirical science. But the younger Darwin, freshly back from his *Voyage* is very much in need of them, and it is these 'castles' of stretched imagination that lay the groundwork for both the *Origin and* the *Descent*:

> Granny[198] says she never builds castles in the air. Catherine[199] often, but not of an inventive class.- Now that I have a test of hardness of thought, from weakness of my stomach I observe a long castle in the air, is as hard work (abstracting it being done in open air, with exercise &c no organs of sense being required) as the closest train of geological thought. – the capability of such trains of thought makes a discoverer, & therefore (independent of improving powers of invention) such

[196] O'Neill (1997, footnote 51, p. xxxviii) cites Paul de Man's discussion of this point (Paul de Man, 1993, p. 63).
[197] In Darwin's *Autobiography,* published posthumously by his son Francis in 1892, he states 'But now for many years I cannot endure to read a line of poetry' (Darwin, F., 1995, p. 50). The unpublished work had the heading 'Recollections of the Development of my Mind and Character' and was dated 'Aug. 3, 1876' (Darwin, F., p. 5). Darwin wrote this when he was 67 years old, six years before he died in 1882.
[198] 'Granny' refers to Darwin's sister Susan, one of his older sisters, who acted as his mother after his mother's death when a child.
[199] His sister Emily Catherine (known as Catherine, Catty and Kitty).

> 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. - (Barrett, 2008, p. 527).

For Darwin, 'castles' were a form of imagination that 'invented' ideas that helped create discoveries. The 'sublime' could also be seen as an aid to this. There are many theories surrounding Darwin's chronic illness (stomach upsets, fevers, blisters, etc.) which he suffered on and off for most of his adult life, but it is likely that the stress of living with his controversial 'dangerous idea' of evolution contributed to this. Discovering the 'tree of life' and peering back at it along its apparent infinite chain must have seemed like standing on the edge of an abyss, and this could have been a sublime experience creating mixed feelings of awe, fear and terror. Yet in order not to be swallowed up by it, he had to create a 'hardness of thought' to overcome his 'weakness of stomach'. His notes here read almost like a poem with a bundle of contradictory statements. He builds his 'castle' from geological data he has gained from experience in the open air, but the relating of the data to form the abstraction is done without the help of his sense organs. This freedom to construct such 'castles' gives him independence from the received view of science, but, at the same time he has to use scientific hypotheses to test out his ideas. The 'castles' are then tempered by scientific reason to create the 'real train of inventive thoughts'. For Darwin these 'castles' need to be banished by 'inventive thoughts', the science with a breathed-in type of Wordsworthian poetry. This banishment is

> The facility with which a castle in the air is interrupted & utterly forgotten -, so as to feel a severe disappointment <<in real train of thought this does not happen. because papers , &c &c round one. one recalls the castle by going to beginning of castle>> because train cannot be discovered – is closely analogous to my Fathers [sic] positive statement that insanity is only cured by forgetfulness. - & the approach to believing a vivid castle in the air, or dreams real again explains insanity. – (Barrett, 2008, pp. 527 – 8).

The 'castles' of imagination are so far removed from reality as to be akin to 'dreams' or 'insanity'. 'Insanity' could be seen as an extreme form of the sublime in which one is lost in imaginative dreams, or 'castles', and is unable to come back to reality. The 'train of inventive thoughts' already have a literal paper trail of notes to work out the beginning and the end, to work out the order of reasoning, enabling interruptions to occur without destroying the structure. 'Castles' on the other hand are not grounded in reality, are more ephemeral and more susceptible to interruptions and therefore are more easily lost or forgotten. This movement or 'conversation' between 'castles in the air' and 'train of inventive thoughts' is akin to the movement between bodily sensations and thoughts in the brain or mind, as well as Humboldt's aesthetic Method.

In his *Notebook M*, Darwin discusses the way the imagination can move between poetry, art, music and science, referring to Wordsworth's [1801/1802] Preface to *Lyrical Ballads* in which the poet hopes that when science has been sufficiently absorbed into the community it will become truly 'poetic' (Beer, 2010, p. 5):

> Pleasure of imagination […] connection with poetry. I a geologist have illdefined [sic] 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) [emphasis mine] (Barrett, 2008, pp. 528 – 9).

Wordsworth's 'science being sufficiently habitual to become poetical' referred to by Darwin[200] can be found in the following passage from the Preface to *Lyrical Ballads*:

> Poetry is the first and last of all knowledge – it is as immortal as the heart of man. If the labours of Men of Science should ever create any *material revolution*, direct or indirect, in our condition, and in the impressions which we *habitually* receive, the Poet will sleep then no more than at present, but he will be ready to follow the steps of the Man of Science, not only in those general indirect effects, but he will be at his side, *carrying sensation into the midst of the objects of the Science itself* [emphasis mine](Wordsworth, 2003, pp. 16 – 17).

Darwin's reference to the word 'habitual' is significant here in the context of aesthetics as his argument in the *Descent* wants to demonstrate that habit creates instinct. Although here he is talking about an aesthetic sense being developed through the absorption of science by the community, this higher aesthetic sense can also be seen as a moral sense (that is, science, poetry, art or music being developed for the good of the community). A '*material revolution'* created by science need not be feared if the Poet is there to breathe in the sensations of Nature into its midst.

Stating that biological behavioural changes came about through generations of habit becoming instinctive, enabled Darwin to adopt a 'slightly altered Lamarckianism' (Herbert and Barrett, 2008, p. 518). Whereas Lamarck believed 'that organisms acted consciously in altering their behaviour' (Herbert and Barrett, 2008, p. 518), Darwin wanted to show that although the mind affected the body, this was done *unconsciously from habit or instinct.*

[200] It is important to note that Darwin's geologist mentor, Sedgwick, was a friend of Wordsworth's and they went on geological walks in the Lake District together. This friendship is demonstrated in Sedgwick's letters 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 and Hughes, 1890, I, 248 -49), cited by Gaul, 1979, pp. 34 – 5). In addition to being a Geology Professor at Cambridge, he was fond of literature and encouraged the young Darwin 'to read Shakespeare, Milton and Wordsworth, in the years from 1837 to 1839, the years Darwin was working on the Metaphysical Notebooks' (Gaull, 1979, p. 34 - 6). Sedgwick was therefore an important link between Darwin and Wordsworth and between science and poetry. Geology, both scientifically and poetically, was the lynchpin to Darwin's theory of natural selection.

Evidence of this can be seen in Darwin's *Notebook C*[201] in which he says 'Lamark's [sic] willing absurd, [therefore] not applicable to plant' (Barrett, p. 259); his reference to structures being instinctive and hereditary: 'heredetary [sic] ambling horses, (if not looked at as instinctive) then must be owing to heredetary [sic] power of Muscles. – then we SEE structure gained by habit' (Barrett, 2008, p. 290). Again, in Man's case, he shows that the active use of memory (or will) is not required when something becomes instinctive:

> My view of instinct explains its loss ʕ [sic] if it explains its acquirement. - Analogy. A bird can swim without being web footed yet with much practice & led on by circumstanc [sic] it becomes web footed, now Man by effort of Memory can remember how to swim after having once learnt, & if that was a regular contingency the brain would become webfooted [sic] & there would be no act of memory.- (Barrett, p. 293).

Darwin emphasises this view that habits and habitual instincts precede structure (the fixed instinct) and that this is not brought about by a conscious mental state or will: 'according to my view, habits give structure, .. habits precedes [sic] structure, ..habitual instincts precede structure. – duckling runs to water. Before it is conscious of web feet.- ' (Barrett, p. 301).

This view that the unconscious structure of instincts resides somewhere in the brain could be regarded as materialist, and this is the view taken by Herbert and Barrett when referring to *Notebook M*: 'The most obvious sign of Darwin's new perspective was the alignment of his transmutation view with materialism and determinism. He embraced materialism enthusiastically […] and argued […] that thought originated in sensation' (Herbert and Barrett, 2008, p. 519). For example:

> Fear must be simple instinctive feeling; I have awakened in the night, being slightly unwell & felt so much afraid though my reason was laughing & told me there was nothing […]. The sensation of fear is accompanied by <<troubled>> beating of heart, sweat, trembling of muscles (Barrett, 2008, p. 532).

However, as argued in earlier chapters, this form of materialism should be regarded as 'Romantic Materialism' (Beer, 1983, p. 152) as the underlying cause is more of a metaphysical concept than a tangible physical entity, despite being part of a material brain (thus the apparent oxymoron 'Romantic Materialism'). At the time of writing *Notebook M* Darwin was visiting his father,[202] a doctor, and discussed various medical conditions, including depression, epilepsy, hereditary defects which helped inform his ideas. Darwin refers to states of mind being brought about by sensations or 'bodily causes':

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[201] *Notebook C* was written between February and July 1838.

[202] Robert Waring Darwin. There are frequent references to his father such as 'My F. says', 'My father's test of sincerity', 'My father thinks', 'My father says', 'My father does not know whether …' (Barrett, 2008, pp. 524 -50).

> Ill-humour & depression, which comes on from bodily causes. -. 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* [emphasis mine] (Barrett, 2008, p. 524).

The seemingly opposing terms 'materialism' and 'truly spiritual' show the apparently contradictory nature of Mind and Brain, and therefore the term metaphysical[203] is apt. This form of materialism made him doubt the existence of free will (seeing it as the same as chance):

> One doubts existence of free will every action determined by heredetary [sic] constitution […]. I verily believe 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 (Barrett, 2008, pp. 526 – 7).

Chance does not mean that there is no causation only that the cause is not known. Similarly, 'the illusion of free will is likewise only an illusion that there is no causal necessitation of the feeling, belief or decision enacted by the mind' (Hodge, 2003, pp. 56 - 7). As Darwin subsumed mind under matter causally early on in his notebooks in 1838, he 'never later had to construct new ways to secure the continuity between man and animals or between man and the lawful order of nature' (Hodge, 2003, p. 57).

To an extent, therefore, according to Darwin, thoughts are determined 'according to law', shaped by a brain that has developed and adapted itself to its environment through the law of natural selection. In *Notebook M*'s discussion of the Mind-Brain problem, one can see Darwin wrestling with the issue of morality that he develops in the *Descent*. Here Darwin already sees 'conscience' as 'instinct', 'acquired by senses', and that therefore 'thinking consists of sensation of images'. The 'instinctive knowledge' of those sensations which brings about those feelings of 'conscience' is the 'memory of such sensations, & memory is repetition of whatever takes place in brain. [sic] when sensation is perceived' (Barrett, 2008, p. 534).

In his *Old and Useless Notebooks* [OUN][204] Darwin discusses the notion of sympathy in relation to the concept of the sublime. His notes discuss Dugald Stewart's *Essay on the*

[203] Darwin regarded the subject matter in *Notebook M* as 'metaphysical': 'In his 'Journal' begun in August 1838, Darwin referred to […] Notebook M as follows – 'opened note book connected with Metaphysical Enquiries', cited by Herbert and Kohn, 2008, p. 7, footnote 2 (Herbert & Kohn, 2008, p. 7).
[204] Barrett, 2008.

Sublime (Stewart, 1829) in which Longinus[205] remarks that the sublime 'fills the reader with a glorying, and sense of inward greatness' (Stewart, 1829, p. 268). Longinus wrote *On the Sublime* which is an aesthetic and ethical dissertation on a style of writing (for example, by Homer or Plato) in which the writer and reader can form an empathy that goes above the ordinary form of writing, taking both to a level of ecstasy in which greatness of soul is achieved. The sublime can be experienced not only through beauty, but also through that which is distressing causing bewilderment. As referred to by Darwin:

> The emotions of terror & wonder so often concomitant with sublime. adds not a little to the effect: as when we look at the vast ocean from any height. – That the superiority & "inward glorying", which height. [sic] by its accompanying & associated sensations so often gives (Barrett, 2008, p. 605).

Stewart conveys the meaning of the sublime by showing how the mind experiences the difference between downward motions and upward motions. A bird soaring upwards, for example, 'exhibits *active powers* which are completely denied to ourselves', and this gives us the idea of a supernatural agent' (Stewart, 1829, p. 270) which is what we mean when we talk of 'flights of imagination and of fancy' (akin to Darwin's 'castles in the air'). Such 'powers are commonly supposed to be the immediate gift of heaven; and not like our scientific habits [and education]' (Stewart, 1829, pp. 270 – 271). Darwin refers to 'great height' and 'eternity' creating this feeling of an 'inward glorying' which is the sublime:

> Hence it appears, that when certain causes, as great height, eternity, &c &c. produces an inward pride & glorying. [sic] (often however accompanied with terror & wonderment) ,<which>[206] <<this>> emotion, from the associations before mentioned. [sic] we call sublime (Barrett, 2008, p. 605).

This captures an image of the imagination moving between the height of the sublime and the humbleness of the ordinary (yet the outward appearance of humbleness can often hide a sublime level of complexity, as with the barnacle). This can be seen not only in Darwin's jumping from the detail of a beetle in one sentence to an examination of the law of natural selection in the next, but also in the switching between the empirical and the scientific (or as already quoted, between 'heaven' and 'our scientific habits'). The 'flights of imagination' that enabled Darwin to develop his insights into Nature come from 'the idea of Creative Power, [which] is owing, in part to the irresistible tendency which that idea has to raise the thoughts toward Heaven' (Stewart, 1829, p. 283). The feeling of sympathy is created

[205] His work *On the Sublime* (First Century AD) was 'the first time greatness in literature is ascribed to qualities innate in the writer rather than in the art' (*Encyclopaedia Britannica*, 2014, unnumbered web page).

[206] The symbol <> refers to an item deleted by Darwin (see symbols used in the transcriptions of Darwin's notebooks, Barrett, 2008, p. vi).

through one's imagination making one's feelings go out towards the object, in which the subject and object become one:

> It appears to me, that we may often trace the source of this "inward glorying" to the greatness of an object itself or to the ideas excited & associated with it. [sic] as the idea of Deity. with vastness of Eternity. [sic] which superiority we transfer to ourselves in the same manner as we are acted on by sympathy (Barrett, 2008, p. 605).

However, according to Beer, Darwin 'avoids this transfer of superiority [to himself] even as his writing style is marked by Romantic subjectivity' (Beer, 2010, p. 4).

This feeling of sympathy plays an important part in Wordsworth's subjective experience of Nature in which that experience is actually communicated to the reader and is therefore objectified, such that it can be said to exist in both the poet's and reader's mind:

> I have said that Poetry is the spontaneous overflow of powerful feelings: it takes its origin from emotion recollected in tranquillity: the emotion is contemplated till by a species of reaction the tranquillity gradually disappears, and an emotion, kindred to that which was before the subject of contemplation, is gradually produced, and *does itself actually exist in the mind* [emphasis mine] (Wordsworth, 2003, p.21).[207]

An example of this communication of the subjective experience of Nature and the emotional experience of sympathy that accompanies it can be seen in Wordsworth's *The Prelude* in which he retells the experience of himself as a boy taking a boat out without permission on Ullswater lake. But in this poem he is not just conveying the experience of the boy to the reader but also the poet's feeling of the way in which Nature can penetrate the observer's mind, and, in so doing, become objectified:

> Wordsworth so describes the boy's experiences as to recreate in the reader sensations and feelings, the 'emotion', experienced by the boy. But the action on the reader of this sequence of feelings is to generate a new emotion, akin to but different from that consciously felt by the boy. It is this complex emotion which, experienced by the reader, constitutes the poet's communication of the 'influence of natural objects' (Winkler, 1975, p. 159).

Both the boy and the reader of the poem are shocked by the sudden change from the movement of the boat 'like a Swan' to the appearance of 'a huge cliff' with its 'uprear'd head' like an unearthly creature instilling sublime fear:

> I dipped my oars into the silent lake,
> And, as I rose upon the stroke, my boat
> Went heaving through the water, like a Swan;
> When from behind that craggy steep, till then
> The bound of the horizon, a huge Cliff,
> As if with voluntary power instinct,
> Uprear'd its head (Wordsworth, 1970, lines 402 - 408).

[207] In Preface to *Lyrical Ballads*.

The fear of the sublime is emphasised with such phrases as 'that spectacle', 'undetermined sense /Of unknown modes of being' and ' huge and mighty Forms that do not live/Like living men mov'd slowly through my mind' (Wordsworth, 1970, lines 418 - 426). But these frightening experiences of Nature not only reflect the importance that natural objects played in Wordsworth's life, but also show how such objects can be both the object of awe and terror in one context but also of pleasure in another (Winkler, 1975, p. 161). This can be seen to be similar to Darwin's view of Nature: on the one hand pessimistic, in being destructive (for example, through death, extinction and struggle), but optimistic in being creative (for example through diversity, reproduction and adaptation). But the poem is not just relating the experience of the sublime. It is also relating the fact that the child, like Darwin's experience of fossils, rock formations , 'savages', slaves and slave traders, is also experiencing the past of humanity in the present. The child 'is living through the whole life of the race in little, before he lives the life of his century in large [and] may possibly dimly apprehend something more of truth in certain directions than is visible to the adults around him' (Myers, 1899, p. 135). Following Plato, the soul of Wordsworth's child existed in a superior world to Man's before it entered the body,[208] but, at the same time, it was connected by the all-pervading Spirit to the material world surrounding him:

> The child begins by feeling this material world strange to him. But he sees in it, as it were, what he has been accustomed to see; he discerns in it its kinship with the spiritual world which he dimly remembers […]. And even when this freshness of insight has passed away, it occasionally happens that sights or sounds of unusual beauty or carrying deep associations – a rainbow, a cuckoo's cry, a sunset of extraordinary splendour – will renew for a while this sense of vision and nearness to the spiritual world – a sense which never loses its reality, though with advancing years its presence grows briefer and more rare (Myers, 1899, p. 135).

Although *The Excursion* impresses upon the reader that the human mind is not part of Nature but is rather accommodated to it as it is 'capable of generating faith, hope, love under the most austere circumstances, of creating beauty […], of humanising […] nature and the science that was developing around it' (Gaull, 1979, p. 40), the Mind could nevertheless, as the boy's mental experience on the lake demonstrates, be seen as part of a Primordial Soul.[209] The memories of the poet go back in time through the boy's mind, which in turn could be seen to be going back to memories of the Primordial Soul before the

[208] This notion is also expressed in Wordsworth's poem 'Ode: Intimations of Immortality from Recollections of Early Childhood' (Wordsworth, 2015d, unnumbered page). Completed in 1804, published in 1807.

[209] Although for Myers the experience of the Primordial Soul is the experience of the human race 'in little' and 'in large'.

existence of Man. These memories could be interpreted as representing both the memory of the individual as well as the collective memory of Mankind and primitive life before that. This grasping of this idealised form of reality, or 'realised idealism', is akin to Goethe's archetypal experiences emanating from seeing the sheep's skull and the 'leaf' in Italy. This might appear as a leap from a Platonic Primordial Soul to Romantic Mind as a product of Nature. But the apparent muddle dissipates if one takes a step back and sees all the threads of Nature as Mind, both past, present and future, as an 'entangled bank' made up of the natural history (or 'science') of Nature overlain by the gossamer threads of poetry and imagination. Here Darwin, Goethe, Humboldt and Wordsworth become intertwined. Memories are individual histories of the experience of self and Nature but are also memories of physical memories, as with Darwin's experiences of the petrified trees or fossils, or Darwin's experience of the development of the morality of his own era through the abolition of the slave trade. In a metaphysical and a physical sense, all these mental experiences and moral values have come from beyond the physical veil separating us from the inner secrets of Nature – and this beyond could be regarded as the Primordial Soul, as well as a Kantian *intellectus archetypus* in the present.

Like Wordsworth, both Darwin and Humboldt uncover the past from the present through their aesthetic experiences, but as their later works demonstrate, the 'advancing years' makes the experience of the 'nearness to the spiritual world' of Nature 'more rare'. Poetry itself can help Man in getting closer to this spiritual side of Nature, and this was expressed by John Stuart Mill in his autobiography in which he praised Wordsworth's poems for lifting him out of a state of dejection:

> In them I seemed to draw from a source of inward joy, of sympathetic and imaginative pleasure, which could be shared in by all human beings, which had no connexion with struggle or imperfection, but would be made richer by every improvement in the physical or social condition of mankind (cited by Myers, 1899, p. 136).

This links in to Darwin's theory that morality comes about through the development of instincts of sympathy between fellow human beings which makes them human.[210] Here this uplifting of the human spirit through poetry contributes to Man's 'sympathetic and imaginative pleasure', thereby helping to improve the 'physical or social condition of mankind'. The sympathy of the emotions joining the subjective to the objective, not just in Nature but also between the poet and his readers, reflects a development and maturity of

[210] As already referred to in Chapter 1.05, Wordsworth's 'Love of Nature Leads to Love of Mankind' in *The Prelude* depicts a unity of humanity with a single 'spirit' and a single 'moral sense'.

mind, or as expressed by Wordsworth, 'growth', which is in the full title to *The Prelude*, or *Growth of a Poet's Mind*. This mental development of the Mind reflects the moral nature of Man. In his *OUN*, Darwin refers to Mackintosh's *Dissertation* in which he regards this maturity as social, as mankind's fellow-creatures help each other 'for its own sake'. Mackintosh states 'that man at the period of maturity is a social animal, who delights in the society of his fellow-creatures for its own sake, independently of the help and accommodation which it yields' (Mackintosh, 1837, p. 113).[211] Darwin puts this into his own words in his notes when he says that

> These instincts consist of a feeling of love,<and sympathy> <<or benevolence>> to the object in question […]. We see in other animals they consist in such active sympathy that the individual forgets itself, & aids & defends & acts for others at its own expense (Barrett, 2008, p. 619).

But the concept of sympathy is strengthened by the word *ought* which makes acts of sympathy towards one's fellow-beings *moral:*

> [The action of] one man trying to save another in desperation […] shows that our feeling, that the instinct *ought* to be followed is a consequence of that being part of our nature, & its effects lasting, whilst passions although equally natural leave effects not lasting (Barrett, 2008, p. 620).

For Darwin the act of trying to save someone from drowning, even though it is obvious that the action will not save that person, is a deeply ingrained *moral* action reflecting a *moral* instinct. It is an action that *ought* to be done for its own sake regardless of outcome. This brings out the 'entangled bank' of mental struggles that exist in Man's mind as he struggles between following strong short-lived passions and weak instincts, 'hence man must have a feeling, that he *ought* to follow certain lines of conduct, & he must soon *necessarily* learn that it is his interest to follow it even when opposed by some natural passion' (Barrett, 2008, p. 621).

Crucial to Darwin's moral law of what is right and wrong, of what are the strong instincts that tell Man what *ought* to be done, is that 'parents' and 'education' are working to achieve the 'same end', namely the benefit of the 'community'. And equally crucial to Darwin's argument, as in the developing physical world, is that the moral laws develop and change according to the beneficial needs of the community. Just as a butterfly species needs to adapt to its changing environment or to other species, so too must Man adapt his moral instincts to changing circumstances within his community:

> As conditions change, from civilization, education changes, & probably likewise instincts, for the same law effects both.- <such> changes <<in accordance to

[211] Darwin has this passage marked in his personal copy (Barrett, 2008, p. 619, footnote 42 – 1).

> beneficial tendency>> will most readily affect. [sic] the instincts, for they are in accordance with it (Barrett, 2008, p. 624).

This clearly links in to the earlier discussion of Wordsworth's interrelationship between the subjective and the objective in Nature, in which the Mind has an impact on Nature and Nature has an impact on Mind.[212] Here Nature creates Man's moral code through the development of Man's instincts, yet at the same time through Man's impact on the world he is changing the Nature that creates his instincts. In another sense, Wordsworth saw his poetry as a vehicle for getting his moral point of view across, and so this was an expression of his moral instinct to help better Man's lot through reflection. His *Lyrical Ballads*, produced in collaboration with Coleridge, could be seen as contributing 'to a revolution in taste which had wide social implications' (Scofield, 2003, p. vii). In his poem 'The Last of the Flock', for example, the narrative 'challenges a view of social relations which relies on the condescending charity of the rich […] with a view which sees human need […] bound up with the need for self-respect and independence' (Scofield, 2003, p. viii).

In the *Descent*, Darwin explains the existence of the 'moral sense' in humans as having developed through four stages.[213] First, a set of 'social instincts' must have been developed that were strong enough to bind members of society together:

> The social instincts lead an animal to take pleasure in the society of its fellows, to feel a certain amount of sympathy with them, and to perform various services for them […]. But these feelings and services are by no means extended to all the individuals of the same species, only to those of the same association (Darwin, 2004, 121).

Second, the intellect must have been sufficiently developed in order to recall and distinguish the social instinct from a momentary urge that is only concerned with the self (as discussed earlier):

> As soon as the mental faculties had become highly developed, images of all past actions and motives would be incessantly passing through the brain of each individual; and that feeling of dissatisfaction, or even misery, which invariably results […] from any unsatisfied instinct, would arise, as often as it was perceived that the enduring and always present social instinct had yielded to some other instinct (Darwin, 2004, 121).

[212] The boat-stealing episode referred to earlier also depicts the sublime in Nature as 'masculine' (connected to the memory of his father) and the beautiful in Nature as 'feminine' (connected to the memory of his mother) (Farnell, 1999, p. 2). As a mental mirroring of Darwin's 'entangled bank', the masculine-sublime and the feminine-beautiful entanglement of sexual identity and aesthetics can be seen as a bridge between the subjective and the objective, with growth and identity achieved through awareness and understanding.

[213] See Richard's summary of these stages at Richards, 2002, p. 549.

Here Darwin emphasises the fact that the mental images pass 'through the brain' rather than the mind indicating that the thoughts are physically located despite the fact they are feelings. Also important is Darwin's reference to different mental states interacting with each other, viz. the past and the present. This 'incessant' movement between the two located in the physical present of the brain is a reminder of Goethe's 'Genetic Method' and, in the case of Darwin, his movement between genealogy (the past) and teleology (the future).

Third, language is required for community members to express and communicate their needs:

> After the power of language had been acquired, and the wishes of the community could be expressed, the common opinion how each member ought to act for the public good, would naturally become in a paramount degree the guide to action (Darwin, 2004, 122).

But language is not just communication between individuals, it is also a tool used by the community to express its 'approbation and disapprobation' of its members according to feelings of sympathy, which forms part of the collective 'social instinct'. Although expressed physically through speech and the written word, language is a symbolic representation of a collective Mind, yet at the same time anchored in a collective Brain (i.e. an archetypal Brain common to all Mankind). In Darwin's own case, he uses language to reflect his sympathy towards the inhumanity of slavery on the one hand, and the intricacies of Nature on the other, through his 'anthropomorphic descriptions of nature' (Browne 2003a, pp. 213 – 6).

Fourth, and finally, Man's state of Mind (and structure of Brain) has been fully developed to reflexively consider the needs of others within his community through the development of habit ultimately making it instinctive. Man's human state is therefore that of a moral creature:

> For the social instinct, together with sympathy, is, like any other instinct, greatly strengthened by habit, and so consequently would be obedient to the wishes and judgement of the community (Darwin, 2004, p. 122).

In this sense the instincts which are 'obedient to the wishes and judgement of the community' can be seen as a form of 'community Mind' but physically based in the community's archetypal Brain.

3.03 The Development of Man's Intellect from Physical Beginnings

So far Man's 'moral sense' has been traced back to Man's intellect, over time, working collaboratively with other members in a community to create a social instinct through habit

in which actions are carried out for the common good. The argument of the present thesis is that there is a Romantic aspect to Darwin's 'moral sense' as it has been hewn from Nature by Nature rather than having been imposed on Man externally by a Deity. According to the Romantic interpretation of Darwin, the 'moral sense' has been created by Nature's own laws and archetypes. This does not mean that there is not a Deity, only that a Deity has not directly created this 'moral sense'. Darwin makes this clear in the epigraphs he uses on the facing page to his title page (Darwin, 1985, p. 50) where he quotes Francis Bacon's work [1605][214] warning against using the scriptures as a substitute for science, and Whewell[215] in his 'Bridgewater Treatise'[216] who argues for a Deity who makes general laws, not individual beings (Young, 1985, pp. 12 – 16). However, It could be argued that Darwin takes Whewell out of context as Whewell's main point is to argue for a Divine Power (Browne, 2003b, p. 80)

This section will examine the evidence that Darwin provides of the causal links between the purely physical organs of Man and his developing intellect that has emanated from those organs. Before Man became a moral being, before his intellect was sufficiently developed for him to be a thinking and reflecting being, he learnt to cooperate like other animals in hunting packs. Gradually over time that physical grouping of cooperation had a physical effect. Individuals needed to communicate and thus their vocal cords were developed, and Darwin gives numerous examples of such communication in the insect, animal, bird and marine life. The highest physical evidence of such development that can be both seen by the naked eye and heard by the ear is the human voice that is used for the purpose of language. The development of the vocal cords, and consequently of language, are an example of how the collective cooperative behaviour of humans has brought about a physical change in their organs:

> The habitual use of articulate language is […] peculiar to man; but he uses, in common with the lower animals, inarticulate cries to express his meaning, aided by gestures and the movements of the muscles of the face […]. Our cries of pain, fear, surprise, anger, together with their appropriate actions, and the murmur of a mother to her beloved child, are more expressive than any words (Darwin, 2004, p. 107).

In the same way as instincts are created, as discussed earlier, so habits create physical change. Language started off as a form of cries expressing 'pain, fear, surprise, anger'

[214] In Markby, 1863, p. 81.
[215] William Whewell's third 'Bridgewater' treatise *On Astronomy and General Physics* (1834).
[216] The 'Bridgewater Treatises' are named after the Eighth Earl of Bridgewater (Francis Egerton) who left a will to pay eight gentlemen a thousand pounds each to write a treatise showing the power of God in Nature (Wyhe, 2014, unnumbered page).

together with associated body language, which developed the corresponding muscles to articulate those expressions of feeling. And as those muscles develop so too do the articulations and forms of communication get fine-tuned to make them more effective. Thus a cycle of psycho-physical development is created in which the physical expression of a communication affects the organ expressing it and then in turn the improved organ effects a developmental change in the expression, articulation or communication:

> No philologist now supposes that any language has been deliberately invented; it has been slowly and unconsciously developed by many steps. The sounds uttered by birds offer in several respects the nearest analogy to language, for all the members of the same species utter the same instinctive cries expressive of their emotions; and all the kinds which sing, exert their power instinctively; but the actual song, and even the call notes, are learnt from their parents or foster-parents (Darwin, 2004, p. 108).

This passage could be interpreted as another example of Darwin demonstrating that development comes from within the laws of Nature itself rather than directly from a Deity since the process is slow coming from many steps, and not from one creation at one moment in time. Importantly here, Darwin allows for variation or diversity. Like birds who have developed the same vocal cords within their species yet can learn songs 'from their parents or foster-parents', Man has the freedom within his species to use his vocal cords, and therefore his language, to express himself individually. Crucial to the development of Man's 'moral sense' is the impact that language has on Man's mental development and therefore his brain. The development of language enables Man to 'carry on long trains of thought':

> As the voice was used more and more, the vocal organs would have been strengthened and perfected through the principle of the inherited effects of use; and this would have reacted on the power of speech. But the relation between the continued use of language and the development of the brain, has no doubt been far more important. The mental powers in some early progenitor of man must have been more highly developed than in any existing ape, before even the most imperfect form of speech could have come into use and advancement of this power would have reacted on the mind itself, by enabling and encouraging it to carry on long trains of thought. A complex train of thought can no more be carried on without the aid of words, whether spoken or silent, than a long calculation without the use of figures or algebra (Darwin, 2004, p. 110).

The vocal organs affect speech, speech affects the vocal organs, but most importantly the overall effect of language is to develop the power of thought and therefore the brain. The developed brain affects the development of language and this in turn affects the development of the brain: 'the continued use of language will have reacted on the brain and produced an inherited effect; and this again will have reacted on the improvement of

language' (Darwin, 2004, p.679). As such powers would have been an advantage to the species, the most developed brains would have been selected and passed on to the next generation due to the law of natural selection.

In Chapters One and Two of the present study, Darwin's reference to 'rudimentary organs' in the *Origin* was discussed and showed that along with fossils they created a link between past and present, revealing the history of species' development. As already referred to earlier,[217] Darwin states that 'organs in a rudimentary condition plainly show that an early progenitor had the organ in a fully developed state' (Darwin, 1985, p. 454). These rudimentary organs are present traces of past states of organs that had a use in the past but no longer have a use in the present. Chapter One[218] referred to Darwin's examples of snakes with a rudimentary pelvis and hind limbs. This argument is taken up in a similar vein when discussing vocal cords. Some could be said to be not fully developed whilst others could be regarded as rudimentary:

> As all the higher mammals possess vocal organs, constructed on the same general plan as ours, and used as a means of communication, it was obviously probable that these same organs would be still further developed if the power of communication had to be improved […]. The fact of the higher apes not using their vocal organs for speech, no doubt depends on their intelligence not having been sufficiently advanced. The possession by them of organs, which with long-continued practice might have been used for speech, although not thus used, is paralleled by the case of many birds which possess organs fitted for singing, though they never sing. Thus, the nightingale and crow have vocal organs similarly constructed, these being used by the former for diversified song, and by the latter only for croaking (Darwin, 2004, p. 112).

So for example with apes, their 'vocal organs' have not been fully developed to make speech possible and therefore reflects their intelligence as not having been developed sufficiently to make language important for their survival. As humans are related to apes through our tree of descent, this shows how Man's own vocal organs and intelligence must have been rudimentary, and the more rudimentary in time, the more physical and less mentally reflective our states were. The example of the birds with developed organs for singing but not used for song underlines the nature of Darwin's 'tree of life' as it emphasises the dead ends reached when species stop developing any further. The rudimentary organs either show where the organs were placed in time when useful to a species and now no longer useful, or they show the development of an organ on the way to

[217] Referred to in Chapter 2.11, 'Nature as Archetype in *On the Origin of Species*'.
[218] Referred to in Chapter 1.05, 'Darwin's One Reality Nature'.

being something useful but stopping dead in its tracks (a kind of unfulfilled teleology). The important point to make here is that the further back the tree of descent is traced, the more physical and less mental the organisms become. This shows that Mind (both individual, collective and therefore social) came from physical beginnings.

Darwin also shows that language itself has developed gradually and gives examples of rudiments to support this:

> The frequent presence of rudiments, both in languages and in species, is still more remarkable. The letter *m* in the word *am*, means *I*; so that in the expression *I am*, a superfluous and useless rudiment has been retained. In the spelling also of words, letters often remain as the rudiments of ancient forms of pronunciation (Darwin, 1985, p. 113).

The gradual development of language shows that there 'is no proof that they owe their origin to a special act of creation' and that there can be no 'insuperable objection to the belief that man has been developed from some lower form' (Darwin, 2004, p. 114). And by 'lower form', as discussed above, this can be taken as a more physical form. The development of languages also supports Darwin's theory of natural selection as 'dominant languages and dialects spread widely, and lead to the gradual extinction of other tongues […]. The survival or preservation of certain favoured words in the struggle for existence is natural selection' (Darwin, 2004, p. 113).

As the above discussion has shown, Mind developed from humble physical beginnings (Darwin's Romantic materialism), showing that morality developed from the material world. This enabled Darwin to provide evidence to support his belief that all races are related through their common progenitor[219] and that although some are more developed than others, they all have the same potential given the right conditions.[220] This is one of the things that informed his opposition to slavery, referred to throughout this thesis.

As the next section will demonstrate, Darwin's theory of sexual selection is not just a bolt-on theory added to his theory of natural selection but a development of the theory, strengthening his theory that Mind comes from matter, and, therefore, another piece in the jigsaw supporting the view that morality developed from matter.

[219] 'We thus learn that man is descended from a hairy, tailed quadruped' (Darwin, 2004, p. 678).
[220] 'The mental powers of the higher animals, which are the same in kind with those of man, though so different in degrees, are capable of advancement [...] through natural selection. The same conclusion may be extended to man' (Darwin, 2004, p. 679).

3.04 The Development of a Physical-Mental Sexual Selection Continuum in Animals and Mankind

Sexual selection[221] might seem an odd example in support of Darwin's view of morality, but as the following discussion will demonstrate, this is another strand of the same argument.

'Natural selection ' and 'sexual selection' both come from the same root cause, namely the assertion, as discussed in previous chapters, that Nature is both creator and product of its own laws. However, although they work together, there is a subtle difference between the two: whereas 'sexual selection depends on the success of certain individuals over others of the same sex, in relation to the propagation of the species', 'natural selection depends on the success of both sexes, at all ages, in relation to the general conditions of life' (Darwin, 2004, p. 684). To understand how sexual selection fits into his theory of Mind, it is useful to first look at how Darwin defines sexual selection in the *Descent* (which could be seen as an expression of his 'Victorianism' – this will be discussed in section 3.05):

> Sexual selection has led to the development of secondary sexual characters. It has been shewn that the largest number of vigorous offspring will be reared from the pairing of the strongest and best-armed males, victorious in contests over other males, with the most vigorous and best-nourished females, which are the first to breed in the spring. If such females select the more attractive, and at the same time vigorous males, they will rear a larger number of offspring than the retarded females, which must pair with the less vigorous and less attractive males. So it will be if the more vigorous males select the more attractive and at the same time healthy and vigorous females; and this will especially hold good if the male defends the female, and aids in providing food for the young (Darwin, 2004, pp. 255 - 56).

For the best and strongest to survive and pass on their strengths to the next generation, males need to be armed to fight off other males in competition for the selection of the strongest females that are best at nourishing their young. To do this they require good weaponry, but this same weaponry can also be used to advantage in holding a female for the purpose of successful reproduction. But the males must also be attractive to hold the female's attention and must be strong enough to keep her and protect her and her young. Therefore 'the females […] prefer pairing with, the more ornamented males, or those

[221] Before discussing sexual selection, Darwin makes a distinction between 'primary sexual characters' (which are the 'organs of reproduction') and 'secondary sexual characters' (which are, for example, sense organs that help a male find a female, and male prehension organs for holding a female securely) as well as differences in structure between males and females relating to 'habits of life' (for example, females of certain fly species being blood-suckers and males not being able to suck). Darwin is only concerned with those secondary sexual characters that have been developed by 'sexual selection' which 'depends on the advantage which certain individuals have over others of the same sex and species solely in respect of reproduction' (Darwin, 2004, pp. 241 – 3).

which are the best songsters' as well as being 'more vigorous and lively males'. Such pairs would therefore 'have an advantage over others in rearing offspring' (Darwin, 2004, p. 249).

Over time the purely practical organs for individual survival, such as feathers for flight or vocal cords for a warning, start being selected additionally for the advantage they give for furthering the selection of the best mates for reproduction and nourishment and protection of the young (ultimately the best advantage this gives the species for survival). Upon coming across the male Lucanidae beetle with its great mandibles, Darwin felt that 'they are so conspicuous and so elegantly branched, and as owing to their great length they are not well adapted for pinching, the suspicion has crossed my mind that they may in addition serve as an ornament' (Darwin, 2004, p. 345).

At this stage of sexual selection in the insect and animal world there is not an 'intellect' at work as there is in Mankind but there is an element of *mental processing* in which the animal or insect is having to make judgements, however simple, based on the sense data received. For example, a peahen has to identify the longest, most colourful and best-kept tail-feathers when approached by more than one peacock. As discussed earlier, Mankind has developed tools through the development of his intellect. For example, being able to make a shelter and clothes has enabled Man to do without a hairy body making it easier for him to move between hot and cold terrains. He can adjust his clothing according to the climate. Having tools to make weapons means that he does not have to waste energy growing horns or developing extra-large jaws. The same applies to ornaments. Man can make himself attractive by making ornaments which also gives him the flexibility of improving them immediately without having to wait for the body to develop them over many years. He can also dye his hair and mark his body with tattoos as Darwin discovered amongst 'savages' on his *Beagle* voyage. Darwin is himself aware of the similarities between the ornamentation of birds in the animal world and the ornamentation in Man's world when he refers to women wearing birds' feathers in their hats. Like the theory of natural selection, sexual selection reveals the chain of development, both physical and mental, from animals to humans. Desmond and Moore state:

> [Darwin] was satisfied that pea-hens 'admire [the] peacock's tail, as much as we do' and choose the best, showing his belief that aesthetic appreciation could stretch from birds to humans […]. Going beyond natural selection, [sexual selection] would explain the peacock's fan, as well as those facial and bodily characteristics that made men and women of each race alluring (Desmond and Moore, 2004, p. xxv).

It is not surprising therefore that 'women everywhere deck themselves with these plumes' confirming 'the beauty of such ornaments' (Darwin, 2004, p. 115). This is another example of Darwin's 'Victorianism', to be discussed in the next section.

In the previous sections reference has already been made to the mind-body development cycle in which the development of the body can develop the mind and, in turn, the development of the mind can further develop the body. For example, the need to cooperate in Man creates the need to communicate, which in turn creates the need to develop the vocal cords which, in turn, develops language and, in turn, enables thought and the development of the intellect. The same applies to sexual selection:

> He who admits the principle of sexual selection will be led to the remarkable conclusion that the nervous system not only regulates most of the existing functions of the body, but has indirectly influenced the progressive development of various bodily structures and of certain mental qualities. Courage, pugnacity, perseverance, strength and size of body, weapons of all kinds, musical organs, both vocal and instrumental, bright colours and ornamental appendages, have all been indirectly gained by the one sex or the other, through the exertion of choice, the influence of love and jealousy, and the appreciation of the beautiful in sound, colour or form; and these powers of the mind manifestly depend on the development of the brain (Darwin, 2004, p. 687).

Here Darwin is saying that the development of the nervous system, that is, the brain, and bodily functions, influences the development of the mind which, in turn, through sexual selection, influences the development of the brain, or nervous system. Sexual selection has therefore also been a contributory factor in the development of Mind from humble physical beginnings, creating the 'mental qualities' of 'courage, pugnacity [and] perseverance' as well as the 'mental powers' of 'choice', 'love', 'jealousy' and 'the appreciation of the beautiful in sound, colour or form'.

Like natural selection, sexual selection is also able to reveal the history of physical and mental development linking present-day animals and humans to their primordial past:

> Within the same genus, the two sexes frequently present every gradation from no difference in colour, to so great a difference [that they were long thought to belong to different genuses] […]. When the sexes nearly resemble each other, this appears due either to the male having transferred his colours to the female, or to the male having retained, or perhaps recovered, the primordial colours of the group (Darwin, 2004, pp. 355 – 6).

These 'primordial' traces, like the rudimentary organs, show the historical processes of change linking present forms to past origins. The important point that Darwin is making here is that the past history of these forms is actually visible in the present (that is, at the time he was writing, in the Victorian era) – in a sense the forms are past-present and

present-past as they encompass their whole history through gradations of great difference to no difference. The reality of this history is also a reflection of the mental aspect of Nature, since Man's scientific interpretation of Nature through Darwin and others organises it historically as well as scientifically: through the blurring of differences, 'the primordial colours of the group' shine through with the help of the scientist's imaginative intellect. For Darwin, whether physical or mental, 'the causes have generally been the same which have determined the brilliant colouring of the males alone of some species, and of both sexes of other species' (Darwin, 2004, pp. 355 – 6). In other words, there is one primordial cause for the outward differences of the two sexes. Darwin gives an example of the Orange Tip butterfly that

> probably shew us the primordial colours of the parent-species of the genus; for both sexes of four or five widely-distributed species are coloured in nearly the same manner […]. We may here infer that it is the males […] which have departed from the usual type of the genus (Darwin, 2004, p. 358).

This is an important argument against Wallace who believes that female lepidoptera adopt their dull colours for the sake of protection.[222] Darwin, on the other hand, believes that the females' colour is the constant and the males deviate from the female colours in order to attract them. In other words, their colours 'have been chiefly modified through sexual selection' which accounts for why 'the females of allied species generally resemble one another so much more closely than do the males' (Darwin, 2004, p. 367). When both females and males are brightly coloured, either imitating species that protect themselves with such markings as a warning that they are unpalatable or imitating their surroundings, Darwin argues that the males have passed on such markings to the females thereby making them deviate from their primordial colours (Darwin, 2004, p. 374).

Darwin uses the example of the male Argus pheasant to support his theory of gradual evolution through simple step changes, from the transition of primary feathers to secondary feathers used as ornamentation to attract females (see Appendix A, Plates 4 – 8). Instead of colours, the male Argus pheasant uses patterns and shapes and these changing forms can be seen between the two types of feathers. This is a living yet fossilised map, frozen in time, showing the tree of descent through Nature's sexual selection. Darwin feels that the females possess an 'almost human degree of taste' as it is quite incredible

[222] Darwin refers to Wallace's paper in the *Westminster Review*, July, 1867, p. 5., in which Wallace states that 'it is only in the tropics, among forests which never lose their foliage, that we find whole groups of birds, whose chief colour is green.' But Darwin counters this by reminding his readers 'that many parrots are ornamented with crimson, blue, and orange tints, which can hardly be protective' (Darwin, 2004, pp. 549 – 50 and footnote 49, p. 549).

that ‘a female bird should be able to appreciate fine shading and exquisite patterns’ (Darwin, 2004, p. 449) and that therefore ‘the mental powers of birds do not differ fundamentally from ours’ (Darwin, 2004, p. 474). The text about the development of these feathers through sexual selection reads like a sacred scroll or tapestry holding all the secrets of the universe; how the pattern itself is not merely a pattern produced by the male to attract the female but is a beautiful pattern of patterns in transition from the practical one of primary function (flight and insulation) to secondary function (ornamentation for the purpose of sexual selection). The beauty is the combined patterns of all the patterns in transition that make up one seamless pattern, but also the pattern that holds all the secrets of transition that reflect gradual evolution. In this respect the tapestry of feathers is sublime in its beauty and akin to a Wordsworth poem:

> Almost every minute detail in the shape and colouring of the ball-and-socket ocelli [of the Argus Pheasant] can be shewn to follow from gradual changes in the elliptic ornaments […]. A perfect series can be followed, from simple spots to the wonderful ball-and-socket ornaments […]. The stages in development […] do not at all necessarily show us the steps passed through by the extinct progenitors of the species; but they probably give us the clue to the actual steps, and they at least prove […] that a gradation is possible […]. As the secondary plumes became lengthened through sexual selection, and as the elliptic ornaments increased in diameter, their colours apparently became less bright; and then the ornamentation of the plumes had to be gained by an improvement in the pattern and shading (Darwin, 2004, pp. 495 – 6).

In Man this tapestry of mental development can be seen in physical ornamentations which make up the cultures of tribal groups, each having their own idea of beauty:

> In Africa [it is] common practice to raise protuberances by rubbing salt into incisions made in various parts of the body […]. The natives of the Upper Nile knock out the four front teeth[…]. In the Malay Archipelago the natives file the incisors into points like those of a saw […]. Further south with the Makalolo, the upper lip is perforated, and a large metal and bamboo ring, called a *pelelé*, is worn in the hole […]. (Darwin, 2004, pp. 641 - 3).

Any developments over time within the tribes or cultural groups would also ‘modify the character of the tribe’ or group and would affect the overall tapestry. But unlike animal breeders, the changes produced would be ‘unconscious’ as the effect would not be consciously chosen (Darwin, 2004, p. 664). Although in the *Descent* Darwin does not underline the similarity between the moral and cultural ornamentation-sympathies exhibited within communities, the principles binding community members together are the same. Not conforming to the community’s moral or aesthetic code brings about disapprobation and isolation preventing the community as a whole from prospering from cooperation. For example, ‘when a chief was asked why women wear [*pelelé*], he asked

"what kind of a person would she be without the *pelelé*? She would not be a woman at all with a mouth like a man, but no beard"' (Darwin, 2004, pp. 641 - 3). Missing front teeth, tattoos, 'protuberances' of the skin, and the *pelelé* can all therefore be seen as symbols of social cohesion in the same way as moral behaviours can. Importantly for Darwin, the characteristics of race such as skin and hair colour had been sexually selected as forms of ornamentation, and were not reflections of 'primordial types' created by God for specific regions as proposed by the polygenist Agassiz.[223] For Darwin the fact that black people lived in different regions showed that there was no connection between their skin colour and their environment or to an all-powerful God. For Darwin the different skin colour of races was evidence of modification through sexual selection as colour is regarded by Man as 'a highly important element in their beauty':

> We know […] that the colour of the skin is regarded by the men of all races as a highly important element in their beauty; so that it is a character which would be likely to have been modified through selection […]. It seems at first sight a monstrous supposition that the jet-blackness of the negro should have been gained through sexual selection; but this view is supported by various analogies, and we know that negroes admire their own colour (Darwin, 2004, p. 673).[224]

Colour is valued as a form of beauty by Mankind but different races have different standards of beauty and therefore select different colours as their standard:

> If any change [in Man through sexual selection] has thus been effected, it is almost certain that the different races would be differently modified, as each has its own standard of beauty (Darwin, 2004, p. 653).

As expressed by Desmond and Moore, 'beauty was the main attraction' and therefore 'the only selection necessary was artificial, self-selection according to local preferences' (Desmond and Moore, 2004, pp. xxix - xxx). Darwin extends this argument to the nakedness of skin in Man, particularly women who are generally less hairy than men throughout the world. Darwin puts this down to the fact that the removal of hair enables the colour of the skin to be 'more fully displayed'. The same applies to many birds in which 'it appears as if the head and neck had been divested of feathers through sexual selection, to exhibit the brightly-coloured skin' (Darwin, 2004, p. 669). Darwin explains 'greater hairiness of certain

[223] Agassiz presented his ideas in the collaborative work *Types of Mankind* [1854] edited by Nott and Gliddon with contributions from Morton, Agassiz, Usher and Patterson. The polygenists believed that the races could not alter their characteristics in new environments.

[224] In arguing by analogy Darwin makes frequent comparisons between Mankind and animals and here blurs the distinction between scientific observer and subjective opinion which could be taken as prejudice: 'The resemblance to a negro in miniature of *Pithecia satanas* with his jet black skin, white rolling eyeballs, and hair parted on the top of the head, is almost ludicrous' (Darwin, 2004, p. 673).

races' as being due to 'partial reversion' to the primordial type. Beards were probably acquired through 'sexual selection as an ornament', and Darwin explains their variability as another example of reversion as 'long lost characters being very apt to vary on reappearance' (Darwin, 2004, pp. 670 – 72). Whereas the beard was only transmitted to the males, naked skin as an ornament was transmitted to both sexes. The human body through its reversions of hairiness or variations of beards, nakedness, skin colour, hair type or self-imposed ornamentation such as tattoos, knocked out teeth or skin protuberations, all create the tapestry of the history of Mankind in the same way as the feather patterns reflect the history of the Argus pheasant. Like the patterns representing the history of the Argus, they also provide the key to unlocking the secrets of the development of Mankind, both in Mind and in Body (and therefore in morality and aesthetics) and in so doing provide a sublime experience of Nature through self-awareness (as the history of Mankind runs through the self). This tapestry of the link between Mind and its physical origins can be seen in the common rudimentary organs 'that the embryos of a man, dog, seal, bat, reptile, &c.,' share such that at first they can 'hardly be distinguished from each other' and that therefore 'a former progenitor possessed the parts in question in a perfect state' (Darwin, 2004, pp. 42 – 3). From this Darwin concludes:

> Thus we can understand how it has come to pass that man and all other vertebrate animals have been constructed on the same general model, why they pass through the same early stages of development, and why they retain certain rudiments in common. Consequently we ought frankly to admit their community of descent […] (Darwin, 2004, p. 43).

This reflects Darwin's Romantic materialism on two counts. On the one hand it shows the link over time of the development of Man from more 'humble'[225] physical beginnings (that is, the development of mind from body), but it also reveals the extent of Man's mental development through the reflective and imaginative nature of Darwin's own mind in creating this imaginative tapestry through imagery akin to a poem, a painting or a piece of music. Levine regards this imaginative 'humility and honesty […] almost as a kind of Wordsworthian egoistic sublime, moving from the ordinary against his own original instinct to achieve extraordinary effects' (Levine, 2011, p. 21). Darwin's power of insight can be seen as akin to Wordsworth's in which 'he has shown by the subtle intensity of his own emotion how the contemplation of Nature can be made a revealing agency, like Love or

[225] But by considering such origins as 'humble' Darwin does not wish to demean their significance or status in the line of descent. In recognising our parentage, Darwin says, we should not 'feel ashamed of it. The most humble organism is something much higher than the inorganic dust under our feet [because such organisms have a] marvellous structure and properties' (Darwin, 2004, p. 193).

Prayer, - an opening, if indeed there be any opening, into the transcendent world' (Myers, 1899, p. 131), that is, enabling one to 'see into the life of things'[226].

Before moving on to an analysis of Darwin's concepts and values within the context of the Victorian society in which he worked and lived, it is worth briefly considering the view that Darwin's science was distorted by the patriarchal nature of society at the time. As with the topic of eugenics briefly referred to in Chapter One, it is not the scope of this research to offer a detailed critique of Darwin's theories as to whether they were right or wrong. However, an awareness of some of the criticism levelled against him can offer some insight into the extent to which his science might have been shaped by the society in which he was living. Messer (2014, p. 8) refers to a number of critiques of Darwin's sexual selection theory which collectively agree that sexual selection on its own cannot account for successful reproduction. Two examples given are works by Sarah Blaffer Hrdy and Joan Roughgarden.

Hrdy[227] is a primatologist and anthropologist whose main hypothesis is that the key transformation in the development of our ancestors before language and larger brains was in alloparenting (that is, the rearing of infants by non-biological caregivers of either sex). This cooperative form of communal breeding or rearing improves survival rates and the success of reproduction. Unlike Darwin, she could not provide evidence from fossils, but instead turned to living ancestors such as marmosets and tamarins because they were cooperative breeders (McGrew, 2009, p.1). From Hrdy's perspective, Darwin's theories concentrated on the male's role in sexual selection at the expense of the female role, and, thus, this balance needs to be redressed:

> If we really want to raise Darwin's consciousness we need to expand evolutionary perspectives to include the Darwinian selection pressures on mothers and on infants. So much of our human narrative is about selection pressures but, when you stop to think and parse the hypotheses, they're really about selection pressures on males: hunting hypotheses or lethal intergroup conflict hypotheses to explain human brains. Well, does that mean that females don't have brains (Interview with Hrdy, in Johnson, 2012a, p.1).

Hrdy's interest in redressing the balance came from her own personal experience as a student in the 1960s when experiencing sexual discrimination in seminars. 'This is what it must be like to be a black person listening to a lecture in support of the Ku Klux Klan' (Johnson, 2012a, p.2). As a graduate student she experienced this in the study of science

[226] From Wordsworth's poem 'Tintern Abbey', cited by Myers, 1899, p. 131.
[227] Some of Hrdy's most well-known works are *The Woman that never Evolved* (1981), *Mother Nature* (1999) and *Mothers and Others* (2009).

itself: 'The dominant narrative about primate social lives was the savannah baboon where males are very political and dominant and they would support each other so they could control females' (Johnson, 2012a, p.2). It appears, therefore, that these Victorian preconceptions of evolution were not just prevalent in Darwin's era but also in the 1960s:

> There was really no consideration of how much variation existed among females […]. The models back then held that there was variance in males' reproductive success and no variance in females. It was assumed every female would be a mother and would breed to the maximum of her capacity so that females would be producing about the same number of offspring each whereas, with males, they could do tremendously well or be a complete zero […]. Supposedly, because the ovary was bigger and more resource rich than the sperm, it meant there were many tiny sperm actively competing for a large, resource rich ovum. This was the basis for the assumption that there was stronger selection pressure on males than on females (Johnson, 2012a, p.2).

Against this view, Hrdy's hypothesis is that humans could only have evolved from ancestors that were cooperative breeders as the calories required to rear a human from birth to nutritional independence are more than could be obtained from a mother and father combined (Johnson, 2012a, p.2). They would have required alloparents.

Roughgarden goes further than Hrdy in claiming that sexual selection should be deconstructed and that successful reproduction not only requires successful mating but also successful rearing and that this is done through social cooperation (Messer, 2014, p. 9). According to Roughgarden's analysis, Darwin's theory of sexual selection is a top-down approach with evolution creating behaviour, whereas her social selection theory[228] is a bottom-up approach in which behaviour creates evolution (Roughgarden, 2012, p. 2295). For Roughgarden, courtship can be seen as negotiation rather than a reflection of sexual selection:

> In this approach, courtship brings about a social infrastructure, however simple or complex, in which offspring grow and mature. In this situation, ornaments and associated behaviour might function as the vocabulary needed to carry out pre-nuptual negotiation (Roughgarden, 2012, p. 2296).

According to this view, cooperation, or teamwork, in birds rearing their young, is pleasurable and benefits both parties. A similar form of negotiation can be seen in the relationship between the parent and the chick. A balance has to be struck between the supply of food by the parent (that is, the energy required to obtain it and therefore the

[228] Roughgarden takes the phrase 'social selection' from West-Eberhard in which individuals compete for resources such as 'food, hibernation space, nesting materials, mates or places to spend the night', and that, therefore, competing for mates (sexual selection) can be seen to be a 'subset of social competition' (Roughgarden, 2012, p. 2294).

resulting fitness of the parent), and the demand for food by the chick (too little begging results in too little food, and therefore risk of death, whereas too much begging results in too much energy being used up). Although competition is acknowledged, social selection emphasises the role of cooperation, and is therefore offered as an alternative to sexual selection (Roughgarden, 2012, p. 2301).

Although it is not the objective of this thesis to conduct an in-depth sociological analysis of Darwin's works, the next section will analyse some of the constraining influences of the Victorian era's values that could be seen as constraining his Romantic imagination from being more enlightened (according to today's values) in the area of sexual, class and race equality. It will then be clear why it was not possible for Darwin, in his day, to have developed such views or theories presented by Hrdy or Roughgarden.

3.05 Darwin's Moral and Reflective Nature: Conflicting Values in the Victorian Era

The preceding sections have examined Darwin's concept of Mind, the development of the intellect and Man's resulting morality created by the laws of Nature. The next section will look at Darwin's own moral values, to what extent he was reflectively aware of them and how easily they sat with him being a 'gentleman' in the Victorian era. This section needs to incorporate a more sociological appraisal of his concepts and personal values in the context of the Victorian values that surrounded Darwin at the time of his writing, as the *Descent* concerns 'Man's' descent, and in this context it deals with the history of society and community and how this is underpinned by morality. The Romantic concepts already analysed in the previous chapters, such as 'Nature', and 'Mind', can be more fully understood when examined in the Victorian context.

As Darwin lived in the Victorian era it might seem natural to first ask the question 'Was Darwin a Victorian?' in the same way as 'Was Darwin a Romantic?', or even 'Could Darwin be both a Romantic and a Victorian?' Answering the question 'Was Darwin a Romantic?' is an easier question to answer as there are at least Romantic concepts to use as a measuring tool as the previous chapters have demonstrated. However, the question of whether Darwin was a Victorian is a more difficult question to answer. Firstly, Darwin was born in 1809 before Victoria became Queen in 1837, and so clearly he was not brought up as a 'Victorian' and was certainly not a 'Victorian' during the voyage of the *Beagle* between 1831 – 1836, although he lived the majority of his life in the Victorian era. If the question is rephrased to ask 'Was Darwin a Victorian in the sense of holding Victorian values?', this is

equally problematical as one could answer 'yes' for some values and 'no' for others. For example, when Darwin published the *Origin* in 1859 this went against the grain of established church values, so in this sense Darwin could be seen as anti-Victorian (yet he was supported by the established 'Victorian' geologist Charles Lyell and the botanist Joseph Hooker). On the other hand he could be regarded as a distinguished Victorian gentleman of independent financial means coming from a respectable line of Darwins and Wedgwoods before him. Yet as a young gentleman in 1841 he was taken into hand by his father Dr Darwin (echoed by his sisters) for not getting his maids to wear caps or for ensuring his manservant, Parslow, has a decent haircut[229] – outward appearances, even for a naturalist, also reflected position in society.[230] Without respectably dressed servants in uniform, Darwin and his wife might be mistaken for 'grocers', and therefore his naturalism might not be taken as seriously.

Darwin's concepts and the Victorian values of the time frequently overlap. For example, Darwin's Malthusian concept of 'struggle' and Townsend's way out of poverty and the workhouse through hard work rather than hand-outs from the parish have already been referred to in Chapter Two. This concept of Self-Help is very much a Victorian value and is exemplified by Samuel Smiles'[231] work first published at the time of Darwin's publication of the *Origin:*

> "Heaven helps those who help themselves" is a well-tried maxim, embodying in a small compass the results of vast human experience. The spirit of self-help is the root of all genuine growth in the individual […]. Help from without is often enfeebling in its effects, but help from within invariably invigorates. Whatever is done *for* men or classes, to a certain extent takes away the stimulus and necessity of doing for themselves (Smiles, 1860, p. 1).

As with Townsend, Smiles believed it was up to the individual to overcome their difficulties and not the government's job, which, in their view, enfeebled the individual. For Smiles, self-help is a motivating factor providing a 'stimulus' in the same way that for Townsend hunger provides a form of stimulation for the poor to do something about it in order to

[229] While visiting his father at Shrewsbury, Darwin writes a letter to his wife Emma on 3 July 1841, in which he relates the following: 'A thunder storm is preparing to break on your head […] about Bessy not having a cap, - "looks dirty", "like grocers maid-servant" & my Father with much wrath added "the men will take liberties with her, if she is dressed differently from every other lady's maid"!!!'(Burkhardt, 2009b, 296).

[230] The 1861 census for Down House showed that Darwin had twelve servants, including maids, manservants, gardeners, a footman, coachman, groom, nurse. The number of servants would have added to his status as well as his silver, valued at £10,000 at today's prices (Browne, 2003, pp. 457 – 8).

[231] Smiles visited Darwin at Down House in 1876 giving him his latest book on self-improvement *Life of a Scotch Naturalist: Thomas Edward* [1876] 'saying he had read every one of his biographies with "extreme pleasure"' (Browne, 2003, p. 385).

prevent starvation. Although Smiles gives examples of great men such as Josiah Wedgwood, Thomas Carlyle and Robert Stephenson who have achieved great things through self-help, he also states that

> Even the humblest person, who sets before his fellows an example of industry, sobriety, and upright honesty of purpose in life, has a present as well as a future influence upon the well-being of his country (Smiles, 1860, p. 4).

This concept and Victorian value of self-help is also very Lamarckian. Lamarck (already referred to in Chapter One) argued against immutability believing that individuals could will change through changing habits and that the benefits could be passed on to the next generation. So for example, the short-necked giraffe that stretched its neck more to reach leaves higher up would pass on its longer neck to the next generation, each generation improving the length until the required height was achieved. For the Victorians, this both explained and justified wealth – hard-working men could rise up like Josiah Wedgewood and could, like acquired giraffe necks, pass it on to the next generation, just as the Wedgwoods passed their shooting skills on to Darwin. And those that did not, like Greg's Irish previously referred to, were 'feckless':

> [The] Lamarckian evolution is the perfect metaphor for the self-made rentier class such as the Wedgwoods and Darwins. Owd Wooden Leg Wedgwood[232] […] made a fortune and was enabled thereby to acquire the houses and lands of a country gentleman (Wilson, 2003, p. 225).

This view of self-help is also expressed in Chambers' *Vestiges*[1844] in which the Creator created natural laws but not individual creations, thereby leaving Man with the responsibility of his own actions, meaning that the poor could climb out of poverty through their own efforts (Brown, 2003b, p. 21). Before him, the Rev Thomas Chalmers in the first[233] 'Bridgewater Treatise' [1833] and in his *Political Economy* [1832] stated that Man creates his own wretchedness and that 'pauperism' is created by the poor (Young, 1985, p. 53). This was written against Godwin's and Condorcet's view that progress could be achieved through reason and thought enabling Man to achieve harmony and "perfectibility" which could be passed on to the next generation (Young, 1985, pp. 25 -6; p. 39).Wallace's experience encapsulates the alternative Malthusian view of the poor being regarded as irresponsible – his brother William died as a result of poor living conditions although Wallace, despite his struggles, was able to support himself[234] (Browne, 2003b, p. 32).

[232] Nickname given to Josiah Wedgewood because of his wooden leg.
[233] The first 'Bridgewater Treatise' by Chalmers was 'On the Power, Wisdom and Goodness of God as Manifested in the Adaptation of External Nature to the Moral and Intellectual Constitution of Man'.
[234] Although he had to collect specimens for the Darwins of the world rather than create an income from his own research.

Darwin, on the other hand, through his patriarchal[235] power base of networks within the scientific community, was able to present his joint paper[236] with Wallace to the Linnean Society in 1858 without Wallace's knowledge, with his own name at the front, without any serious discussion and without any real effort as it was all done for him in his absence (Browne, 2003b, pp. 18 – 25; pp. 32 – 9).

Although on the one hand scientists, or natural historians, like Darwin were searching for an objective reality, 'their ideas are shaped by their times' (Wilson, 2003, p. 225). This can already be seen in the prevalent ideas at the time cited earlier represented by Malthus, Townsend, Lamarck, Greg and Smiles.

This section will explore the concept of 'Darwin the Victorian' in terms of some of the conflicting moral values he held during the Victorian era and will examine to what extent his imagination enabled him to reflect upon them and their contradictory nature. The analysis will also examine to what extent his theories were driven by his moral outlook, as well as those absorbed from the Victorian values, and to what extent his moral views were created by the moral instincts he sets out to prove were created by Nature.

The Victorian era could be summed up as representing a belief in progress and improvement seen in manufacturing, commerce, science, art, technology and social relations, as well as political reform (for example, the 1832 Reform Act extending suffrage to property owners, and the 1867 Reform Act extending suffrage to some members of the working class). [237] The Romantic stretch of the imagination pushing innovation to the limits could be seen as the art of making the impossible become the possible. Apart from the industrial feat of building the railways, this could be observed in anything from the Lipton shop mirrors making customers appear skinny upon entering and well fed upon leaving (Sweet, 2001, p. 53), to Jean François Gravelet 's - Blondin's - daring tightrope walks 1,300 feet across Niagara Falls in 1859 (the year of the *Origin*) in which he pushed a wheelbarrow, cooked an omelette and carried his manager on his shoulders – eventually settling in London to perform (Sweet, 2001, pp. 7 – 20). With Darwin, this imagination of the impossible could be seen in his experiments in transportation when he hung ducks' feet up

[235] Darwin's patriarchal view of the world is reflected in his *Autobiography* in which he refers to his father and grandfather but misses out his female ancestry. 'Darwin, seemingly like many Victorian intellectuals, regarded the development of his mind within a predominantly patrilineal descent' (Browne, 2003, p. 427, referring to Broughton, 1999 – page number not cited).
[236] Darwin's paper was sent along with a letter written to Hooker in 1844 to prove that he had the theory before Wallace (Burkhardt, 2009g, p. 507 – 11, Appendix III).
[237] See Wilson, 2003, p.39 and p. 386.

to check for any snails (Browne, 2003a, p. 519). This belief in progress and stretching the limits was further expressed through the work of missionaries overseas and charities at home to help the poor improve themselves (Browne, 2003a, p. 248). This view was strengthened by Captain Fitzroy's Fuegians (Jemmy, York and Fuegia) returned to South America on the *Beagle* – their stay in England had enabled them to become virtually fluent in English and this was seen as proof that one could develop from being a 'savage' into an advanced stage of Man (Browne, 2003a, p. 248). Darwin could see the similarities between the Anglicised Fuegians and wild savages and could see a common humanity, which, through evolutionary improvement, stretched right up to his own family, including his sisters (Browne, 2003a, p. 249). Yet his squire-like snobbishness can be seen during his time in South America when he expects Spanish and Portuguese landowners to show off their wealth[238] (Browne, 2003a, p.262).

So there is a tension and contradiction between Darwin's beliefs as an upper-class gentleman according to his privileged upbringing and position in society, and his more radical belief of transmutation (or evolution) for the time. This can be seen in his attitude towards women, which is also a reflection of the beliefs of the era, as exemplified by the narrative poem 'The Angel in the House' by Coventry Patmore[239] (this attitude can be seen to be reflected in the account of sexual selection discussed in the previous section). Darwin was, for example, condescending towards a Spanish woman dressed for riding like a man (Browne, 2003a, p. 263). Many years later in the *Descent* , Darwin's naturalist 'evidence' mirrors the beliefs of the era, namely that sexual selection has resulted in Man's superiority to women (through Man's competitiveness) : 'Man is more courageous, pugnacious and energetic than woman, and has a more inventive genius. His brain is absolutely larger' (Darwin, 2004, p. 622); 'Woman seems to differ from man in mental disposition, chiefly in her greater tenderness and less selfishness' whereas 'man is the rival of other men; he delights in competition, and this leads to ambition which passes too easily into selfishness' (Darwin, 2004, p. 629). 'Imagination and reason' add to man's success and have also been developed through the 'contest of rival males' and 'thus man has ultimately become

[238] Browne refers to Darwin's diary entry: 'If their surprise was great, mine was much greater to find such ignorance; & this amongst people, who possess their thousands of cattle & *estancias* of great extent' (cited by Browne, 2003a, p. 262).

[239] Coventry Patmore's narrative poem 'The Angel in the House' defines the ideal woman as one who pleases Man by being devoted and submissive: 'Man must be pleased; but him to please/ Is woman's pleasure' (Patmore, 2012, p. 68). This ideal was originally expressed by the middle classes but was soon spread further by Queen Victoria's devotion to her husband Albert (Brooklyn, 2011, unnumbered page). A similar ideal can be detected in Emma's devotion to her husband Charles.

superior to woman' (Darwin, 2004, p. 631). Although Darwin himself demonstrates a form of 'genius' and 'imagination' in his works, his writing is a mix of the era's beliefs, his own beliefs and the results of scientific research. For example, the reference to Man's brain being larger could be attributed to the prevailing theory of phrenology,[240] or Darwin's view 'that both sexes ought to refrain from marriage if in any marked degree inferior in body or mind' could be seen to support his cousin Francis Galton's theory of eugenics.[241] However, although Darwin recognises the existing inequalities between the sexes at the time of writing the *Descent*, he does not see them as social inequalities; he sees them as physical and mental inequalities that can only be changed through natural and sexual selection:

> In order that woman should reach the same standard as man, she ought, when nearly adult, to be trained to energy and perseverance, and to have her reason and imagination exercised to the highest point; and then she would probably transmit these qualities chiefly to her adult daughters. All women, however, could not be thus raised, unless during many generations those who excelled in the above robust virtues were married, and produced offspring in larger numbers than other women […]. Although men do not now fight for their wives, they generally undergo a severe struggle in order to maintain themselves and their families; and this will tend to keep up or even increase their mental powers, and, as a consequence, the present inequality between the sexes (Darwin, 2004, p. 631).

As the above illustrates, for Darwin the inequalities can be *mitigated* through training in 'energy and perseverance', but this will still not bring women up to the same level of genius and imagination as men. According to Darwin, this can only be achieved over many generations by increasing the number of women who have achieved a higher level of intellect and imagination (Darwin does not elaborate on this but one could imagine some kind of breeding programme if it were not to happen naturally). But Darwin does not see a way out for women to break away from man's dominance and just sees it as totally natural (as perhaps reflected by women's exclusion from suffrage in the 1832, 1867 and 1884 Reform Acts). For Darwin, man naturally protects his family in the face of struggle and this struggle increases his 'mental powers' which means that man will be forever in control. These roles are reflected in Darwin and Emma's relationship, although ironically Darwin's ill health prevented him from being the physically strong provider – he provided and protected Emma financially through a combination of support from his father and Emma's

[240] Already discussed in Chapter One.

[241] See footnote 9 in the General Introduction. The Darwin quote is cited in Desmond and Moore, 2004, p. liii. During the Victorian era, eugenics and social Darwinism fitted in with the attitudes of the time, for example that filth and disease were brought about by the 'immoral' poor. However, this view was mainly held by the upper classes who viewed themselves as superior and used this view to justify their discrimination (Rogers, K. 2009, unnumbered page).

dowry. Physically and emotionally Emma was the provider as she nursed her husband through illness that dogged his whole life (supporting Darwin's view that woman had 'greater tenderness and less selfishness' than man). For Darwin and Emma, their 'roles were cast from the start. One was a perpetual patient, the other a devoted nurse' (Browne, 2003a, p. 429). These roles are brought out in their letters. For example in a letter to her Aunt Jessie Allen, she states that 'he always tells me just how he feels and never wants to be alone, but continues just as warmly affectionate as ever, so that I feel I am a comfort to him' (cited by Browne, 2003a, p. 430), and in a letter to Emma on 17 November 1848, Darwin writes, 'My own dear wife, I cannot possibly say how beyound [sic] all value your sympathy & affection is to me. – I often fear I must wear you with my unwellnesses & complaints. Your poor old Husband' (Burkhardt, 2009d, p. 183).

Nevertheless, the women in Darwin's household and the women in Victorian Britain can be seen to be in a stage of transition, as part of a social evolutionary process. Women did not have total equality with men, but as industrialisation developed, so the demands for equality increased, as did the demands for better working conditions for workers in general. Before the accession of Queen Victoria, women were regarded as 'non-people', having the same status as slaves. Slowly attitudes changed, backed up by legislation such as the Infants and Child Custody Act (1839) giving women access to their children, the Divorce Bill (1855) enabling women to repossess their property, and The Matrimonial Causes Act (1857) allowing women to get divorced from cruel husbands and get maintenance (Wilson, pp. 58 -9; Sweet, 2001, pp. 181 - 2). Although poor women forced into prostitution suffered forcible examinations under The Contagious Diseases Acts (1864), whereas men were not, infants and children were starting to get more legal protection , for example from the Infant Life Protection Bill (1871) after a public outcry over the starving to death of sickly children by paid 'baby farmers'. Darwin could also be seen as controlling his children when using them to assist in his experiments on the one hand, but easing his patriarchal grip on the other in giving them more freedom and time for play (Burkhardt, 2009f, p. XVIII; Sweet, 2001, pp. 176 – 7). John Ruskin can also be seen to represent this transitionary period. In his 'Of Queens Gardens' essay published in *Sesame and Lillies* (1865), he describes the doctrine of 'separate spheres' of man and woman – man being 'creative' and woman being 'domestic'. However, he was also an advocate of progressive education for girls to include such subjects as science, history and mathematics – subjects which had hitherto not been

available to them (Sweet, 2001, p. 178).[242] Women were also involved in stylistic editing of books, not just proof-reading.[243]Charles Dickens raised public awareness of the plight of the poor, in particular children, and Charles Kingsley's serialization of the *Water Babies* (1862 – 3) satirizes selfish capitalists (the 'Doasyoulikes') who exploit child labour in the form of chimney sweeps, showing that evolution can be regressive[244] (Wilson, 2003, pp. 295 – 304). This was a period of transition in values and so it would be unfair to expect Darwin to share all the values we would regard as moral and just today. Darwin, for example, went along with the Victorian faith in 'Water Treatments' for the treatment of his probable stress-induced ailments (Browne, 2003a, pp. 492 – 6), perhaps strengthened by his belief that body and mind were one. This reflects the shift in attitudes towards the concept of Mind and therefore of morality towards the end of the Victorian era. Morality was gradually being acknowledged as manmade (that is, a mental construct from Mind) and therefore independent of God.[245] As the Mind was seen as coming from the brain, the laws of the mind were gradually becoming recognised as a science, viz. psychology (Young, 1985, pp. 57 -8; p. 65; pp 71 -3).

To understand Darwin's Victorian mind-set, it is important to understand the views expressed in Chambers' *Vestiges* [1844], as these both summarised the naturalists' ideas at the time as well as the mood of the general public, and that included Darwin despite his criticism of the book. Chambers saw the brain as the 'expansion' of the nervous system ('branching lines'), a continuum of matter from the mollusca and crustacean. He believed that matter formed different grades of 'consciousness of thought' from animals to humans enabling independent existence (but unlike Darwin, 'designed, formed, and sustained by Almighty Wisdom' (Chambers, 2010, pp. 107 – 8.) He believed that the difference between animals' and Man's mind was only one of degree, as animals also show signs of 'affection, jealousy, envy' (Chambers, 2010, pp. 108 – 9). For Chambers, the Almighty controlled the

[242] Although Darwin did not arrange a progressive education for his daughters, his sister-in-law, Fanny Wedgewood, supported girls' education (Browne, 2003a, pp. 534 – 6).
[243] Emma Darwin's friend, Georgina Tollet, had considerable input in the style of the *Origin* (Browne, 2003b, p. 76).
[244] But Kingsley, like others already referred to, believed that some races were inferior to others and were more akin to animals than humans. He regarded the Irish, for example, as 'white chimpanzees': 'I am haunted by the human chimpanzees I saw [in Ireland] . . . I don't believe they are our fault. . . . But to see white chimpanzees is dreadful; if they were black, one would not feel it so much. . . ." (cited by Wohl, 1990, unnumbered page, from a letter Charles Kingsley wrote to his wife).
[245] In a letter to Asa Gray, he says 'I cannot admit that Man's rudimentary mammae […] were designed' (cited by Young, 1985, p. 109). See also Young, 1985, pp. 104 – 5. This is another example of Darwin's belief that such useless rudiments demonstrate that they were not directly designed by a Deity with a purpose in mind. They are merely remnants of Man's developmental process.

physical laws that made matter possible, and the mind came from the brain which was physical. So the mind was independent of the Almighty yet subject to Divine laws (Chambers, 2010, pp. 105 – 7). In addition to referring to Locke's and Gall's distinction in the brain between sense data from the outside world and ideas of form such as size, colour and weight, Chambers refers to another part of the brain that is devoted to the sentiments of 'self-esteem, love of approbation' that, along with language, enable Man 'to maintain his place in [the world] as an individual and as a species' (Chambers, 2010, p. 110). This is similar to Darwin's concept of 'sympathy'. Chambers also believed in gradations of mind that were reflections of the stages of development of Man. He believed that negative characteristics such as 'rivalry and jealousy' would disappear as Man became more civilized: 'as civilization advances, reason acquires a greater ascendancy' (Chambers, 2010, pp. 111 – 120). Moral advancement, for example the elimination of criminality, depended on the influence of members of the community, again harking back to Darwin's concept of 'sympathy' (Chambers, 2010, pp. 115 - 16). Despite the many similarities to his own views, Darwin attacked the work for not being scholarly enough.[246] Darwin's *Origin* was based on more solid factual information and avoided discussions on the beginning of the earth (Browne, 20013b, p. 61), yet when it was published it was hugely popular amongst the general public and became an obsession (Wilson, 2003, p. 95).[247]

Despite its scholarly shortcomings, there are many similar Romantic expressions of the imagination to Darwin's. When Chambers describes the crystallization of silver and mercury in nitric acid, he compares it to a tree with leaves and roots (Chambers, 2010, p. 53). This is akin to his 'branching lines' in the nervous system and to Darwin's archetypal 'tree', both (through their 'branching') expressing a link to 'vestiges' or 'rudimentary' beginnings ('rudimentary' being a common Darwinian concept) and a mind-matter continuum. Like Whewell, Chambers believed natural laws were branches of a 'comprehensive law [which cannot be separated] from Deity itself', and that the Creator did not directly create individual species as their coming into being was separate from the laws which made this possible. He also believed that moral laws were separate from the laws governing inanimate matter which accounted for disease and disasters (Chambers, 2010, pp. 116 – 22). Morality was therefore part of Man's will and not God's. Chambers also reflected the racism of his time, writing that the 'coarse features' of the 'negro race' become a less 'meaner form' if their living conditions are improved. Although he believed that change and

[246] The 'geology strikes me as bad, & his zoology far worse' (cited by Desmond and Moore, 2009, p. 320).
[247] It was read by Queen Victoria, Lincoln, Wallace, Tennyson and George Eliot (Wilson, 2003, p. 95).

development were possible, he believed that the Caucasian was better developed than the 'Negro', and that the Mongolians were regressive and so 'degenerate' (Chambers, 2010, pp. 69 – 70; pp. 91 – 102). These views are similar to the Victorian view of the Irish held by Darwin already discussed.

With the development of the manufacturing industries in the towns and the movement of workers away from agriculture in the rural areas, the lot of the poor was only made worse by the Poor Laws and the Workhouses. Darwin had read Malthus' *Essay on Population* in 1838 and along with the publication of Carlyle's[248] *French Revolution* in 1837, these works contributed to Darwin's concerns for the struggles within mankind, whether this was through overpopulation, revolution or riots (Wilson, 2002, pp. 11 – 18). The evolution of capitalism along with an increase in wealth and poverty was also bringing about discontent and demands for better working conditions, along with demands for male suffrage through the People's Charter in 1838. The Depression of 1837 – 1844 brought the conditions in the workhouses to a head in 1845 with the Andover Workhouse Scandal[249] finally leading to the abolition of the Poor Law commission in 1847. Darwin would have been aware of these conditions, particularly as he travelled by train and would have seen more of the poor's lot through his carriage windows (Wilson, 2002, pp. 28 – 33). As already discussed in Chapter One, the general view at the time was that the poor could help themselves in the same way as 'savages' , with encouragement from the missionaries, could improve themselves.[250] Yet in thinking about development and advancement, Darwin did not seem to consider his own privileged position. He assumed that he got to where he got to merely through hard work without reflecting on what underpinned his position. As Browne puts it, 'Darwinism was made by Darwin *and* Victorian society' (Browne, 2003a, p. xi). The poor did not have the same resources or networks that Darwin had to advance themselves. It was not merely a question of hard work:

> Because Darwin believed in the Victorian ethos of character – in the inbuilt advantages of mind – and unconsciously endorsed the cult of great men and public heroes that was so much a part of nineteenth century life, he did not – could not – see that figures like himself were the product of a complex interweaving of

[248] Carlyle visited Darwin at Down House in 1875 leading to his reluctant acceptance of evolution, resulting in his comment to Huxley that 'If my progenitor was an ape I will thank you, Mr. Huxley, to be polite enough not to mention it [as evolution was] rather a humiliating discovery and the less said about it the better' (Browne, 2003, p. 385).

[249] 'Colin McDougal, the workhouse supervisor, […] regularly thrashed children as young as three for messing their beds and he kept his paupers on such short rations that some survived by eating candles. [The children were even seen] eating potato peelings thrown out for Mr McDougal's chickens' (Wilson, 2002, p. 32).

[250] See Samuel Smiles' (1860) *Self-Help* referred to earlier.

> personality and opportunity with the movements of the times. Scientific ideas and scientific fame did not come automatically to people who worked hard and collected insects, as Darwin seems to have half hoped they would. A love of natural history could not, on its own, take a governess or a mill-worker to the top of the nineteenth-century intellectual tree (Browne, 2003a, pp. xi – xii).

This is the paradox. Darwin 'did not' and 'could not' see that he could be 'the product of a complex interweaving of personality and opportunity', yet for today's objective observer looking back in time (which is what Darwin was doing for most of his life), Darwin's own 'personality and opportunity with the movements of the times' can be seen to be akin to the melding and moulding of the 'entangled bank' alongside the rock strata, fossilised past remains and the present diversity of flora and fauna. We the objective observers can see Darwin with his privileged personality and opportunities as part of that very 'entangled bank' that he walked past on his Sand Walk. We can see it, but he could not. The influences that make up the 'web of affinities' in the Victorian era are just as complex as those in Nature. If Darwin were able to describe himself, he would probably agree with Browne's imaginative description of him working away in isolation like one of his own barnacles, with his wife Emma the captain and his children the crew, using his position in society to get everything he wanted through his letters (Browne, 2003, pp. 473 – 9; pp. 530 – 2).

This attitude that the poor can easily lift themselves out of poverty through sheer will and hard work is underlined by the British government's attitude towards the Irish during the potato famine of 1845 – 50 caused by potato blight.[251] The main issue was the society in which the Irish peasant farmers lived. They relied entirely upon their potato crops in order to survive. Extreme poverty meant that crime figures were high, making the English view the Irish as feckless, dishonest and violent. No consideration was given to the fact that this could be due to their lack of educational or economic advantage or oppression of the mainly Catholic poor by the wealthy Protestants (Wilson, 2003, p. 78). Despite some schemes to import cheap maize from America by the Prime Minister Robert Peel, there was no real effort to take their plight seriously. Prosperous farmers still prosecuted 'starving labourers caught stealing food from their fields' (Wilson, 2003, p. 79). About 1.1 million were thought to have died by starvation between 1845 and 1850 (Wilson, 2003, p. 81). Weakness in the Darwinian jungle was seen as akin to sin. This was underlined by the view of the *Manchester Guardian* which compared the Irish to the English. Unlike the Irish, the

[251] Regardless of Darwin's own feelings towards the Irish poor, he was keen to support research into preventing potato blight in the future. In 1881 he sent a cheque for £100 to James Torbitt, a Belfast wine merchant and grocer, to support his 'breeding experiments to produce an infection-proof race of potato' (Browne, 2003, p. 482).

English were not starving because 'they bring up their children in habits of frugality, which qualify them for earning their own living, and then send them forth into the world to look for employment' (cited by Wilson, 2003, p. 82). This view of fecklessness can be found in an article by William Greg published in *Fraser's Magazine* in 1868[252]. Greg was a former student friend of Darwin's and Darwin quotes him in support of his view (no doubt held by many other Victorian readers of the *Manchester Guardian* at the time) that the Irish were responsible for their own misfortunes:

> Thus the reckless, degraded, and often vicious members of society, tend to increase at a quicker rate than the provident and generally virtuous members. Or as Mr Greg puts the case: 'The careless, squalid, unaspiring Irishman multiplies like rabbits: the frugal, foreseeing, self-respecting, ambitious Scot, stern in his morality, spiritual in his faith, sagacious and disciplined in his intelligence, passes his best years in struggle and in celibacy, marries late, and leaves few behind him […]. In the eternal "struggle for existence", it would be the inferior and *less* favoured race that had prevailed – and prevailed by virtue not of its good qualities but of its faults' (Darwin, 2004, p. 164).

This view can be seen as even stronger when read alongside Darwin's comments on the preceding page that the 'careful and frugal' are in effect a 'superior class', which he would like to see encouraged rather than providing help and support to the less advantaged. According to this view, it's all down to free will: the poor can dig themselves out of their own hole, which harks back to Townsend's attitude of laissez-faire, referred to earlier in Chapter Two:

> A most important obstacle in civilised countries to an increase in the number of men of a superior class has been strongly insisted on by Mr Greg and Mr Galton,[253] namely, the fact that the very poor and reckless, who are often degraded by vice, almost invariably marry early, whilst the careful and frugal, who are generally otherwise virtuous, marry late in life, so that they may be able to support themselves and their children in comfort (Darwin, 2004, p. 163).

A similar view of superior classes is mirrored in Darwin's view that it is inevitable that 'the civilised races of man' will ultimately 'exterminate, and replace, the savage races throughout the world' (Darwin, 2004, p.184) and that

> the break between man and his nearest allies will then be wider, for it will intervene between man in a more civilised state, as we may hope, even than the

[252] See footnote 19, in Darwin, 2004, p. 163.

[253] Darwin's cousin Francis Galton argued in his *Hereditary Genius* (1869) that genius runs in families, like the Darwins, and that this could be increased by selective breeding. According to Darwin's son Leonard, Darwin was just as anxious as Galton to 'promote the gradual improvement of our race' (Moore and Desmond, 2004, pp. xlvi - xlvii). However, if Darwin is seen as a 'Romantic' in the Victorian era, this would mean that he should be read *against* eugenics, as Darwin's Romanticism is about Nature improving itself rather than one race or one species gaining superiority or power over all others.

> Caucasian, and some ape as low as a baboon, instead of as now between the negro or Australian and the gorilla (Darwin, 2004, p.184).

This seems to suggest that Darwin welcomes 'the extermination of savages' as they are less civilised ('as we may hope') and includes 'negroes' and 'Australians' under the term 'savages'. It is important to note that Darwin uses the active verb in 'man will exterminate' rather than the passive 'will have been exterminated' as the result of something else, such as climate. It is also important to note that there is no reference here to the possibility of the savage races being able to become civilised through their own efforts or with the help of missionaries. It is almost as if he is implying that certain races such as the 'negroes' and the 'Australians' are inherently uncivilised and cannot change or improve themselves. This 'racist anti-speciesism' (O'Hear, 1999, p. 134) can also be seen in his preference to be descended from a brave monkey saving the life of a keeper or a brave baboon saving his comrade from a pack of dogs than 'a savage who delights to torture his enemies, offers up bloody sacrifices, practises infanticide without remorse, treats his wives like slaves, knows no decency, and is haunted by the grossest superstitions' (Darwin, 2004, p. 689). O'Hear understands why the Marxists, therefore, saw it as 'no coincidence that [Bishop] Wilberforce [in his attack on Darwin][254] was a Wilberforce, the son of William Wilberforce, the emancipator of the slaves. Samuel Wilberforce was concerned that Darwinism might give comfort to racial and other supremacists' (O'Hear, 1999, p. 134). But despite this 'racist anti-speciesism', O'Hear does not believe there is any 'reason to suppose that Darwin would have countenanced active genocide, but it is hard to see how the severe struggle he advocates as a means of raising the stock could flourish among a people possessed of universal sympathy and benevolence (O'Hear, 1999, p. 135). When considering Darwin's view of the mutability of species and how species adapt to their environment, this view of fixed classes, either superior or inferior, with pre-set wills of the

[254] The 1860 Oxford evolution debate took place at the Oxford University Museum in Oxford, England, on 30 June 1860, seven months after the publication of Charles Darwin's *On the Origin of Species*. Those present included Thomas Huxley, Bishop Samuel Wilberforce, Benjamin Brodie, Joseph Hooker and Robert FitzRoy. The debate is famously remembered today for Huxley's reply to Wilberforce's alleged question as to whether it was through his grandfather or his grandmother that he claimed his descent from a monkey: 'If then, said I, the question is put to me would I rather have a miserable ape for a grandfather or a man highly endowed by nature and possessed of great means & influence & yet who employs these faculties & that influence for the mere purpose of introducing ridicule into a grave scientific discussion I unhesitatingly affirm my preference for the ape' (Desmond and Moore, 2009, p. 497). However, it is important to point out that the recollections of the Huxley-Wilberforce debate are just as famously unreliable. Huxley's alleged reply to Wilberforce is based on his reminiscence written down a couple of decades after the event. There are no other records of the exchange. They no doubt clashed, but it is impossible to state who said what to whom and who witnessed the event other than Huxley.

ability or inability to change their lots, does seem at odds with his theory of natural selection.

However, these views of Darwin's are understandable within the context of the values held by Victorians at the time. The ruthless British reprisals against the Indian mutiny of 1857 could be seen as a Christian civilization putting down an inferior 'barbaric' people (Wilson, 2003, pp. 202 – 222). This view of the British as a superior race is echoed by prominent literary figures of the time, such as Anthony Trollope who regarded black workers as lazy, Alfred Henty who regarded 'Negroes' as inferior, Jamaica's Governor Edward Eyre who regarded black people as indolent, and Tennyson who called them 'niggers' (Wilson, 2003, pp. 258 – 272). Rider Haggard's *King Solomon's Mines* (1885) emphasises cultural superiority in Africa, and this reflects the view of imperialists such as Cecil Rhodes who was encouraged by the British government to create the territories of Rhodesia and the dominion of South Africa (Wilson, 2003, pp. 601 – 6). This Victorian attitude of treating other races as inferior could be seen in battle and continued after the death of Darwin, in 1900 – 1901, with Kitchener's[255] burning of farms and the starving of women and children in concentration camps during the Boer Wars (Wilson, 2003, pp. 612 – 13).

When considering the above discussion, there seems to be a blurring of two forms of Darwin's type of 'reflection', namely, 1. the 'reflection' on objects in the physical world consisting of the processing of sense data in time and space creating the 'I' or ego, with 2. 'reflection' on the reflection-making process creating emotions or feelings felt by the observer (that is, feelings that amount to the moral compass of the self and community). The first form shows that Man's mind originates from material nature (a theory that Darwin is trying to prove from scientific facts) – this is the '*is*' form of reflection. The second form is Darwin's moral standpoint, the '*ought*' form of 'reflection': on the one hand Man is equal through his common progenitor, and on the other some races are better developed than others and the better developed act as a natural check against the less well developed. But Darwin's reference to Greg suggests that he *might* be sympathetic to those wishing to nudge Nature on a bit through human intervention. Darwin's reasons for not supporting

[255] Kitchener is also alleged to have sexually abused young men and women. Servants had to sleep across bedroom thresholds to bar his entry when he was staying with friends. This is perhaps not atypical of men in positions of power during the Victorian era. Wilson goes so far as to suggest that Imperialists and the British Empire could be made sense of in terms of 'repression of, or failure to understand, sexuality' and 'how nearly one could argue that the careers of Rhodes, Kitchener, Baden-Powell and many other manly, knobbly-kneed sons of Empire reached their zenith at the very moment Wilde confronted his nemesis. *Empires are male phenomena. They presumably come about in conjunction with an excess of testosterone*' (emphasis mine) (Wilson, pp. 598 – 9).

eugenics, i.e. coercive selective breeding, could be interpreted as pragmatic, as eugenics could have a counterproductive moral effect on those doing the coercing, in the same way as forcing people to inflict pain on others would have the effect of damaging their moral compass. Yet Darwin can be seen to be sympathetic to non-coercive means such as selecting one's mate carefully – Darwin was very much aware of this in his own case of selecting his cousin Emma Wedgwood as his wife and the possible effect of this on the health of his children. Either way, there is a dangerous tendency for Darwin to blur the distinction between scientific evidence and subjective moral views. A worrying reference in *The Descent* refers to reversion in which a characteristic, like the stripe of the zebra occurring occasionally in horses, is likened to the black sheep of the family – that is the undesirable inherited characteristics of the family that reveal themselves in an individual:

> […] injurious characters which tend to reappear through reversion, such as blackness in sheep; and with mankind some of the worst dispositions, which occasionally without any assignable cause make their appearance in families, may perhaps be reversions to a savage state, from which we are not removed by very many generations. This view seems indeed recognised in the common expression that such men are the black sheep of the family (Darwin, 2004, p. 163).

Although Darwin does not actually say so, he gives the impression that he would happily see certain undesirable characteristics weeded out.[256] If this was Darwin's view it would indeed be a darker side of his Romanticism and could be regarded as an example of a 'black' reversionary streak of human nature, as a form of primitive savagery dressed up in the guise of Victorian respectability.

Darwin's own nature is the result of his privileged background acting as a psycho-socio-cultural constraint, inhibiting insightful reflection of his own nature and society; unable to see that his own privileged class takes advantage of its position over the less fortunate classes; unable to see that such prejudice against the Irish is akin to the same prejudice he deplores against blacks and slaves; and that this class dominance used to make his class stronger and the weaker classes weaker runs in his own veins.

Is Darwin the thinker more Romantic than Darwin the writer, and is Darwin the writer more Victorian than Darwin the thinker? Darwin the writer will be examined in greater detail in the next chapter, but in the context of this chapter it can only be reiterated that there are

[256] Reading the *Descent* as a whole, it can be seen that for Darwin any coercive means of weeding out undesirable characteristics would be counterproductive as this would reduce the level of 'sympathy' among members of the public doing the coercing. Such a reduction in this 'sympathy' would therefore reduce the level of morality in that society, therefore making it less civilized or morally advanced than before. 'A just public opinion' is therefore very much a part of the concept of 'sympathy' and morality (Darwin, 2004, p. 682).

only *aspects* of Darwin that can be labelled 'Romantic' or 'Victorian'. In other words, there is not one colour running through Darwin's 'stick of rock' – he is a blend of Romantic and Victorian colours even though on the surface they might appear to be contradictory. For example, as already discussed, the Victorian 'colours' can be reflected in his belief that women are less intellectual than men (yet Darwin regarded men and women as equal in that they come from the same progenitor and, as he has demonstrated, the male butterfly colours come from the original base female colour). The Victorian belief that certain races were inferior such as the Irish, the Sepoys in India and the 'savages' in America is another example (yet Darwin's notion that Nature was able to adapt and improve ran in parallel to the work carried out by the missionaries in America, although imperialist in nature, showing that the Victorians *did* also believe that change and improvement *was* possible. This is also reflected in political reform such as the Reform Acts and social change such as the Factory Acts, which underpinned the improvement of working conditions). At the centre of the mix, where the two colours blur into one, is the Victorian naturalist on the one hand bringing back crates full of specimens, dead or alive, normally used to fill museums or zoos, and on the other hand a new breed of aesthetic scientist akin to Humboldt who is able to lift his imagination beyond the scientific data to something equally poetic and artistic; in other words, the imaginative ability to see the 'web of affinities'. As demonstrated above and in chapters 3.05 and 4.05, this thesis argues that Darwin is a complex mix of the Romantic and the Victorian, both at the conceptual and periodic levels. The conceptual distinction covers Darwin's absorption of ideas from both the historical periods of Romanticism and Victorianism given how he comes of age intellectually on the cusp of the Romantic into the Victorian period.

As the preceding discussion has already demonstrated, there are various influences that pull Darwin in one direction or the other. Darwin's most insightful experiences of pure imagination were obtained when he was able to experience Nature first hand, without the constraining or restraining influences of the values of his era (although it could be argued that all experience is coloured by society's values to an extent). The most imaginative can be seen in the 'Humboldtian' experiences of South America, already described in the first two chapters. However, Darwin did have such aesthetic, almost mystical, experiences before he voyaged on the *Beagle*. One of these was while he was a Cambridge student when he was uplifted by his aesthetic reflection of Sebastiano del Piombo's painting *The*

Raising of Lazarus[257] [1517 – 1519][258] exhibited at the National Gallery, London (see Appendix A, Plate 9). Darwin's friend at university, Whitley,[259] frequently went with him to the National Gallery in London, and in his autobiography [1876] Darwin wrote 'of Sebastiano del Piombo exciting in me a sense of sublimity' (Darwin, 1995, p.19). Through Whitley he learned the art of looking, of deciphering the layers of the painter's technique and the allusion behind the technique.[260] It enabled him to expand his imagination through aesthetic experience and to apply this to his experience of Nature itself. Neither science nor the religious theme of the painting held him back from experiencing the sublime (Browne, 2003a, p. 106). The accompanying text from St John's Gospel also encapsulated an experience of the wonder of Nature through the complex emotions of the polar opposites of faith and disbelief that go with the thoughts of creation and resurrection:

> Sebastiano's text from St. John's Gospel went straight to the heart of Christianity, encompassing creation, resurrection, faith, and disbelief: "I am the resurrection, and the life". For the impressionable young Darwin, the sense of intense wonder was as readily inspired in an artistic and theological context as in exploring nature (Browne, 2003a, p. 106).

Darwin's interest in the painting could also be seen as a reflection of his fascination with death and extinction through his interest in fossils.[261]

Yet, despite such subliminal imaginative experiences, both in the art gallery, in the jungles of South America and in his studies in London and Kent, it can be argued that Darwin's

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[257] This miracle of raising Lazarus from the dead attributed to Jesus in the Gospel of St John 11 demonstrates his divine power over death, one of the enemies of humanity. The name 'Lazarus' comes from the Hebrew, meaning 'God is my help'. For a summary of the story from the Gospel, see John 11: 1 – 44.

[258] Sebastiano's *Raising of Lazarus* was commissioned by the archbishop of Narbonne in France to match Raphael's *Transfiguration* and was in competition for a place in a church in Rome. The painting cast Christ in the role of healer and divine physician to raise Lazarus from the dead four days after his death. 'The subject of this painting is taken from the New Testament (John: 11). At the request of the sisters Martha and Mary, Jesus visits the grave of their brother Lazarus and raises him from the dead' (National Gallery, 2014). Michaelangelo, who was a friend of Sebastiano, supplied drawings for the figures as he was keen to help show up his bitter rival Raphael. In the end, however, Raphael's painting was preferred, and so Sebastiano's painting went to Narbonne's cathedral instead. The painting was eventually transferred to the Orleans Collection in Paris (between 1715 – 23), then purchased by John Angerstein in the early nineteenth century, before finally being purchased by the British Government in 1824 for the National Gallery, named NG1 as this was its first painting (Dunkerton and Howard, 2009, pp. 26–51, and National Gallery, 2014, unnumbered page).

[259] Whitley also came from Shrewsbury school, was a clever mathematician and came top of the Cambridge honours examination list (Browne, 2003a, pp. 105 – 6).

[260] As discussed on pp. 171-2 of the thesis, Darwin's *Origin of Species* can be seen to be a representation of a Phoenix-like rebirth of fossilized remains. This rebirth is mirrored in *The Raising of Lazarus*, both in terms of Lazarus and the materials used to paint him.

[261] The palaeontological term 'Lazarus taxon', for example, refers to organisms that reappear after an apparent period of extinction, probably due to an incomplete fossil record and a degree of rarity.

Victorian values[262] prevented him from gaining a similar insight into the dehumanising streak of prejudice existing in himself and his own class[263] (for examples of Victorian values, see chapters 3.05 and 4.05 which cover such concepts as Smiles' Self Help, Coventry Patmore's *Angel in the House* and the widely held view at the time that the Irish were feckless and were therefore responsible for their own poverty). If he had gained such an insight, he might have experienced Kurtz's[264] 'The horror! The horror!' (in Conrad's *Heart of Darkness*), when confronted with Man's darkest side of uncontrolled human nature. Perhaps to an extent, Darwin's move to Down House was a way of burying himself not only in his work away from the distractions of London but also of burying himself in isolation away from the Victorian values that constrained him (like a metaphorical *Rhea darwinii* burying its head in his 'Sandwalk').[265] Doing his research independently financed by himself meant that he also did not have to kowtow to any academic institutions or the government. So in this sense he could be said to be less Victorian than his peers. Other personal factors also made him less Victorian and less dependent on institutions. The death of his daughter Annie,[266] for example, which he never got over, strengthened his disbelief in a traditional God,[267] as did the untimely deaths of other members of his family and friends around this time.[268] But none of these experiences enabled him to step out of himself in order to look into his own mind, to see how he and his class fitted into his own line of 'Descent'.

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[262] This term is not used in the sense of the term popularised by Margaret Thatcher's administration in the 1980s regarding liberalism and small government.

[263] This perhaps is an example of 'Darwin the writer' as opposed to 'Darwin the thinker'. This will be covered in more detail in Chapter Four.

[264] The narrator, Marlow, describing Kurtz shortly before he died: 'It was as though a veil had been rent. I saw on that ivory face the expression of sombre pride, of ruthless power, of craven terror – of an intense and hopeless despair. Did he live his life again in every detail of desire, temptation, and surrender during that supreme moment of complete knowledge? He cried in a whisper at some image, at some vision – he cried out twice, a cry that was no more than a breath – "The horror! The horror!"' (Conrad, 1976, p. 87).

[265] The famous Sandwalk is where Darwin would take his exercise at Down House using a pile of flint stones to mark his five circuits making up a half mile. This 'was his spiritual home […] where he pondered. In this soothing routine, the power of place became preeminent in Darwin's science. It shaped his identity as a thinker' (Browne, 2003, p. 402).

[266] Anne Elizabeth "Annie" Darwin 2 March 1841 – 23 April 1851. In his memorial to her, Darwin wrote: 'We have lost the joy of the Household, and the solace of our old age:- she must have known how we loved her; oh that she could now know how deeply, how tenderly we do still & shall ever love her dear joyous face. Blessings on her. – April 30. 1851' (Burkhardt, 2009e, p. 542).

[267] 'Annie's cruel death destroyed Charles's tatters of belief in a moral, just universe […]. Charles now took his stand as an unbeliever' (Desmond and Moore, 2009, p. 387). 'This death was the formal beginning of Darwin's conscious dissociation from believing in the traditional figure of God' (Browne, 2003a, p. 503).

[268] For example, the death of his father Dr Robert Darwin on 13 November 1848, the death of his sixteen-month-old son, Charles Waring Darwin on 28 June 1858, and the death of his friend and mentor John Stevens Henslow's wife Harriet in 1857.

Nevertheless, despite these shortcomings, Darwin's *Origin* and *Descent* could be seen as a written equivalent of *The Raising of Lazarus*, a Phoenix rising up from the dead, a rebirth of a fossilised past made up of data in the present. In the same way as the thousands and thousands of brush strokes make up the picture alongside the layers of canvas, paper and glue, the written history of the past makes up the present through the structure of its 'tree' of descent, its branches and constituent species. In both cases, death rises up into the present as life. Through Darwin's image of the past, the reader gets as close as he can to the concept of his own non-existence on the one hand, and close to the continuation of his existence through the human species on the other. Yet even Man's non-existence can be experienced through the idea of the connected existence of simple organisms before that. The flight of the Phoenix, therefore, seems to fly in both the direction of the past and the future. *The Raising of Lazarus* as a physical painting can also be seen as Darwinesque as it is made up of layers of past restorations. Each restoration is made up of its own layers of glues, papers, boards, varnishes and flakes of paint precariously held together, each with their own history (due to blisters, shrinking or bug-infested glues, grime and so on). Again past and present combine and evolve to create a form moving into the future hinged on historical restoration techniques and technologies.[269]

3.06 Conclusion

The above discussion has demonstrated that Darwin can be regarded as a Romantic materialist. For Darwin, Mind comes from the origins of matter. The highest forms of Mind are Morals gained through instinct and imagination. Conscience guides moral choice in being able to move freely between past and future actions, in being able to assess sympathies towards fellow Man and feelings of sympathy from fellow Man to oneself. In a similar way, the flight of the imagination, like a bird (or 'castles in the air') is also able to move between the past and the present, but also between subject and object, between the particular and the universal, between the empirical and the scientific, and between the humble and the sublime. In the form of Darwin's work, like Wordsworth's poetry, it can be seen as a 'double consciousness', reflective through a poetic dialogue or 'conversation', like the 'Humboldtian Method' and Goethe's 'Genetic Method'. The metaphysical form of the archetypes helps the Mind to conceptualise Nature and helps the scientist and the poet to get closer to an understanding of it, at its highest form approaching a mystical or sublime experience. Despite Darwin's reflective shortcomings in terms of understanding his own

[269] For a history of the painting's restoration work, see Dunkerton and Howard, 2009, pp. 26–51.

contradictions in terms of 'racist anti-speciesism' (which could be due to the values of the era in which he lived),[270] Darwin's highly-tuned imagination can be shown to have unlocked the door to some of Nature's most intimate secrets. His imagination along with his writings, (like a Wordsworthian poem), can be seen as a phoenix rising from the primordial past just like the feathers of the Argus pheasant or the restored painting of *The Raising of Lazarus.*

[270] The metaphor of the 'entangled bank', as discussed in this chapter, can be seen as a way of explaining Darwin's inability to stand outside himself.

CHAPTER 4: THE TRANSMUTATION OF THE ORIGINS OF CHARLES DARWIN'S ROMANTIC THOUGHT, LANGUAGE AND SCIENCE ON THE BEAGLE INTO THE ROMANTICISM OF HIS LATER WORKS.

4.01 Introduction

The aim of this chapter is to analyse the text of the *Voyage of the Beagle* and Darwin's *Beagle* notebooks in relation to Darwin's Romantic concepts, already discussed in Chapters One to Three, to see how they were developed in the early Darwin, to examine the language used to express them, and how the form of Darwin's expression changed as he matured in years, as reflected in the *Origin* and the *Descent*.

As the previous chapters have demonstrated, the concept of Mind is central to an understanding of Darwin's Romanticism. Mind, over millions of years, has evolved from matter through the development of instincts, culminating in such human mental forms as imagination, sympathy, conscience, morality, and, through reflection, the experience of the mystical or the sublime.

This chapter continues to trace the power of Mind and how it evolved from raw material data, how Darwin's early experiences on the *Beagle* became Romantic through the development of his imagination, and how they in turn matured into a new form of selfless scientific Romanticism in Darwin's later works. The analysis examines Darwin's early piecing together of the history of Nature, like a South American Indian following the tracks (or 'Rastro') of horses. This reading of Nature creates the narrative of Nature, and throughout Darwin's writing the reader is presented with a 'double movement of prose' in which he is first presented with an impossible-to-believe discovery (for example, shells at the top of a mountain) creating the experience of wonder, followed by an explanation (for example, the sea beds were upheaved over millions of years to form mountains) creating yet more wonder that such a thing could actually happen (often followed by an exclamation mark). The narrative of Darwin's works reveals not only the development of Man's Mind from simple beginnings, but also the development of Darwin's Mind alongside that of the reader's. The 'Rastro' reading of Nature is an experience shared by writer and reader.

Reference has already been made to the influence of Wordsworth, the importance of poetry in Darwin's youth and how in later life he no longer enjoyed it. This chapter will examine the importance poetry played in developing his imagination through the experience of Nature creating a personal poetic experience, and how in turn this was

transformed into a more objective poetry of science, capturing both the wonder and enchantment of Nature. This development of a poetic imagination can be seen to reflect a move away from an anthropocentric world in which Man is the centre, to a more anthropomorphic world in which Man and the animal world share common sympathies of consciousness; in which humble creatures such as the common earth worm are given traits that are almost human. Darwin makes the small and insignificant appear big and sublime.

Darwin also shows that Man shares the concept of beauty with birds, bringing Man and beast closer together. Darwin's conventional Victorian attitudes regarding the differences between men and women paradoxically enabled him to identify female choice in animals, although this was not acknowledged in Man (apart from the possibility of this being hinted at in Man by analogy). The development of Mind from matter eliminating the power of a Deity as a proximate cause seemed to eradicate enchantment.[271] However, enchantment was recreated by the metaphysical explanation of intention through sexual selection.

Darwin's use of the 'Rastro' to write the narrative from the humble beginnings of the *Beagle* voyage, his development of wonder and enchantment from his experience of poetry and his poetry of experience, along with his linking together of animals and humans through a shared experience of consciousness, create a link between the subjective and the objective experience of Nature. Mind can be seen to recreate Nature through the 'Rastro', through the piecing together of Nature's parts (past, present and future), and in so doing recreating a collective memory, a collective narrative or history. This chapter examines the history of these Romantic beginnings on the *Beagle* and how they link in to the *Origin* and the *Descent*.

4.02 Darwin's 'Rastro' Method of Reading Nature to Write its Romantic History

Darwin's analysis of the data that make up the history of Nature is not merely the result of deductive reasoning; it is also a process of poetic imagination in which the impossible is

[271] Darwin was saddened by Wallace in April 1869 when he published an article in the *Quarterly Review* arguing that natural selection could not be the cause of mind in humans. For Wallace, the material frame of Man was descended from the apes while the immaterial spirit came from a higher power. This transformation of belief came from spiritualism when a medium, Mrs Mary Ann Marshall, 'tapped out a message from his dead brother Herbert' (Browne, 2003, pp. 318 - 9). This interest in spiritualism reflected 'the very Victorian hope that there was more to this life than material form' (Browne, 2003, p. 320). Darwin and Emma attended a séance at Erasmus Darwin's house in January 1874 that included Francis Galton, George Lewis and Mary Ann Evans (George Eliot) and Huxley. According to Darwin's son Francis, Darwin declared 'it was all imposture'. The medium Charles Williams was later 'unmasked as a fraud' (Browne, 2003, pp. 405 – 6; Buckland, 2005, p. 432).

allowed expression (the 'castles in the air' referred to in previous chapters), combined with the ability to focus on detail, the unusual rather than the normal, and to make comparisons between species, geographical regions and periods of time. This is Romantic in the sense that it incorporates the 'oneness' of Nature in which everything is related to everything else, and here, in relation to the 'Rastro', includes the relationship between the objective forms of Nature being pieced together by the subjective 'reader' of Nature; that is, both Darwin, reading Nature and writing the narrative of Nature, and the reader of Darwin's works. This is one of the highest forms of Mind that has developed from the simple beginnings of instinct, in turn developed from matter. Darwin's 'Rastro' method of reading Nature may also be seen to be Romantic in its ability, through the medium of poetic prose, to paradoxically unite the possible with the impossible, as with uniting Mind and matter, to make the mystical tangible.

This skill of learning to 'see' through paying attention to detail can be seen to have been developed through reading Charles Lyell's *Principles of Geology* whilst on the *Beagle* (Levine, 2011, pp. 44-50). Darwin completed reading Lyell's third and final volume of the *Principles* in April – June 1834, which helped reinforce Darwin's view that the elevation of Patagonia had been gradual and that 'many successive earthquakes in the Andes' had a 'potential elevating power' (Chancellor, 2009, p. 136). But this understanding of Nature is not just obtained through raw perception, but through a combination of reason and poetic imagination. As Levine puts it, 'raw perception is always tangled with reasoning' and reason creates wonder through poetic insight (through the 'double movement of his prose', moving from wonder to explanation and to wonder again) (Levine, 2011, pp. 52 – 61). This wonder is not just created by being struck by awe but is created by spotting the unusual and asking questions (Levine, 2011, pp. 53 – 55). Through this 'double movement of prose', an initially self-effacing Darwin expresses wonder at the unknown and the unknowable, yet then explains natural phenomena through the ordinary, creating the feeling of wonder again that such a thing could be possible. For example, in the *Origin* Darwin expresses his wonder at the instinct of the hive bee to create the hive. He then explains the development of the ordinary bee from working independently to working with other bees to create a hive and how this instinct is passed on (creating the feeling of wonder again). The exquisite structure of the hive bee has been built up through natural selection by 'imperceptible gradations'. Such gradations can be seen in bees today with varying degrees of perfection (Levine, 2011, pp. 156 – 7). As expressed by Levine, this is the perfect paradox as the individual bees consciously perform the act of making a hive without knowing what they

are doing (Levine, 2011, p. 158): 'The bees […] no more knowing that they swept their spheres at one particular distance from each other, than they know what are the several angles of the hexagonal prisms and of the basal rhombic plates' (Darwin, 1985, p. 256). The paradox can equally apply to Darwin as he is conscious of the details of Nature as it unfolds before him yet is ignorant of the history in which he and everything around him is embedded. His theory is an imaginative leap based on his experience of data creating a history, a Rastro, of which he is a part but of which he is not fully conscious. Nature produces beautiful and complex structures without being aware of what it is doing. 'Not only instinct but human consciousness itself grows from mindlessness' (Levine, 2011, p. 159).

Darwin introduces the concept of the 'Rastro' in his *Voyage* [272] when referring to the native Indians in search of the wild Indians who had committed murder and who had left a track ('Rastro') leading into the Pampas (Levine, 2011, p. 58). One 'glance at the rastro' enabled the native Indians to work out the history of the horses' journey:

> One glance at the rastro tells these people a whole history. Supposing they examine the track of 1,000 horses, they will soon guess by seeing how many have cantered the number of men; by the depth of the other impressions, whether any horses were loaded with cargoes; by the irregularity of the footsteps, how far tired; by the manner in which the food has been cooked, whether the pursued travelled in haste; by the general appearance, how long it has been since they passed. They consider a rastro of ten days or a fortnight, quite recent enough to be hunted out (Darwin, 1989, p. 110; see also Keynes, 2009, pp. 214 – 5).

Levine (2011, p. 61) identifies the same 'Rastro' method used by Darwin when he refers to the connection Darwin makes between the 'mud, sand and shingle' of the beaches with the 'rattling noise' of the stones in the mountain torrents:[273]

> As often as I have seen beds of mud, sand, and shingle, accumulated to the thickness of many thousand feet, I have felt inclined to exclaim that causes, such as the present rivers and the present beaches, could never have ground down and produced such masses. But, on the other hand, when listening to the rattling noise of these torrents, and calling to mind that whole races of animals have passed away from the face of the earth, and that during this whole period, night and day, these stones have gone rattling onwards in their course, I have thought to myself, can any mountains, any continent, withstand such waste? (Darwin, 2003, p. 316).[274]

Again Darwin uses the 'double movement of prose' in which it seems impossible that the mountain torrents could produce 'mud, sand, and shingle, accumulated to the thickness of

[272] In August 1833 while in Bahia Blanca.
[273] Whilst in the Passage of the Cordillera on the 19th March 1835.
[274] This edition of the *Voyage* is referred to as the passage does not appear in the Darwin 1989 publication (1839 first edition), which is the main text referred to. This applies to further references to the 2003 publication (1860 third edition).

many thousand feet'. But then when he contemplates the huge period of time in which 'whole races of animals have passed away from the face of the earth', he realises that this same mountain torrent *would* have continued bringing down its 'rattling stones' and therefore be able to produce 'such waste'.

Darwin's description[275] of the contrast between the noisy torrents of the mountain and the 'tranquillity' of the beaches below also mirror the parallel image of vibrant living species in struggle on the one hand, and the tranquillity or peace of death and extinction on the other hand. The disappearance of the waters has been slow and has not been due to any 'great catastrophe':

> I do not think nature ever made a more solitary, desolate pile of rock […]. The strange aspect of this mountain is contrasted by the sea-like plain, which not only abuts against its steep sides, but likewise separates the parallel ranges. The uniformity of the colouring gives, also, an extreme quietness to the view; the whitish gray of the quartz rock, and the light brown of the withered grass of the plain, being unrelieved by any brighter tint. From custom, one expects to see in the neighbourhood of a lofty and bold mountain a broken country, strewed over with huge fragments. Here nature shows, that the last movement before the bed of the sea is changed into dry land, may sometimes be one of tranquillity. Under these circumstances, I was curious to observe how far from the parent rock any pebbles could be found. On the shores of Bahia Blanca, and near the settlement, there were some quartz, which certainly must have come from this source: the distance is forty-five miles (Darwin, 1989, pp. 116 – 7).

The 'tranquillity' or 'extreme quietness' of the beaches after the noisy torrents have stopped is also expressed by 'the uniformity of colouring' such as the 'whitish gray of the quartz rock' and 'the light brown of the withered grass' (here the 'withered' denotes the ending of the previous life of the terrain), all quiet, toned-down colours rather than a 'brighter tint' which might suggest more violent forces at work (such as the 'noisy torrents'). The quietness of the colours also contrasts with the expectation of a violent terrain normally associated with 'a lofty and bold mountain', such as 'a broken country, strewed over with huge fragments' (Levine, 2011, pp. 62 – 3). Once again, Darwin is hit by wonder by the opposite of what he expected, by the impossible that becomes a reality. Finally, the enormous change that Darwin sees at the end of the torrent's journey is reflected in the 'distance of forty-five miles' that the quartz has travelled from its source, and although now 'tranquil' hides the rattling noise that once occurred (Levine, 2011, pp. 62 – 3). Darwin's 'Rastro' is not a mere forensic Sherlock Holmes-type descriptive analysis.

[275] Described in September 1833 while travelling from Bahia Blanca to Buenos Ayres. This description of the deep past in the present echoes James Hutton's theory of Uniformitarianism, made more widely known by John Playfair and probably percolated down to Darwin via Lyell.

It is also a multi-layered work of poetic art, both in terms of its poetry and imagination, but also as a kind of visual art that comes through the imaginative description. The reference to the quiet colours, for example, gives the prose a perspective like a painting, making the colours fade away into the distance – and the distance created by this perspective is an exact reflection of the distance between the start of the torrent and its end on the beaches. This is a work of art captured in prose, but when imagined visually can be seen as a landscape painting. This is akin to the Romantic Argus feathers in the *Descent*, representing the same 'Rastro' traces of history, with their depth of perspective measuring out the distance of time between past and present through the changing patterns and shades of the ocelli.

When viewing the 'streams of stones' in the present moment that over time have created the tranquil beaches below,[276] Darwin also compares them to his past experience of the after- effects of the earthquake at Concepcion: the 'stupendous mountains have been broken into pieces like so much thin crust' (Darwin, 2003, p. 197). Using the 'Rastro' method, Darwin again relates the present to the past but also through the 'double movement of prose' argues that awe-inspiring phenomena that seem impossible to explain can potentially be explained naturalistically rather than using a deity as cause:

> Never did any scene, like these 'streams of stones', so forcibly convey to my mind the idea of a convulsion, of which in historical records we might in vain seek for any counterpart: yet the progress of knowledge will probably some day give a simple explanation of this phenomenon, as it already has of the so long-thought inexplicable transportal of the erratic boulders, which are strewed over the plains of Europe (Darwin, 2003, p. 197).

Darwin may have had Stonehenge[277] in mind when referring to 'the erratic boulders […] strewed over the plains of Europe' (Levine, 2011, pp. 66 – 77), that can be explained yet at the same time imagined as if they are 'erratic boulders' before being assembled by Man. Geologically the term 'erratic boulders' suggests that they have been brought from a distance by glacial action, but for the reader familiar with Stonehenge, the same contrast between 'tranquillity' and 'noise' or violence can be imagined: the majesty of the towering stones against the sky or a sunset, the mystical experience of their arrangement, all creating a feeling of peace and tranquillity; yet at the same time they are 'erratic boulders' (rather than stones hewn by Man) that have been 'strewed over the plains of Europe' as if by that same earthquake at Concepcion, thus creating the same impression as that of the

[276] Written on the 19th May 1834 whilst visiting the Falkland Islands.
[277] In the late 1870s Darwin and Emma visited Stonehenge, and armed with a spade, went looking for worms (Browne, 2003, pp. 447 - 8).

'streams of stones' conveying 'the idea of a convulsion'. It is not difficult to imagine Darwin excavating worms from under these stones yet at the same time looking up at the towering stones above him, trembling under their power of the sublime, experiencing a mixture of the tranquillity of their present stillness with the distant rumblings of their movement in getting the stones to their present positions, however that was achieved. Darwin often explained natural phenomena through his imaginative use of analogy and so it is not difficult to imagine Darwin imagining glacial action at Stonehenge even though he is aware that the boulders were moved by Man. Even the impression they create in the mind is a violent one, as expressed in 'so forcibly convey to my mind'. Darwin is not just using the 'Rastro' as a forensic tool to analyse his data, but subtly creating a narrative poem as a piece of conceptual art capturing all the shades, colours and textures of his images, all helping to bring the past histories alive in the present.

Darwin also uses the 'Rastro' method to propel himself into the past to imagine the way things might have happened as a way of explaining the present.[278] For example, when Darwin sees the shattered and broken rocks in an area where there are no longer any earthquakes appearing, he imagines them being 'hurled into their present position thousands of years ago'. At the summit of Mount Wellington in Van Diemen's Land in Chile, Darwin wonders 'at the force which has upheaved these mountains, and even more so at the countless ages which it must have required, to have broken through, removed, and levelled whole masses of them' (Darwin, 2003, p. 257; Levine, 2011, p. 67). Darwin develops this form of imaginative 'Rastro' in the *Origin* (by supposing a new glacial period) as an explanation to help him interpret the traces of previous glacial action (Levine, 2011, p. 97):

> But we shall follow the changes more readily, by supposing a new glacial period to come slowly on, and then pass away, as formerly occurred. As the cold came on, and as each more southern zone became fitted for arctic beings and ill-fitted for their former more temperate inhabitants, the latter would be supplanted and arctic productions would take their places (Darwin, 1985, p. 360).

The 'Rastro' method also helps Darwin discover 'the infinite interdependence of organisms on each other, on the weather, on time, on geology' (Levine, 2011, p. 106). This 'interdependence' is another example of Darwin's Romanticism as it reflects the 'oneness' of Nature in which everything is related to everything else, in which everything has an equal part to play, whether this be Man or the humble worm. This form of the 'Rastro' is developed further in the *Origin* in which Darwin's understanding of the interdependence

[278] On the 17th August 1834 when on top of Mount Wellington in Van Diemen's land in central Chile.

of organisms in one area helps him understand them in another area (in a similar way to the 'streams of stones' helping Darwin understand earthquakes better). Darwin illustrates this by comparing Staffordshire with Farnham, Surrey. In Staffordshire, where Scotch fir trees had been enclosed, the insect and bird population had increased but not in the adjoining heathland. In Farnham Darwin could see the difference between an enclosed area of Scotch fir where there were self-sown trees, and an unenclosed area where seedlings were browsed by cattle and were unable to grow (Levine, 2011, pp. 107 – 8; Darwin, 1985, pp. 123 – 4). Staffordshire and Farnham can also be related to Paraguay – flies laying eggs in the navels of cattle reduce their reproduction – the balance is kept by the number of birds eating insects and the number of prey that eat the birds (Darwin, 1985, p. 124).

When Darwin's gardener Lettington saw Darwin looking at a flower 'for ten minutes', he interpreted this as reflecting a sad state of mind ('[he] has been very sadly […], he moons about in the garden […], if he only had something to do I really believe he would be better'). But Darwin's keen, continued observation was no doubt an examination of the flower's parts and their relationships to each other as well as their developmental history (Levine, 2011, pp. 141 – 142; Browne, 2003, p. 460). The use of the 'Rastro' here can be seen as akin to Goethe's discovery of the plant archetype while gazing at plants in the botanic garden in Italy, and Darwin's seeing the history of the ocelli in the plumage of the Argus pheasant. For Darwin, the 'Rastro' method of observation, like Goethe's 'Genetic Method' and the 'Humboldt Method', is both a key into the soul of Nature and into the soul of Mankind, uniting their common history, sharing their tapestry of colours, brush strokes, subtle shades, textures and prose.

4.03 The Development of Darwin's Poetic Imagination

Analysing the 'Rastro' has already highlighted the importance of Darwin's poetic imagination in relating facts to help him interpret the secrets of Nature. This section will now examine the influence of poetry on Darwin's sensitivities to his experience of Nature, how this developed his own poetic interpretation of Nature, and finally, how he moved from an anthropocentric to an anthropomorphic view of Nature that was transformed into a selfless poetic science, one of the highest forms of objective Mind and imagination.

Darwin's children rejected Darwin's view of himself 'as a deadened, anaesthetic man' (Browne, 2003, p. 429; Levine, 2008, p. 139) and this is reflected by his own account of

himself as a young man in his autobiography where he states he had a passion for poetry and literature:

> I took much delight in Wordsworth and Coleridge's poetry [whilst at university]; […] Formerly Milton's *Paradise Lost* had been my chief favourite, and in my excursions during the voyage of the *Beagle*, when I could take only a single volume, I always chose Milton (Darwin, 1995, p.31).

This passion is reflected in Darwin's *Coquimbo notebook* in an entry for May 1835 in which 'Milton' forms part of a to do list: 'Spunge […] – Blacking – Milton – Clothes Washed – Shoes blacking […] – write letters' (Chancellor, 2009, p. 480, [132]).

Darwin shows deep regret at having lost the pleasure of literature:

> This curious and lamentable loss of the higher aesthetic tastes is all the odder, as books on history, biographies, and travels (independently of any scientific facts which they may contain), and essays on all sorts of subjects interest me as much as ever they did (Darwin, 1995, p. 51).

But Darwin is not unfeeling, as he has strong memories of poetry's pleasures (Levine, 2008, p.135).

Levine, citing Beer, argues that reading Milton sent Darwin into 'tropical raptures', feeding his imagination and encouraging his sense of 'multiplicity, profusion and abundance' (Levine, 2008, p.141). The light of the seas off South America reminded Darwin of Milton's *Paradise Lost*, in which the wilderness equated to 'chaos and anarchy'. In Darwin's *Beagle Diary* entry for 24th October 1832:

> The night was pitch dark, with a fresh breeze. – The sea from its extreme luminousness presented a wonderful & most beautiful appearance; every part of the water, which by day is seen as foam, glowed with a pale light. The vessel drove before her bows two billows of liquid phosphorus, & in her wake was a milky train. – As far as the eye reached, the crest of every wave was bright; & from the reflected light, the sky just above the horizon was not so utterly dark as the rest of the Heavens. – It was impossible to behold this plain of matter, as it were melted & consuming by heat, without being reminded of Miltons [sic] description of the regions of Chaos & Anarchy (Keynes, 2009, pp. 142 – 3).

The strange 'luminousness', the water glowing 'a pale light', the 'billows of liquid phosphorus', the 'milky train', the 'bright' crests as well as the light reflected in the 'pitch dark' sky all contributed to this feeling of an unearthly 'Chaos & Anarchy' in which everything is 'melted & consuming by heat'. Here Milton's poetry has sparked Darwin's imagination[279] and fired his sensitivity to the experiences of Nature.

[279] Like Darwin, Milton also wrote from his imagination, especially following the onset of his blindness.

Darwin intermingles his thoughts and memories of Wordsworthian and Miltonic poetry with his own experiences of Nature (Levine, 2008, p.142). The memories portrayed in Darwin's works are both the memories of his own experiences as well as a reflection of the historical narrative of the life of Nature and its beginnings through fossils, or the 'memories' of transmutations such as those expressed in the ocelli of the Argus pheasant. Like Humboldt before him, Darwin pays attention to the details of Nature and responds with his feelings to what he sees and experiences, blending the aesthetic with the scientific (Levine, 2008, p.143). This feeling of 'Chaos & Anarchy' is frequently experienced as 'sublime' during his five-year voyage, particularly when the insignificance of Man is brought out by the backdrop of a wild mountainous landscape further intensified by the wild weather. This also expresses his move away from an anthropocentric view of Nature. Darwin captures this in his *B. Blanca notebook* entry for 8th June 1834 in Tierra del Fuego, where the 'authority' of Man evaporates and the sovereignty of Nature reigns supreme:

> Curious scenery constant dirty cloud driving clouds peeps of rugged snowy crags: blue glaciers: rainbows squalls – outline against the lurid sky: […] no claims no authority here man. – How insignificant does wigwam look – [The] Fuegian man does not look like […] the lord of all he surveys – […] The inaccessible mountains wider power of nature despise for control seem to say here we […] are the sovereign (Chancellor, 2009, p. 161, [80a] – [81a]; also p. 142).

In the *Despoblado notebook* entry for 6 June 1836, Darwin again captures the insignificance of Man and the Miltonic atmosphere of 'Chaos & Anarchy' in which he defines 'perfect chaos' as the solitude and desolation of Nature, its sovereignty again reigning supreme:

> Perfect chaos = country very desolate solitary mountainous, few animals, farm houses in valleys – no trees, wild deer large white vultures like Condors – Band of mountains (Chancellor, 2009, p. 542 [63b]).

This power of Nature's sovereignty reigning supreme over Man is expressed in the *Voyage* when describing the natural beauty at Bahia in San Salvador on 1 August 1836. Nature is so powerful that 'even in the vicinity of large cities' the power of Nature is stronger than 'the artificial labour of man' through his buildings and cultivated land:

> The whole surface is covered by various kinds of stately trees, interspersed with patches of cultivated ground, out of which houses, convents, and chapels arise. It must be remembered that within the tropics, the wild luxuriance of nature is not lost even in the vicinity of large cities; for the natural vegetation of the hedges and hill-sides, overpowers in picturesque effect the artificial labour of man. Hence, there are only a few spots where the bright red soil affords a strong contrast with the universal clothing of green. From the edges of the plain there are distant glimpses either of the ocean, or of the great bay bordered by low wooded shores, and on the surface of which numerous boats and canoes show their white sails (Darwin, 1989 p. 366).

Once again the power and sovereignty of Nature is expressed through 'the wild luxuriance of nature'. Even the softer vegetation in the form of hedges and hill-sides 'overpowers' Man's labour, and the ocean and 'the great bay' dwarf Man's existence through the insignificance in size of the boats and canoes. This insignificance of Man and his labours is further brought out by the power of the midday sun, which makes the whitewashed houses appear like insubstantial shadows rather than buildings:

> The houses, and especially the sacred edifices, are built in a peculiar and rather fantastic style of architecture. They are all whitewashed; so that when illuminated by the brilliant sun of midday, and as seen against the pale blue sky of the horizon, they stand out more like shadows than substantial buildings (Darwin, 1989 pp. 366-7).

Man is therefore not the centre of the universe, Nature is. And Nature has not been made for Man's enjoyment, but has been created by itself for itself – that is, it has been created for everything that is part of Nature, not just for Man. It has been created for Nature's 'menagerie':

> The land is one great wild, untidy, luxuriant hothouse, which nature made for her menagerie, but man has taken possession of it, and has studded it with gay houses and formal gardens (Darwin, 1989, pp. 367-8).

The move from an anthropocentric view of the world is reflected in Darwin's anthropomorphic descriptions of Nature in which Man is now seen as part of Nature, not the centre of Nature; Man, though more developed in terms of consciousness, shares a common consciousness and a common history with all Nature's organisms, from worms and barnacles to apes and human beings. All share a common narrative. In Darwin's *Rio notebook* dated 17 April 1832, he compares 'twiners entwining twiners' to 'tresses like hair' (Chancellor, 2009, p. 45, [27b]). This underlines the common features that organisms[280] in Nature share, enabling the same descriptions to be used. Darwin is able to do this through

[280] The term 'organisms' is here used to cover both the animal and plant world as Darwin strongly believed in a continuum of consciousness from the lowest to the highest organisms, including plants. This is clearly expressed in Darwin's *Movement in Plants* [1880] describing climbing plants when he acknowledged 'consciousness' as the ability of the organism to react to its environment through its 'sense-organs': 'It is hardly an exaggeration to say that the tip of the radicle thus endowed, and having the power of directing the movements of the adjoining parts, acts like the brain of one of the lower animals; the brain being seated within the anterior end of the body, receiving impressions from the sense-organs, and directing the several movements' (Darwin, 1880, p. 573). With this interpretation of 'consciousness', intention can also be included on the same continuum. As stated by Jones, 'Any creature, animal or vegetable, needs, as it copes with the outside world, to find out what is going on, to pass the information to the appropriate place and to respond to the challenges presented by Nature' (Jones, 2009, pp. 166 – 7). In this sense, such behaviours could be seen to be expressions of conscious intention, but they need to be seen in the context of this continuum and Darwin's imaginative use of 'brain' to express an organism's ability to react to its environment through its 'sense-organs'. Taking the plant's power too literally (as if it had a brain) would result in the assumption that plants were moral beings – and this question is outside the scope of this thesis.

his poetic imagination by putting his mind into the consciousness of the organism. The very act of using this common language is a statement saying that all organisms share a common consciousness, although graded. This recognition must also have been reinforced by Darwin's experience of seeing the natives of South America taking on the personae of animals during various ritualistic dances, for example natives imitating the Emu bird in the Emu dance and the movements of a kangaroo in another dance (Darwin, 1989, pp. 331-2). In the *Descent* (Darwin, 2004, p. 118), Darwin attributes human traits to his dog when he describes it as a 'sensible animal' imagining a stranger when the breeze moves a parasol (like a human being inventing a God to explain a mysterious event [Levine, 2011, p. 165 – 6]).

An important example of Darwin's poetic sensibilities, sitting in an intermediate stage between the influences of Wordsworth and Milton, and his own later scientific poetic prose, can be seen in his description of the ship's spider in his *Journal of Researches.*[281] It has both 'scientific rigor' and 'a sensibility that leans towards analogy and metaphor' (Levine, 2008, p. 145):

> The little aeronaut as soon as it arrived on board, was very active, running about; sometimes letting itself fall, and then reascending the same thread; sometimes employing itself in making a small and very irregular mesh in the corners between the ropes. It could run with facility on the surface of water. When disturbed it lifted up its front legs, in the attitude of attention. On its first arrival it appeared very thirsty, and with exserted [sic] maxillae drank eagerly of the fluid; […]: may it not be in consequence of the little insect having passed through a dry and rarefied atmosphere? Its stock of web seemed inexhaustible. While watching some that were suspended by a single thread, I several times observed that the slightest breath of air bore them away out of sight, in a horizontal line. On another occasion […] I repeatedly observed the same kind of small spider, either when placed, or having crawled, on some little eminence, elevate its abdomen, send forth a thread, and then sail away in a lateral course, but with a rapidity which was quite unaccountable (Darwin, 1989, p. 148).

The introduction of the spider as 'the little aeronaut' immediately tells the reader that this is no ordinary spider. It is more like an explorer travelling through space, akin to a modern-day astronaut, except travelling through air. It is also not dissimilar to a colonist taking over a new territory with its spinning of a 'very irregular mesh in the corners between the ropes'. With the use of 'employing itself', this very active running around feels more like a person trying to kill time by finding something to occupy themself than a mere spider. The

[281] The spider is first noted in Darwin's *St. Fe notebook* on 7th October 1833: 'Saw a largish (running spider) Shoot [sic] several times long lines from tail, there by slight air not perceptible & rising current were carried up-wards & out wards (glittering in the sun) till at last spider loosed its hold, sailed out of sight the long […] lines curling in the air' (Chancellor, 2009, p. 189, [30a]).

lifting of its legs 'in the attitude of attention' gives it a kind of human consciousness, as if it is thinking about something. The spider does not just need drink but appears to be conscious of its lack of fluid so that it feels 'thirsty', another human attribute. From a close observation of the data before his eyes, Darwin is not only able to portray the scene poetically, but is able to make assumptions about where it has been and where it might go. Its 'thirst' suggests it has 'passed through a dry and rarefied atmosphere', which further suggests it can move from place to place through the air, able to 'send forth a thread, and then sail away', particularly as 'its stock of web seemed inexhaustible'.

Darwin describes another spider in equally poetic prose that reinforces his hypothesis that spiders can travel great distances, but also through the length of his description over two pages and the time spent focussing on the minutiae of detail , demonstrates the importance he places on such a creature's ability to shine a light on Nature's secrets:

> A spider […] while standing on the summit of a post, darted forth four or five threads from its spinners. These glittering in the sunshine, might be compared to rays of light; they were not, however, straight, but in undulations like a film of silk blown by the wind. They were more than a yard in length, and diverged in an ascending direction from the orifices. The spider then suddenly let go its hold, and was quickly borne out of sight. The day was hot and apparently quite calm; yet under such circumstances the atmosphere can never be so tranquil, as not to affect a vane so delicate as the thread of a spider's web. If during a warm day we look either at the shadow of any object cast on a bank, or over a level plain at a distant landmark, the effect of an ascending current of heated air will almost always be evident. And this probably would be sufficient to carry with it so light an object as the little spider on its thread (Darwin, 1989, p. 149).

This description of the spider creates wonder and amazement. It stands 'on the summit of a post' as if a mountaineer conquering a mountain top surveying the territory below. It produces 'threads from its spinners', 'glittering' like gems but so light as to be mistaken for 'rays of light' such that they bend with the movement of the air in 'undulations', almost insubstantial 'like a film of silk'. The description fills the reader with amazement – the threads from the spider are 'more than a yard in length'. And then there is the mystery of where the spider goes when it is 'borne out of sight', after it 'suddenly let go its hold'. But after a careful reading of the 'Rastro' everything makes sense. The delicate construction of the spider and its threads gives it incredible power. For humans the day is hot, still and calm. But a careful observation will detect 'the effect of an ascending current of heated air' that would probably 'be sufficient to carry with it so light an object as the little spider on its thread'. The reading of the 'Rastro' combined with the poetic descriptions of wonder enable Darwin to think imaginatively, to create possible hypotheses from sense

impressions that initially seem impossible. 'The little aeronaut' anticipates the notion that nothing is static, that organisms can change and move, leading on to Darwin's theory of natural selection, and that the whole action does not have to be seen[282] in order to make a hypothesis just in the same way as the borne-away spider does not mean it no longer exists just because one can no longer see it – the observer can imagine where it has gone and how it got there based on the springy nature of the threads and on the warm air currents.

Darwin moved away from anthropocentric poetry to his own anthropomorphic prose as he felt that anthropocentric poetry gave a false sympathetic view of Nature, unlike the real world of meaningless suffering which cannot give consolation. This can be understood when comparing Wordsworth's *Ode to Duty* [1805], which refers to the death of the poet's brother John, and Tennyson's *In Memoriam* [1850], which refers to the death of his close friend Arthur Henry Hallam who was engaged to his sister Emily. Tennyson,[283] unlike Darwin, was able to find solace through the act of his sentimental writing, in a Nature that did not seem to care about human beings. From the experience of his loss, Tennyson tried to create hope and love for the wider world. Although Tennyson's description of Nature as 'red in tooth and claw' (Tennyson, 2009, LVI: 15, p. 131) is violent, he hopes

> […] that somehow good
> Will be the final goal of ill (Tennyson, 2009, LIV:1-2, p. 130)

and 'that not a worm is cloven in vain' (Tennyson, 2009, LIV:9, p. 130), which rings out an endorsement of Darwin's own celebration of the worm. For Tennyson there is hope after death, for life is infinite and will continue after death:

> My own dim life should teach me this,
> That life shall live for evermore,
> Else earth is darkness at the core,
> And dust and ashes all that is (Tennyson, 2009, XXXIV: 1 -4).

This optimistic note of infinite life is reflected in Darwin's *Buenos Ayres notebook* entry for December 1833: 'Delightful walk reflecting how many hundred years has been. [sic] how many will be' (Chancellor, 2009, p. 84, [87a]) and expanded in his *Beagle* diary entry on 28 December 1833: 'All is stillness & desolation. One reflects how many centuries it has thus been & how many more it will thus remain' (Keynes, 2009, p. 249). So although many of the

[282] As with Milton's 'blind' imagination already referred to.
[283] Darwin was introduced to Tennyson in July 1868 through the photographer Julia Cameron who rented out a house to Darwin in Freshwater on the Isle of Wight and took three photographs of him. Emma Darwin appeared to have been more excited about meeting Tennyson than Darwin was (Browne, 2003, pp. 298 – 301).

themes of Nature are similar to Darwin's, Darwin could not find any consolation for his loss by writing about it in this way.

Wordsworth's brother John died at sea on 5 February 1805, but Wordsworth did not hear about it until 11 February, the day he is known to have started writing the first stanza of *Ode to Duty* (Moorman, 1965, p. 4). Until this moment Wordsworth could be said to have an almost childlike feeling of awe for Nature and its heavenly attributes in which happiness is portrayed as

> When love is an unerring light,
> And joy its own security (Wordsworth, 2015, ll. 19 – 20).

Wordsworth's *Ode to Duty* is more akin to Darwin's way of dealing with grief than Tennyson's. Both Darwin and Wordsworth need a law maker to create a structure for their world in which to immerse themselves, away from the feelings of grief. For Darwin, who cannot find any consolation in Nature to make the death of his daughter Annie meaningful, the law maker is Nature itself. Darwin overcomes his grief by immersing himself in the study of those laws through his natural history work and publications. For Wordsworth's *Ode to Duty* it is the reaffirmation of his faith in a Deity that is linked to the creation of the laws of Nature; and this reaffirmation takes the form of 'duty' in recognising that Nature is infused with divinity:

> Stern Lawgiver! Yet thou dost wear
> The Godhead's most benignant grace (Wordsworth, 2015, ll. 41 - 42).

Moving on from the childlike belief that love and joy can fix all ills, 'duty' is seen as the lawgiver's structure to guide him to 'humbler functions' away from the impulses of selfishness:

> Oh, let my weakness have an end!
> Give unto me, made lowly wise,
> The spirit of self-sacrifice (Wordsworth, 2015, ll. 52 - 54).

In moving away from an anthropocentric self-centred view of the world, Wordsworth and Darwin can be said to have achieved a more objective art form. Darwin can also be said to be following 'duty'[284] in the Wordsworthian sense, in that by moving away from an anthropocentric world to an anthropomorphic world, his prose is moving towards a more selfless form of poetic science, that is less personal and more universal, benefitting mankind and science. Darwin's 'moral sense' of *ought* was influenced by Mackintosh and

[284] Darwin could be said to have been influenced by a sense of duty from both sides of the Darwin and Wedgwood families: his father Robert Darwin's sense of duty towards his patients, his uncle Jos Darwin's sense of duty as an MP fighting for the abolition of slavery, and his wife Emma's (Jos' daughter's) sense of duty in helping the poor (Healey, 2002, p. 129 and pp. 134 -6).

has already been discussed in Chapter Three. This is the same as Kant's 'duty',[285] quoted by Darwin in the *Descent,*[286] a universal 'naked law in the soul' unaffected by individual 'appetites'. Darwin's selflessness can be compared to the worm eating the earth (facts) producing castes (ideas) (Levine, 2008, pp. 290 -1). Originally the facts Darwin collected were independent of poetry (imagination and reflection) but then like the mitochondrion cell (the facts or experience) invade the single-cell organism (poetry, imagination, reflection) to transform them for ever. Darwin has a fond memory of 'pure' poetry, but once this has been transformed into an imaginative science he is unable to go back to a state of pure innocence. Like the transformed cells, Darwin was never the same again. Although this new transformed state produced his 'ideas', they affected his health through seeing the beauty and destruction of Nature, of having some of his children and friends taken away through death without purpose, without a God to fall back on, creating the emptiness of the sublime, knowing that poetry helped create his ideas but at the same time creating his emptiness bordering on despair – that Nature created Man and that Man was morally responsible for himself. Thus Darwin's feeling of nausea when attempting to read Shakespeare later in life.[287] Darwin's *Beagle* voyage was his Eden and his innocence was destroyed by his curiosity. But this move from his inner imaginative poetry through the experience of the wonder of science eradicated the self through concentrating on the detail, enabling him to merge with objective Nature (Levine, 2008, pp. 215-18; Stott, 2003, p. 142). Darwin needed to move from his own imaginative poetry to the objective poetry of science as imagination got in the way of science. For example, in the *Origin* Darwin initially doubted that the mechanism of the eye could be formed by natural selection:

[285] Although in his *Critique of Practical Reason* [1788] Kant states that the two things that fill his mind are '*the starry heavens above and the moral law within'* (Kant, 1889, p. 260), it is the 'invisible self' that 'exhibits me in a world which has true infinity'; it is through the '*intelligence'* of the person that the moral law reveals 'a life independent on animality and even on the whole sensible world'. It is this 'reaching into the infinitude' that creates this feeling of 'awe' or wonder for Kant (Kant, 1889, p. 260).

[286] 'Immanuel Kant exclaims, "Duty! Wondrous thought, that workest neither by fond insinuation, flattery, nor by any threat, but merely by holding up thy naked law in the soul, and so extorting for thyself always reverence, if not always obedience; before whom all appetites are dumb, however secretly they rebel; whence thy original?"'(Darwin citing Kant, 1836, p. 136, in Darwin, 2004, p. 120, footnote 3). This higher value of duty is a reflection of his own class, as already discussed, as Darwin believed in a hierarchy in society and a 'hierarchy of nations' (Browne, 2003, pp. 342 – 3).

[287] 'As a schoolboy I took intense delight in Shakespeare […]. I have tried lately to read Shakespeare, and found it so intolerably dull that it nauseated me' (Darwin, 1995, p. 50).

> *His reason ought to conquer his imagination;*[288] though I have felt the difficulty far too keenly to be surprised at any degree of hesitation in extending the principle of natural selection to such startling lengths [emphasis mine] (Darwin, 1985, p. 219).

Or put another way, 'Reason […] is far more imaginative […] than imagination' (Levine, 2008, p. 153). Reason reveals more of Nature's secrets than pure poetry. Although not through poetry, like Wordsworth, Darwin experiences the wonder of Nature through examining the minutiae of its general laws (Levine, 2008, pp. 214 – 15; p. 217). Science gave consolation to Darwin rather than poetry, although this science could be regarded as a kind of poetry:

> The wonder of particular details left him happiest when he was counting seeds in a pot, playing the piano for worms, germinating what he could find in bird droppings […]. Out of such potentially messy, even sordid, matter emerges the sublime, emerges new life. (Levine, 2008, p. 168).

Most importantly for the development of science is the way in which Darwin objectifies natural history through his strategy of self-effacement that leads to the removal of Man as the centre of Nature. The great comes from the ordinary. For example, the tallest cliffs are the product of slow incremental rises; life on islands starts with grubby little insects and not palms; human moral sensibility comes from the sexual activity of peacocks and peahens (Levine, 2008, p. 220).

Finally, as already discussed in Darwin's use of the 'double movement of prose', moving through wonder, explanation and then wonder again, Darwin's 'scientific self-effacement' affirms his scientific theories by using the 'not knowing as a means to affirmation' (Levine, 2011, p. 95).[289] For example, in the *Origin* Darwin marvels at the idea of extinction as something to be initially dismissed, but then marvels at our presumption to understand the 'complex contingencies' of the relationship of species – in other words, how can we assume to know so much about the complexity of species to be able to assert that extinction of species is not possible? (Levine, 2011, pp. 95 - 6):

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[288] Another example of Darwin's 'double movement of prose' – that is, reason offers a rational explanation to something that initially appears both wondrous and impossible. But such a rational explanation also creates a feeling of wonder that such a thing is possible.

[289] Whereas Darwin's 'double movement of prose' creates a unity of consciousness through a bringing together of wonder and explanation in the same temporal moment, Wordsworth's 'double consciousness' (exemplified in *The Prelude*) reflects a fissure between two consciousnesses belonging to two time periods, childhood and manhood. The older Wordsworth cannot quite recover the former mind of his childhood. All he can experience is his present self and 'some other Being': 'The vacancy between me and those days/Which yet have such self-presence in my mind/That, sometimes, when I think of it, I seem/Two consciousnesses, conscious of myself/And of some other Being' (Wordsworth, 1970, Book ii, lines 29 – 33).

> The manner in which single species and whole groups of species become extinct, accords well with the theory of natural selection. We need not marvel at extinction; if we must marvel, let it be at our presumption in imagining for a moment that we understand the many complex contingencies, on which the existence of each species depends. If we forget for an instant, that each species tends to increase inordinately, and that *some check is always in action, yet seldom perceived by us*, the whole economy of nature will be utterly obscured. Whenever we can precisely say why this species is more abundant in individuals than that; why this species and not another can be naturalised in a given country; then, and not till then, we may justly feel surprise why we cannot account for the extinction of this particular species or group of species [emphasis mine] (Darwin, 1985, p. 325).

Like the spider being borne away mysteriously by the wind, there are hidden causes; but careful observation and reading of the 'Rastro' together with imagination can help form hypotheses. Just because the causes cannot be seen[290] does not mean they do not exist. The same applies to extinctions which can never be directly experienced but can, through the 'Rastro' be imagined. As Darwin is at great pains to point out, '*some check is always in action, yet seldom perceived by us*'. Imagination tempered with reason is required to fill the gap in knowledge. This enabled Darwin to develop his theory of natural selection.

4.04 Man's Shared 'Intelligence' with Lowly Creatures: Darwin's Imaginative Ability of Being Able to See Larger Systems through the Detail of Smaller Organisms

The imagination is another example of Romantic Mind coming from matter. But the common consciousness shared between Man and animals also reflects a sympathy towards organisms at all stages of development that share a common structure, common laws and a common history. And this feeling of sympathy towards other creatures, as shown in Chapter Three, is a feeling at a higher level of development that helps cement Man's own morality. In his *Journal,* Darwin's attention to detail makes him see that life did not originate from the heavenly exotic forms of plants such as palms but from the sordid and unpleasant, such as dirt-feeding parasites, spiders and dung. When approaching the Cape de Verd Islands on February 16th 1832, the *Beagle* 'hove to' the Rocks of St Paul. Darwin noticed that the white colour

> is partly owing to the dung of a vast multitude of seafowl [and] under the blowpipe it decrepitates, slightly blackens, and emits a fetid odour […] and its origin without doubt is due to the action of the rain or spray on the bird's dung (Darwin, 1989, pp. 47 – 8).

This was so totally unexpected. The assumption was always that beautiful organisms originated before the less exotic. The idea that beauty came from filth seemed almost

[290] As with Milton's 'blind' imagination referred to earlier.

blasphemous (as suggested by Levine, 'in the beginning was the parasitic bug' as a replacement of 'in the beginning was the Word' would have made many Victorians feel disgust rather than awe [Levine, 2008, p. 152]). Darwin fears that

> it destroys the poetry of the story to find, that these little vile insects [such as the woodlouse living on the dung] should thus take possession before the cocoa-nut tree and other noble plants have appeared (Darwin, 1989, p. 49).

Yet this reversal of the anthropocentric view of Nature through 'anti-poetry' creates a form of excitement and wonder for Darwin that such sordid life is responsible for the exotic forests that he finds so beautiful.[291] Paradoxically, the creation of beauty from something so vile can also appear to be miraculous, but for Darwin the miracle comes from the laws of Nature and not from something Divine.

This theme of commonality between lowly beings and developed beings is emphasised in the *Origin*. Here Darwin states that their 'chemical composition', 'cellular structure' and 'laws of growth and reproduction' are the same – for a Victorian it must have been shocking[292] to imagine a human being sharing a common composition with 'vile insects', let alone a 'hairy quadruped':

> All living things have much in common, in their chemical composition, their germinal vesicles, their cellular structure, and their laws of growth and reproduction (Darwin, 1985, p. 455).

Darwin's imaginative ability through his intense Wordsworthian observations to see the larger systems through smaller organisms, like the ship's spiders, barnacles or worms (Levine, 2008, p. 147) also helps him develop his imaginative sympathy of being able to enter the minds of animals. For example, Darwin enters the minds of female birds when working out his theory of sexual selection. His own observations as a Victorian bird watcher are mirrored as he enters the 'mind' of the hypothetical person from another planet, viewing the 'pretty girl' at a rustic fair (Levine, 2008, p. 195). Levine regards Darwin's anthropomorphism as 'zoomorphism' as 'humans are animals, and therefore one can – as an animal oneself – understand non-human behaviour simply by imagining one's way into

[291] The same could be said about the writing of the *Origin* at Down House – the birth of this wondrous work came from a house filled with 'the nauseating smells from his experiments: plants rotting in green slime, skinned birds and animals' as well as 'the boiling of rancid ducks' and the vomit from 'retching that filled the house day and night' (Healey, 2002, p. 232). From filth came wondrous prose and science.

[292] Reference has already been made in Chapter Two to the Victorian feeling of anathema towards Darwin's view that Man and the Apes are related. This could equally apply to worms as they are lower down the animal chain than apes. But also 'in late-Victorian society there was a chronic underestimation of its "lowest" members: a sense that what was going on underground was at once shocking and dramatically impressive', as discovered when mining (Phillips, 1999, p. 60).

the animal's mind' (Levine, 2008, p. 197). In experiencing the wonder of the spider, the worm or the barnacle, Darwin wants to demonstrate that the wonder comes from the organism's own activity and that the wonder does not come from the thought that this activity is due to a divine creator (Levine, 2008, p. 145). That is, Darwin is not looking up to a Deity for the cause of or reverence for creation, but is looking down to the bowels of Nature itself in the form of the worm, for example. Life and death are inextricably mixed together as the earth and dead vegetable matter pass through the living worm. Darwin believed there was a continuity of consciousness between the worm and human beings: 'We can hardly escape from the conclusion that worms show some degree of intelligence'[293] (cited by Levine, 2008, p. 149). Although the worms Darwin tested were not aesthetic creatures as they did not come out of their pots when the piano was played, neither were they anaesthetic as they showed sensitivity to vibration by retreating into their burrows when placed on the piano when played (Levine, 2008, pp. 149 – 50 and Irmscher, 2004, p. 103). Such reflections seem to turn Nature inside out, making it into a bundle of opposites of what one would expect. Perhaps the greatest paradox is 'the paradox of mindlessness producing the mind that can detect it' (Levine, 2011, p. 219).

Beer makes the point that Darwin and Keats shared the same view of seeing the world through experience rather than through a pre-constructed Idea of the world, enabling them to see an all-inclusive world of diversity: 'Darwin is on Keats's side of this argument. He begins with the multifariousness of the world, is even prevailed over by it, and then uses it as both material and idea' (Beer, 1983, p. 79). Darwin draws upon his experience 'of the perceptual world because it refused the notion of precedent Idea with its concomitant assumption of preordained Design' (Beer, 1983, p. 79). Schwartz endorses this when she argues that Darwin's view of the 'multifariousness of the world' is shared by other Romantic poets, such as Coleridge[294] in his *Eolian Harp* in which the 'organic Harps diversely fram'd' refers to the whole of animated Nature in all its diversity (Schwartz, 2012, p. 196). The worm is an essential part of this diversity, symbolising 'the relative association of all life and indicative of decomposition as cultivation and preservation' (Schwartz, 2012, p. 196). This symbolism of 'decomposition as cultivation and preservation' harks back to Keats's *Isabella or, the Pot of Basil* [1818/1820]. This poem retells Boccaccio's story of Isabella who buries the head of her dead lover Lorenzo in a Basil pot, keeping her love alive

[293] From Darwin's *The Formation of Vegetable Mould through the Action of Worms* [1881].
[294] Coleridge was given financial support as a poet by Tom Wedgwood and his brother Jos, who introduced him to Goethe's *Italian Journey*. Wedgwood would have recommended this to Emma before their Grand Tour. (Healey, 2002, pp. 46 – 55; 64 – 65).

by watering it with her tears. Lorenzo had been murdered by her well-to-do brothers for courting above his station. Isabella eventually dies of a broken heart when her brothers take the pot away from her. This poem is not about worms as such but figuratively refers to decay, as in 'Ah! Wherefore all this wormy circumstance?' (Keats, 1969, p. 54, XLIX), as well as fertility in the form of the lover's head which will feed the Basil plant through its decomposition, along with Isabella's tears. Although this is a poem about undying love and a love that is regenerated through death, it is also about the constancy of life that continues through death.[295] It also conveys the merging of forms through the transmutation of the dead head of animal life into the plant life of the Basil. There is also the transformation of what is vile into what is beautiful. When the head was found in the pot by the brothers, 'the thing was vile with green and livid spot' (Keats, 1969, p. 57. LX). But it was this decomposition which had given the pot of Basil its beauty and made it sweet. Likewise, the action of Darwin's worms are 'like a gardener who prepares fine soil for his choicest plants'.[296] Schwartz argues that such worm work can also be taken metaphorically 'as vermicular reading, a "sift[ing]" or breaking down of meaningful "particles" of thought only to be "mingle[d] … intimately together" to form a rich humus of ideas – at once unstable and stabilizing' (Schwartz, 2012, p. 197). This echoes Darwin's 'Rastro' on two levels: firstly, earth worms leave behind physical evidence of their work, such as casts or the movement of stones and leaves in the same way as glaciers and earthquakes leave behind evidence of their actions; and secondly, the 'Rastros' of Darwin's work – that is, the workings of his imagination in creating his theories through the sifting of the histories of geology, plant life and animal life. And as a mirror to this history are the 'Rastros' of this thesis, working through Darwin's 'Rastros', creating further worm-like casts within a new narrative. But, suffice it to say that, Darwin's 'Rastros' may also be seen within the context of other naturalist travel writing that he would have been familiar with, providing their own 'Rastros'; for example, works by George Forster (*A Voyage Round the World in His Britannic Majesty's Sloop Resolution, Commanded by Capt. James Cook, during the Years, 1772, 3, 4, and 5 [1777])*, Joseph Banks (*The Endeavour Journal of Sir Joseph Banks*[1769]), Henry Walter Bates (*The Naturalist on the River Amazons* [1863]), or Alfred Russel Wallace (*A Narrative of Travels on the Amazon and Rio Negro* [1853]).

The influence of Victorian values has already been examined in Chapter Three, but the next section will examine the extent to which the culture of Darwin's time helped shape his

[295] Keats was consumed by the 'worms' of tuberculosis yet the beauty of his poems lives on.
[296] From Darwin's *The Formation of Vegetable Mould through the Action of Worms* [1881], cited by Schwartz, 2012, p. 197.

imagination while on the *Beagle* and upon his return to England. This 'culture' could also be seen to be wormlike in terms of the casts or 'Rastros' it leaves in Darwin's imagination.

4.05 The Extent to which Victorian Culture[297] Percolates through Darwin's Thoughts and Theories

According to Darwin's *Autobiography*, his choice of contemporary fiction[298] was determined by his desire for the appearance of 'pretty women':

> 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 a pretty woman all the better (Darwin, 1995, p. 51).

This is similar to the view presented in Coventry Patmore's poem 'The Angel in the House', already discussed in Chapter Three, which depicts the woman's role as pleasing man. The notion of a 'pretty woman' pleasing Darwin is another example of this Victorian culture. This desire for a 'pretty woman' in literature can be seen as a reflection of Darwin's own sexual desire and as a 'fall' from the elevated height of being human to the 'primitive' level of being an animal. Ironically in birds, choice is given to the female to choose the male but not in the human as women are seen as less intelligent than men and therefore men choose their women (the reversal in role is reflected by the bird feathers women wear in their hats as ornamentation). This is doubly ironic as the choice that female birds have in selecting their mates drives sexual selection, thereby creating two varieties of plumage, one for the male and one for the female (that is, dimorphism). But Darwin does not recognise this power of the female in creating dimorphism in humans; he only recognises it in animals. However, he did once imagine such a choice by way of analogy in the *Descent* when he says that a 'pretty girl' could exert such a choice over rustics at a fair (Levine, 2008, p. 195):

> With respect to female birds feeling a preference for particular males, we must bear in mind that we can judge of choice being exerted, only by analogy. If an inhabitant of another planet were to behold a number of young rustics at a fair courting a pretty girl, and quarrelling about her like birds at one of their places of assemblage, he would, by the eagerness of the wooers to please her and to display their finery, infer that she had the power of choice (Darwin, 2004, p. 473).

The aesthetic concept of 'pretty' is presented by Darwin as something that can only be appreciated by higher cultures, thus the 'savage's' sense of beauty is regarded as inferior to that of birds (Levine, 2008, p. 192):

[297] 'Victorian culture' here includes the late Georgian period before the coronation of Victoria.
[298] It might also be expected that Darwin's choice and appreciation of novels with complex plot structures would mirror his own plots and narrative structures.

> Judging from the hideous ornaments, and the equally hideous music admired by most savages, it might be argued that their aesthetic faculty was not so highly developed as in certain animals, for instance, as in birds. Obviously no animal would be capable of admiring such scenes as the heavens at night, a beautiful landscape, or refined music; but such high tastes are acquired through culture, and depend on complex associations; they are not enjoyed by barbarians or by uneducated persons (Darwin, 2004, p. 116).

Darwin is here comparing the 'savage's' culture to that of Victorian 'high' culture, which he regards as far superior and which the Victorians felt was superior to non-European cultures. This is brought out by savages' ornaments and music being described as 'hideous' and the idea that 'high tastes' cannot be 'enjoyed by barbarians or by uneducated persons'. Thus the view supported by Darwin that missionaries should change savages' culture and make them more civilized. This view was exemplified by FitzRoy's previous voyage on the *Beagle* when he captured four Fuegians in Patagonia for stealing one of his boats and took them back to England to civilize them, giving them English names. They were Fuegia Basket (Yokcushla) aged 9, Jemmy Button (Orundellico) aged 14, Boat Memory (original name unknown) aged 20 and York Minster (El'leparu) aged 26. They arrived in England in 1830. Boat Memory died of smallpox upon arrival in Plymouth. The others went to a school in Walthamstow to be educated and to learn to sing hymns. They were shown off on the London social circuit and were presented to King William IV and Queen Adelaide. In 1831 they were taken back to Patagonia by FitzRoy on the *Beagle* when it sailed with Darwin. Disappointingly for FitzRoy, Jemmy Button went back to his old life, giving up his civilized ways (Bayliss, 2012, pp. 1 -3). By today's standards, society would see such actions as a form of kidnapping, child abuse and a kind of ethnic cleansing in which the culture, language and personal identities of individuals are removed – even their names were taken away from them. But at the time of the Victorians it was quite natural to regard non-European races, as with women, as inferior. However, Levine argues that Darwin's cultural attitudes towards women were drivers in his theory of sexual selection and are not 'reflections of complicity in Victorian sexism'. He believes Darwin's cultural attitudes were driven by the concept of aesthetic taste (shared by animals and humans) (Levine, 2008, p. 178 and p. 199). If humans find the adornments of male peacocks and pheasants 'pretty', then birds must also find them 'pretty' (that humans find them 'pretty' is evidenced by women wearing feathers in their hats like Victorian birds) (Levine, 2008, p. 196). This appreciation of the 'pretty' shading of birds' feathers is also appreciated by artists (Darwin, 2004, p. 487; Levine, 2008, p. 196): 'The shading [of the ocelli on the wing-feathers of the

Argus pheasant] has excited the admiration of many experienced artists' (Darwin, 2004, p. 487).

Darwin shows that the aesthetic sense derives from animal sexuality, the root of which is female choice (Levine, 2008, p. 190). Chapters One and Two referred to references in the *Origin* in which Darwin provided evidence that the colour and patterns of male and female butterflies originated from the female form. Levine (2008, p. 179) refers to Beer's (1983) positive view of Darwin in which his Victorian attitude towards women is nevertheless rooted in the origins of female choice in animals, thus showing that Darwin's views are coloured by his culture but, at the same time, showing that he is able to break free from it to shape it. This is similar to the idea of Nature being both producer and creator – Darwin's attitudes have to an extent been shaped by the Victorian period in which he lived, but at the same time he was able to contribute towards its change through his theories.

These subtle origins of intention and dimorphism of the female form could be seen as harking back to the sixteenth-century ancient Egyptian goddess of Nature, Isis, at Saïs, also known as Artemis and Diana of Ephesus (see Plate 10). The many breasts in the image make people believe 'that she nourishes all animals and all living beings' (Hadot, 2006, p. 235). The primordial origin of life in Nature, like the mythological goddess of Nature, could be seen to have come from a female form, or in a biblical inversion, from Eve, with Adam coming from her rib. Although the *Descent of Man's* theory of evolutionary change is 'antagonistic to the idea that everything has a purpose', sexual selection can be seen to emanate from dimorphism which explains racial and sexual difference (Levine, 2008, p. 187). Female choice creates two varieties of plumage for the male and the female (Dimorphism). 'The female chooses among differences' and in so doing creates divergences which thus creates dimorphism in birds, and ultimately dimorphism in humans (Levine, 2008, p. 195). Nipples in men, for example, can be seen as a vestige of the female form, again reflecting the power of Isis. However, this shift in the power of choice from females in animals to males in humans was seen by Darwin as an evolutionary shift to a higher cultural level, thus supporting the cultural view at the time that man was superior to woman. This provides the link between Darwin's misogyny, Victorian racism and sexual selection. This shift in power of choice from females in animals to males in humans appears to justify the superiority of males in human society. Such a view at the same time seems to strengthen the already racist view that other groups in society, such as the Irish, are inferior to the English gentleman. Such a misguided view (by today's standards) is ironic, as

seeing women as 'pretty' objects of pleasure rather than seeing them as intelligent equals, helped Darwin work out his theory of sexual selection through *female choice*.

Although Darwin grades civilizations according to how they measure up to Victorian culture and refers disparagingly to some,[299] when visiting Tahiti in November 1835 he is nevertheless able to appreciate the beauty of the natives' form when their expressions appear less 'savage' and they show they are 'advancing in civilization':

> The Tahitians with their naked, tattooed bodies, their heads ornamented with flowers, and seen in the dark shade of the woods, would have formed a fine picture of man, inhabiting some primeval forest (Darwin, 1989, p. 300).

In particular, Darwin appreciates the human forms set against the background of Nature itself such as the 'heads ornamented with flowers', 'the dark shade of the woods' and the 'primeval forest' which both give a naturalistic feel to the natives but also provide an allusion to their primordial past which is also part of the narrative. This naturalistic description of the natives is further emphasised when the description of the natives and Nature blur into one, in which the forms of both are like creepers entwining one another (like Darwin's 'twiners entwining twiners' referred to earlier), creating one form, one Nature, like an 'entangled bank':

> Most of the men are tattooed; and the ornaments follow the curvature of the body so gracefully, that they have a very pleasing and elegant effect. One common figure, varying only in its detail, branches somewhat like a tuft of palm-leaves from the line of the backbone, and curls round each side. The simile may be a fanciful one, but I thought the body of a man thus ornamented, was like the trunk of a noble tree embraced by a delicate creeper (Darwin, 1989 pp. 293-4).

The tattoo 'ornaments [that] follow the curvature of the body' seem organic, as if creepers growing up a tree. The shape of one tattoo brings out the curves of the person transforming him into a palm. The 'line of the backbone' becomes the trunk of the palm with 'a tuft of palm-leaves' branching out from the base. The tattoo accentuated the shape and curves of the man such that it was difficult to know whether he was man or plant: 'the body of a man thus ornamented, was like the trunk of a noble tree embraced by a delicate creeper'. This is again very Wordsworthian in blurring the distinction between the subjective and objective in Nature through Darwin's anthropomorphic descriptions. And 'the trunk of a noble tree' anticipates Darwin's 'tree of life', with the 'noble' hinting at its primordial progenitors. This is exemplified in Wordsworth's Tintern Abbey (Wordsworth, 2015b, unnumbered page) in which he describes how his youthful memories of Nature's

[299] For example, when visiting New Zealand in December 1835, Darwin found that extensive tattooing on the natives puzzled and misled the observer, and that their 'twinkling in the eye' created the appearance of 'cunning and ferocity' (Darwin, 1989 pp. 305-6).

'beauteous forms' have worked on his adult mind during his absence, creating deeds of kindness and lifting the burden of life from his soul, enabling him to look into 'the life of things'. So powerful are these recalled memories of Nature past that he believes that the present memories of his revisit can help his sister Dorothy when she is sad, as well as provide her with memories of her brother's love of Nature when he is dead. It is the memories of Nature rather than the form of the Abbey that suffuse the scene, creating the impression of a naturalistic Abbey[300] created by the speaker, in which God, Nature and Humankind are all linked. This is a good example of how Nature 'embrace[s] not only inanimate nature but (in the true eighteenth-century tradition) human nature also, [uniting] […] the mental and material worlds' (Winkler, 1975, p. 168).

Although Darwin's assumptions regarding women during his voyage are viewed negatively by today's standards, he was nevertheless able to apply them to help him explore the origins of sexual selection through the aesthetic appreciation of beauty in Nature, its human forms and how they intertwine through their common primordial histories. The form of Man is indeed 'like the trunk of a noble tree'.

4.06 Conclusion

This chapter has demonstrated that Darwin's use of the 'Rastro' was not just a forensic examination of Nature's history but was also a focus on the details that sparked his poetic imagination, bringing the hidden elements of past time into focus showing how Nature's most developed creations came from its most humble beginnings. As Darwin showed, the first things in life on the Rocks of St Paul's were not the most exotic but were the most disgusting – beauty can come from filth.

Darwin's poetic imagination was started by reading such poets and authors as Milton, Wordsworth and Humboldt, but he created his own poetic imagination once he was on the *Beagle* and able to experience Nature poetically for himself through his own direct experiences. Through his naturalism he was then able to create a scientific imagination on a higher plane, in which an anthropocentric and egocentric world was replaced with a world with Nature at its centre. Getting into the mind of humble creatures such as spiders and worms (and recognising that they shared a form of consciousness with Man) enabled him to do this.

[300] The speaker is not at the Abbey but 'five miles' up the River Wye'. The distance emphasises the imagination.

Although Darwin carried the baggage of Victorian values[301] with him onto the *Beagle* and through his major works such as the *Origin* and the *Descent*, he was still able to penetrate the secrets of Nature through his imagination, and through his 'double movement of prose' he was able to fill his writing with wonder and therefore make it Romantic. At the same time as creating an imaginative view of Nature with mind at its centre, Darwin could also be seen as imposing order on Nature. As stated by Levine:

> Through the great sweep of Victorian thought, the Romantic idea that mind alone could and did impose order on nature because it alone could create it was certainly given great force by the very emptying mind out of nature that marked the movement of Darwin's representation of the world (Levine, 2011, p. 150).

This view mirrors Wordsworth's 'Tintern Abbey' in which the narrator feels that the ability of the mind to impose order on the world is 'abundant recompense' for what has been lost:

> That time is past,
> And all its aching joys are now no more,
> And all its dizzy raptures. Not for this
> Faint I, nor mourn, nor murmur: other gifts
> Have followed, for such loss, I would believe,
> Abundant recompense. For I have learned
> To look on nature, not as in the hour
> Of thoughtless youth (Wordsworth, 2015b, unnumbered page, lines 84 – 90).

This lost youthful experience of Nature on his first visit is compensated by a more mature imaginative view of Nature on his revisit. The same development can be seen in the lost youth of Darwin's voyage that matures into his sublime science. However, present day readers who have experienced the 'aching joys' and the 'dizzy raptures' alongside Darwin during his *Voyage of the Beagle*, may miss the uplifting nature of these experiences when reading Darwin's later narratives.

[301] These values are already expressed in embryonic form in Townsend's *Dissertation on the Poor Laws* [1786] referred to in Chapter Two, and a precursor to Smiles's *Self Help*[1859] referred to in Chapter Three.

CONCLUSION: Romantic Materialism within Romanticism

The objective of this thesis was to identify any debts that Darwin might owe the German and English Romantics in developing his ideas. On this basis the thesis has convincingly demonstrated that Darwin has been open to the influences of Romantic naturalists and poets such as Humboldt, Goethe and Wordsworth and that they have helped develop his methods and ideas. Their main influence has been to spark his imagination, to make it more aesthetic, to sharpen his perceptual awareness, to link past and present natural histories, and in so doing create hypotheses to imagine the impossible as in Darwin's 'castles in the air' (Barrett, 2008, p. 527).This can be seen in his use of the 'Humboldt Method' that combines sense impressions and the emotions to create a geographical context, Goethe's 'Genetic Method' that enables the mind to move between forms to visualise archetypes, such as the plant, as well as between present and past natural histories in order to understand their origins, and Darwin's 'Rastro' method of tracing the footprints of Nature's origins through his ability to see the interrelatedness of Nature as an organic whole. The thesis' contention is that the key concept that flows through all these Romantic methods is Mind, as all the methods are mental methods that reflect movement. The methods, as with Mind and Nature, are forever moving and are never fixed. They are mutable, forever changing and being changed. This is the paradox making all the methods recognizably Romantic. In reflecting Mind they reflect the mortal users of these methods who are born and die. Somehow the mind is constant, undying, infinite, yet at the same time finite, time-limited. The same applies to species as well as individuals. And for humans, with Mind comes morality and conscience, but whose origins come from the depths of mud, filth, parasites and ultimately matter.

But through the darkness of our past origins, Darwin lifts our being up through the wonder of the unbelievable, creating poetic science through the 'double movement of prose'. The poetic descriptions of the spiders, for example, make the reader empathise with creatures who could have been our ancestors, enabling the reader to enter their minds, realising the commonality of being[302] that all creatures share. This creates a common feeling of sympathy, enabling the mind to fathom the origins of the development of Mind and morality. It also helps create a world in which Man is part of and not the centre of the world. Although this evolutionary view of the world can create a feeling of fear through the thought of the sublime, of which individual humans are but a finite part of the infinite

[302] Or Darwin's continuum of 'consciousness', as discussed in Chapter Four.

whole,[303] it also creates a feeling of wonder and comfort that all of mankind is a part of this shared world, this 'entangled bank', this 'web of affinities'.

Darwin's respect for humans of all races has already been referred to with regard to his opposition to slavery. The same applies to his respect for animals and plants. Although he started out as a young man interested in shooting for shooting's sake, he only killed animals if it benefitted his research. Darwin supported vivisection, as long as animals were treated humanely, as he believed such research benefitted mankind.[304] Darwin's view of Nature could be regarded as Romantic as plant life and animal life offered a window into Man's past. This applied equally to the most beautiful and the most sordid as they all participate in the cycle of life, death and regeneration. This can be seen particularly in Darwin's fascination with the worm. Darwin's treatment of climbing plants *as if* they have brains and his treatment of worms *as if* they are conscious is similar to Kant's '*as if*' clause referred to in Chapter Two in which his *intellectus archetypus* refers to Nature *as if* it were caused by God even if this could not be proved. Giving all living things the benefit of the doubt of having consciousness enables Darwin to conduct such experiments of playing music to worms and thus stretching his scientific imagination to its limits.

The thesis set out to determine whether Darwin owed the Romantics a debt and whether he could in any way be regarded as a Romantic. The thesis has clearly shown that he believed Nature was both creator and product and that Man, and therefore Mind, evolved from its material past. It has also been demonstrated that the observer of Nature is also a part of Nature as the Mind doing the observing has been created by Nature. The sense impressions of Nature and the emotions created by them are therefore mirror images of each other. The same applies to Man's experience of a finite object of Nature such as a leaf, and its infinite representation in the form of an archetype that goes beyond that of a species. The Mind is here, paradoxically, Romantically material as it moves between finite and infinite forms, and in so doing is shaped by both the physical sense impressions (for example by the finite leaf) and the mental stimuli they produce (for example by the leaf archetype). Nature is therefore in part a mental construct made up of the history of species (interpreted by Man through his experience of those 'Rastros' or histories) in addition to Man's aesthetic interpretation of his sense impressions through written narratives such as Darwin's prose or Wordsworth's poetry. The direct experience of the 'sublime' forces of

[303] Infinite in the sense of all individuals being replaced after death by other individuals *ad infinitum* and at the same time being part of the process in which species evolve.
[304] Brown, 2003, pp. 418 – 23.

Nature is not only experienced directly through earthquakes, observing the stars or electric shocks, but also through the mental movement between the finite and the infinite as with the 'Genetic Method' of understanding the archetype of the leaf. Like Goethe's visionary experiences before him, Darwin was also able to 'see' the origins of the patterns of beauty in the Argus pheasant, and through the sight, sounds and colours of rivers and pebbles, and the origins of mountains. But these visual and tactile experiences created mental impressions which were more akin to Wordsworth's memories of childhood,[305] re-experienced and understood through the prism of adult understanding. This re-experienced past is just as much Darwin's past as the 'Rastro' footprints are those of his progenitors.

In seeking to determine whether Darwin was a Romantic, the thesis also sought to consider whether there was a contradiction in Darwin being both a 'Victorian' and a 'Romantic'. Although on first reading it might appear that Darwin believed that the Irish, the Fuegians and women were inferior to the Victorian English gentleman such as himself, he did nevertheless believe that development was possible, fitting in with his belief in transmutation, even though by today's standards this would seem patronising. Being a Victorian gentleman with his position in society, his Wedgwood wife Emma and servants, and his inherited wealth also gave him the opportunity of immersing himself in Nature as a naturalist. Also, paradoxically, as shown in Chapter Four, Darwin's Victorian attitudes towards women actually helped him formulate his theory of sexual selection.

Perhaps the most important debt that Darwin owes the Romantics is that all these methods of seeing Nature enabled him to discover some of the laws of Nature and to see beyond the veil. That Nature comes from Nature and is its centre is perhaps the most sublime revelation of all. But as already discussed, excluding the hand of a Deity in creating Nature and its laws does not necessarily exclude the possibility of a God. This form of Romantic materialism, therefore, does not have to be incompatible with faith.[306] Neither does Darwin's Victorianism have to be seen as incompatible with his Romanticism. Victorianism can be seen as a period of Man's development in time, adjusting to industrialisation and gradually implementing better reform through acts of parliament. Change can be seen as another example of Man's mental development, another aspect of Nature's development, another example of Romantic materialism.

[305] See the 'double consciousness' already referred to in *The Prelude*.
[306] As, for example, expressed by Coleridge's form of Romantic pantheism in *The Eolian Harp*, already referred to in Chapter One.

In Darwin's lifetime, the values of Victorianism were at a crossroads. Politically this was expressed by the liberal views of the Whigs and their reform bills. Darwin's liberal upbringing and social circle was exemplified by his uncle and father-in-law Jos Wedgwood who had a huge influence over him. His uncle's feeling of moral duty was reflected by his work as an MP[307] to help get the anti-slavery and other reform bills through parliament. The Victorian period was a time of change and culturally the kaleidoscopic adaptations in society were a mirror image of the evolutionary changes Darwin was describing in Nature. The transformations in society, politics, science, religion, the arts, the family and culture during the Victorian period were multi-faceted and, as such, can be compared to the plumage of the Argus pheasant Darwin so eloquently described – both the pheasant and the Victorian period can be seen as a revelation of beauty in their respective complexities but can also be seen as providing a reflection of a deep insight into the history of Man's cultural heritage. Viewed from this perspective it does not seem contradictory to regard Darwin as both a Victorian and a Romantic. Nevertheless, tensions between Darwin the Victorian and Darwin the Romantic have been identified in the thesis, and, like Blake's 'Without Contraries is no progression',[308] could be seen as a necessary ingredient to Darwin's creativity in the same way as life (optimism) and death (pessimism) are necessary co-authors of Nature. So too with Darwin the Victorian and Darwin the Romantic. Both contribute to the tapestry of Nature.

[307] Jos Wedgwood was elected as MP for Stoke-on-Trent in 1832 and stood for one term (Healey, 2002, p. 134).

[308] 'Without Contraries is no progression. Attraction and Repulsion, Reason and Energy, Love and Hate, are necessary to Human existence.

From these contraries spring what the religious call Good and Evil. Good is the passive that obeys Reason; Evil is the active springing from Energy.

Good is Heaven. Evil is Hell' (Blake, 2015, unnumbered page, l.l. 2–4).

REFERENCES

Primary Sources

Barrett, Paul H. et al (2008) *Charles Darwin's Notebooks, 1836 – 1844; Geology, Transmutation of Species, Metaphysical Enquiries*. London: Natural History Museum and Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2008) *Charles Darwin: The 'Beagle' Letters* [1831-6]. Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2009a) *The Correspondence of Charles Darwin. Anniversary Set 1821 – 1860. Volume 1 1821 - 1836*. Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2009b) *The Correspondence of Charles Darwin. Anniversary Set 1821 – 1860. Volume 2 1837 - 1843.* Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2009c) *The Correspondence of Charles Darwin. Anniversary Set 1821 – 1860. Volume 3 1844 - 1846.* Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2009d) *The Correspondence of Charles Darwin. Anniversary Set 1821 – 1860. Volume 4 1847 - 1850.* Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2009e) *The Correspondence of Charles Darwin. Anniversary Set 1821 – 1860. Volume 5 1851 - 1855.* Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2009f) *The Correspondence of Charles Darwin. Anniversary Set 1821 – 1860. Volume 6 1856 - 1857.* Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2009g) *The Correspondence of Charles Darwin. Anniversary Set 1821 – 1860. Volume 7 1858 - 1859.* Cambridge: Cambridge University Press.

Burkhardt, Frederick (ed.) (2009h) *The Correspondence of Charles Darwin. Anniversary Set 1821 – 1860. Volume 8 1860.* Cambridge: Cambridge University Press.

Chancellor, Gordon and Van Wyhe, John (transcribed, edited and introduced by) (2009) *Charles Darwin's Notebooks from the Voyage of the 'Beagle'* [1831 – 1836]. Cambridge: Cambridge University Press.

Darwin, Charles (1880) *The Power of Movement in Plants* [1880]. Assisted by Francis Darwin. London: John Murray.

Darwin, Charles (1909) *The Foundations of the Origin of Species: Two Essays* [1842 and 1844], ed. Frances Darwin. Cambridge: Cambridge University Press.

Darwin, Charles (1962) *Voyage of the Beagle[1839].* [1845, second edition, edited by Leonard Engel]. New York: Doubleday Anchor.

Darwin, Charles (1985) *The Origin of Species [1859*, first edition]. [Edited with an introduction by J.W. Burrow]. London: Penguin.

Darwin, Charles (1989) *Voyage of the Beagle* [1839, first edition]. [Edited and abridged with an introduction by Janet Browne and Michael Neve]. London: Penguin Classics.

Darwin, Charles (1995) 'Autobiography' In Darwin, Francis , *The Life of Charles Darwin*, London: Senate, pp. 5-54 (see Secondary Sources).

Darwin, Charles (2002) *Autobiographies* ('An autobiographical fragment' first published in 1903, and 'Recollections' first published in 1887). Edited by Michael Neve and Sharon Messenger. London: Penguin Classics.

Darwin, Charles (2003) *The Voyage of H.M.S. Beagle* [1839]. [1860, third edition, with an introduction by Richard Keynes]. London; The Folio Society.

Darwin, Charles (2004) *The Descent of Man, and Selection in Relation to Sex* [1871]. [1879, second edition reprint, with an introduction by James Moore and Adrian Desmond]. London: Penguin Classics.

Darwin, Charles (2008) *The Descent of Man, and Selection in Relation to Sex* [1871]. [1877, second edition, with an introduction by Richard Dawkins (2003)]. London: Folio Society.

Darwin, Charles and Wallace, Alfred Russel (2008) 'On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection. By Charles Darwin, Esq., F.B.S., F.L.S., & F.G.S., and Alfred Wallace, Esq. Communicated by Sir Charles Lyell, F.R.S., F.L.S., and J.D. Hooker, Esq., M.D., V.P.R.S., F.L.S., &c. [Read July 1st, 1858.] London, June 30th, 1858'. London: Linnean Society.

Darwin, Charles (2009a) *Charles Darwin's Beagle Diary (1831 – 1836)* [1839]. Sioux Falls: Ezreads Publications LLC.

Darwin, Charles (2009b) *The Expression of the Emotions in Man and Animals* [1872]. [1998, third edition, with an Introduction, Afterword and Commentaries by Paul Ekman]. London: Harper P Darwin, Charles (2009b) Charles Darwin's Beagle Diary (1831 – 1836) [1839]. Sioux Falls: Ezreads Publications LLC.erennial.

Darwin, Charles and Wallace, Alfred Russel (2008) 'On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection' [1858], *The Linnean Society of London: The Linnean Special Issue Number 9: The Survival of the Fittest: Celebrating the 150th anniversary of the Darwin-Wallace theory of evolution*, edited by Brian Gardiner, Richard Milner and Mary Morris.

Darwin Correspondence Project (2014a) 'Darwin's Reading Notebooks'. University of Cambridge. Available at: http://www.darwinproject.ac.uk/darwins-reading-notebooks (Accessed: 27 March 2014).

Keynes, Richard D. (edited and introduced by) (2009) *Charles Darwin's Beagle Diary (1831 – 1836)*. [Reprinted Cambridge University Press edition 1988]. Sioux Falls USA: Ezreads Publications LLC.

Secondary Sources

Bayliss, Bill (2012) *Fuega Basket, Captain Fitzroy, Charles Darwin and The Beagle*. Available at: http://www.walthamstowmemories.net/pdfs/Bill%20Bayliss%20-%20Fuegia%20Basket.pdf (Accessed on 12 March 2015).

Beer, G. (1983) *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot, and Nineteenth-Century Fiction*. Cambridge: CUP.

Beer, G. (2010) 'Darwin and Romanticism', *The Wordsworth Circle*, Vol. 41, Issue 1 – Winter 2010, pp. 3 – 9.

Bellis, Mary, (2013) *History of Photography*. Available at: http://inventors.about.com/od/pstartinventions/a/stilphotography.htm (Accessed on 16 April 2013).

Blake, William (2015) 'The Marriage of Heaven and Hell' [1790 – 1793]. Available at: http://www.bartleby.com/235/253.html (Accessed on 20 October 2015).

Bowie, Andrew (2003) *Aesthetics and Subjectivity: from Kant to Nietzsche*. Manchester and New York: Manchester University Press.

Botting, Douglas (1973) *Humboldt and the Cosmos*. London: Sphere Books.

Brooke, John Hedley (2003) 'Darwin and Victorian Christianity' in Jonathan Hodge and Gregory Radick (ed.) *The Cambridge Companion to Darwin*. Cambridge: Cambridge University Press.

Brooklyn College (2011) 'The Angel in The House'. The City University of New York. Available at: http://academic.brooklyn.cuny.edu/english/melani/novel_19c/thackeray/angel.html. Accessed on 12 June 2014.

Broughton, Trev Lynn (1999) *Men of letters, writing lives: masculinity and literary auto/biography in the late Victorian period.* London: Routledge.

Browne, Janet (2003a) *Charles Darwin: Voyaging*. London: Pimlico.

Browne, Janet (2003b) *Charles Darwin: The Power of Place*. London: Pimlico.

Buckland, Raymond (2005) *The Spirit Book: The Encyclopedia of Clairvoyance, Channeling, and Spirit Communication.* Canton, MI, USA: Visible Ink Press.

Bumblebee Conservation Trust (2013) *Bumblebee Nests*. Available at: http://bumblebeeconservation.org/about-bees/faqs/bumblebee-nests/ (Accessed on 04 April 2013).

Burke, Edmund (2010) *Reflections on the French Revolution* [1790]. Available at: http://socserv.mcmaster.ca/econ/ugcm/3113/burke/revfrance.pdf (Accessed on 08 November 2010).

Burns, J. H. (2005) 'Happiness and utility: Jeremy Bentham's Equation' in *Utilitas*, 17, pp. 46 – 61.

Burrow, J. W. (1985) 'Note on this Edition' in Darwin, Charles *The Origin of Species* [1859]. London: Penguin.

Chambers, Robert (2010) *Vestiges of the Natural History of Creation* [1844]. Memphis, Tennessee: General Books.

Clark, J. W. and Hughes, T. M. (1890) *The Life and Letters of Adam Sedgwick*, 2 Vols. Cambridge: Cambridge University Press.

Coleridge, Samuel Taylor (2013) *The Eolian Harp* [1795]. Poetry Foundation. Available at: http://www.poetryfoundation.org/poem/183957/ (Accessed on 05 November 2013).

Conrad, Joseph (1976) *Heart of Darkness [1899]* and *Typhoon*. London: Pan Books.

Coplestone, Frederick (1967) *A History of Philosophy Volume VIII. Modern Philosophy: Bentham to Russell. Part I. British Empiricism and the Idealist Movement in Great Britain*. New York: Image Books.

Darwin, Francis (1995) *The Life of Charles Darwin*. London: Senate.

Davidson, Paul G. (2012) *Evolution is the Core of Modern Taxonomy (Systematics)*. Available at: http://www.buildingthepride.com/faculty/pgdavison/BI%20101/evolution_is_the_core_of_modern_.htm (Accessed on 06 December 2012).

Desmond, Adrian and Moore, James (2004). 'Introduction' in Darwin, Charles (2004) *The Descent of Man, and Selection in Relation to Sex* [1879, second edition]. London: Penguin Classics.

Desmond, Adrian and Moore, James (2009) *Darwin*. London: Penguin Books.

Desmond, Adrian and Moore, James (2010) *Darwin's Sacred Cause: Race, Slavery and the Quest for Human Origins*. London: Penguin Books.

Dunkerton, J. and Howard, H. (2009) 'Sebastiano del Piombo's "Raising of Lazarus": A History of Change'. *National Gallery Technical Bulletin*, Vol. 30, pp. 26–51.

Encyclopaedia Britannica (2014) 'Longinus'. Available at: http://www.britannica.com/EBchecked/topic/347517/Longinus (Accessed on 31 March 2014).

Encyclopaedia Britannica (2015) 'Alexander von Humboldt'. Available at: http://www.britannica.com/biography/Alexander-von-Humboldt (Accessed on 22 September 2015).

Encyclopaedia Britannica (2015b) 'Biogenetic Law). Available at: http://www.britannica.com/science/biogenetic-law (Accessed on 23 October 2015).

European Graduate School, The (2015) 'Ernst Haeckel – Biography'. Available at: http://www.egs.edu/library/ernst-haeckel/biography/ (Accessed on 23 October 2015).

Fara, Patricia (2003) *Sex, Botany and Empire*. Cambridge: Icon Books UK.

Farnell, Gary (1999) 'Wordsworth's *The Prelude* as Autobiography of An Orphan', *Romanticism on the Net*, Number 13, February 1999, pp 1 – 10. Available at: http://www.erudit.org/revue/ron/1999/v/n13/005847ar.html (Accessed on 11 June 2014).

Ferguson, Alfred P. (ed.) (1964) *The Journals and Miscellaneous Notebooks of Ralph Waldo Emerson*. Cambridge, Mass.: Harvard University Press.

Gaul, Marilyn (1979) 'From Wordsworth to Darwin: "On to the Fields of Praise"', *The Wordsworth Circle*, Vol. 10, Issue 1 – Winter 1979, pp. 33 - 48.

Goethe, Johann Wolfgang von (1949) 'The Metamorphosis of Plants' in, Rudolf Magnus (1949), *Goethe as a Scientist*, translated by Heinz Norden. New York: Henry Schuman, 1949.

Goethe, Johann Wolfgang von (1970) *Italian Journey* [1786 – 1788]. [Translated by W. H. Auden and Elizabeth Mayer]. London: Penguin.

Goethe, Johann Wolfgang von (1985 – 98) 'Die Faultiere und die Dickhäutigen,' *Zur Morphologie*, in *Sämtliche Werke nach Epochen seines Schaffens* (Münchner Ausgabe). Ed. Karl Richter et al. 21 vols. Munich: Carl Hanser Verlag.

Goethe, Johann Wolfgang von (1985 – 98b) *Erster Entwurf einer allgemeinen Einleitung in die vergleichende Anatmie, ausgehend von der Osteologie*, in *Sämtliche Werke nach Epochen seines Schaffens* (Münchner Ausgabe). Ed. Karl Richter et al. 21 vols. Munich: Carl Hanser Verlag.

Goethe, Johann Wolfgang von (1985 – 98c) *Tag- und Jahres-Hefte* [1790] in *Sämtliche Werke nach Epochen seines Schaffens* (Münchner Ausgabe). Ed. Karl Richter et al. 21 vols. Munich: Carl Hanser Verlag.

Goethe, Johann Wolfgang von (1988) 'Studies for a Physiology of Plants,' in *Scientific Studies*, edited and translated by Douglas Miller. New York: Suhrkamp, 1988.

Goethe, Johann Wolfgang von (1998) *Goethes Briefe* (Hamburger Ausgabe). Ed. Karl Robert Mandelkow. 4th ed. 4 vols.Munich: C. H. Beck.

Goethe, Johann Wolfgang von (2009) *The Metamorphosis of Plants* [1790]. [Introduction and photography by Gordon L. Miller]. London: The MIT Press.

Hadot, Pierre (2006) *The Veil of Isis*. London: The Belknap Press of Harvard University Press.

Hall, T. D. (1995) 'Influence of Malthus and Darwin on the European Elite'. Available at: www.trufax.org/avoid/manifold.html (Accessed on 25 October 2010).

Halmi, N. (2012) 'Coleridge's Ecumenical Spinoza'. Available at: https://www.erudit.org/revue/ravon/2012/v/n61/1018604ar.html (Accessed on 20 October 2015).

Healey, Edna (2002) *Emma Darwin: The Inspirational Wife*. London: Review/Headline Book Publishing.

Herbert, Sandra and Barrett, Paul H. (2008) 'Notebook M Introduction' in Barrett, Paul H. et al (2008) *Charles Darwin's Notebooks, 1836 – 1844; Geology, Transmutation of Species, Metaphysical Enquiries*. London: Natural History Museum and Cambridge: Cambridge University Press.

Herbert, Sandra and Kohn, David (2008) 'Introduction' in Barrett, Paul H. et al (2008) *Charles Darwin's Notebooks, 1836 – 1844; Geology, Transmutation of Species, Metaphysical Enquiries*. London: Natural History Museum and Cambridge: Cambridge University Press.

Hodge, J. (2003) 'The notebook programmes and projects of Darwin's London years' in Jonathan Hodge and Gregory Radick (ed.) *The Cambridge Companion to Darwin*. Cambridge: Cambridge University Press, pp. 40 – 68.

Holmes, Richard (2009) *The Age of Wonder*. London: Harper Press.

Hulme, T. E. Hulme (1911) 'Romanticism and Classicism'. Available at: http://www.poetryfoundation.org/learning/essay/238694 (Accessed on 17 Nov 2011).

Humboldt, Alexander von (1806) *Beobachtungen aus der Zoologie und vergleichenden Anatomie: Gesammelt auf einer Reise nach den Tropen-Ländern des neuen Kintinents*. Tübingen: F. G. Cotta.

Humboldt, Alexander von (1849 – 70) *Cosmos: A Sketch of a Physical Description of the Universe*. Translated by E. C. Otté. 5 vols [1845 – 61]. London: Henry G. Bohn.

Humboldt, Alexander von (1995) *Personal Narrative* [1799 – 1804]. [Abridged and Translated by Jason Wilson]. London: Penguin.

Humboldt, Alexander von (1997) *Cosmos: A Sketch of a Physical Description of the Universe* Volume 1 [1845] [Translated by E. C. Otté; Introduction by Nicolaas A. Rupke]. Baltimore and London: The John Hopkins University Press.

Hurley, Chris (2009) 'Charles Darwin and Evolution 1809 – 2009'. Christ's College, Canbridge. Available at: http://darwin200.christs.cam.ac.uk/pages/index.php?page_id=f3 (Accessed on 17 June 2014).

Huxley, T. E. (2004) 'Note on the resemblances and differences in the structure and the development of the brain in man and apes' pp. 230 – 240, in Darwin, Charles *The Descent of Man, and Selection in Relation to Sex* [1879, second edition]. London: Penguin Classics.

Irmscher, Christoph (2004) 'Darwin's Beard' in Jansohn, Christa (ed.) (2004) *Old Age and Ageing in British and American Culture and Literature*. Muenster: LITVerlag, 2004, pp. 87 – 105.

Jimack, P. D. (1993) 'Introduction' in Rousseau, Jean-Jacques (1993) *Emile or on Education* [1762]. London: Everyman, J.M. Dent.

Johnson, Eric Michael (2012a) 'Raising Darwin's Consciousness: An Interview with Sarah Blaffer Hrdy on Mother Nature'. *Scientific American*, pp. 1 – 4. Available at: http://blogs.scientificamerican.com/primate-diaries/2012/03/16/raising-darwins-consciousness-an-interview-with-sarah-blaffer-hrdy-on-mother-nature/?print=true (Accessed on 20 June 2014).

Johnson, Eric Michael (2012b) 'Raising Darwin's Consciousness: Sarah Blaffer Hrdy on the Evolutionary Lessons of Motherhood'. *Scientific American*, pp. 1 – 4. Available at: http://blogs.scientificamerican.com/primate-diaries/2012/03/16/raising-darwins-consciousness-sarah-blaffer-hrdy-on-the-evolutionary-lessons-of-motherhood/ (Accessed on 20 June 2014).

Jones, Steve (2009) *Darwin's Island: The Galapagos in the Garden of England*. London: Little, Brown.

Kant, Immanuel (1836) *Metaphysics of Ethics*, translated by J. W. Semple. Edinburgh: Thomas Clark.

Kant, Immanuel (1889) *Critique of Practical Reason* [1788]. Translated by Thomas Kingsmill Abbot [fourth edition]. London: Longman.

Kant, Immanuel (1912) *Briefwechsel von Imm. Kant in drei Bänden*. Ed. H. E. Fischer, 3 vols. Munich: Georg Müller.

Kant, Immanuel (1957) *Kritik der Urteilskraft [Critique of Judgement, 1790]*, in *Immanuel Kant Werke*. Ed. Wilhelm Weischedel, 6 vols. Wiesbaden: Insel Verlag.

Kant, Immanuel (1957b) *Prolegomena zu einer jeden künftigen Metaphysik dies als Wissenschaft wird auttreten können* [1783], in *Immanuel Kant Werke.* Ed. Wilhelm Weischedel, 6 vols. Wiesbaden: Insel Verlag.

Kant, Immanuel (1914) *Critique of Judgement* [1790]. Translated by J. H. Bernard (1892). Second revised edition. Available at: http://oll.libertyfund.org/titles/1217 (Accessed on 22 October 2015).

Keats, John (1969) 'Isabella or, The Pot of Basil' in Gillham, D. G. (ed) *John Keats Poems of 1820 and The Fall of Hyperion*. London: Collins.

Keynes, R. D. (ed.) (1988) *Charles Darwin's Beagle Diary*. Cambridge: Cambridge University Press.

Kreis, Steven (2009a) 'The History Guide: Lectures on Modern European Intellectual History. Lecture 16: The Romantic Era'. Available at: http://www.historyguide.org/intellect/lecture16a.html (Accessed on 08 December 2010).

Kreis, Steven (2009b) 'The History Guide: Lectures on Modern European Intellectual History. Lecture 9: Écrasez l'infâme!: The Triumph of Science and the Heavenly City of the 18th Century Philosophe'. Available at: http://www.historyguide.org/intellect/lecture9a.html (Accessed on 08 December 2010).

Lack, Walter H. (2009) *Alexander von Humboldt and the Botanical Exploration of the Americas*. London: Prestel Publishing.

Landow, G.P. (2013) 'Evolutionary Theory before Darwin'. *The Victorian Web*. Available at: http://www.victorianweb.org/science/darwin/darwin2.html (Accessed on 19 November 2013).

Larrimore, Mark (2008) 'Antinomies of race: diversity and destiny in Kant', *Patterns of Prejudice*, Vol. 42, Nos 4 – 5, pp. 341 – 363.

Levine, George (2008) *Darwin Loves You*. Princeton and Oxford: Princeton University Press.

Levine, George (2011) *Darwin the Writer*. Oxford: Oxford University Press.

Lyell, Charles (1977) *Principles of Geology* [1830-33]. [Edited by James A. Secord]. London: Penguin Books.

Lyons, Eric and Butt, Kyle (2013) 'Darwin, Evolution and Racism'. Apologetics Press. Available at: http://www.apologeticspress.org/apcontent.aspx?category=9&article=2654/ (Accessed on 12 November 2013).

Mackintosh, James (1837, second edition) *Dissertation on the Progress of Ethical Philosophy, Chiefly During the Seventeenth and Eighteenth Centuries*. Edinburgh: Adam and Charles Black.

Malthus, Thomas R. (2008) *An Essay on the Principle of Population* [1798]. Oxford: Oxford University Press.

Man, Paul de (1993) 'Time and History in Wordsworth', reprinted from *Diacritics*, 17/4 (Winter,1987), 4 – 17, in Cynthia Chase (ed.), *Romanticism*, Longman Critical Readers. London: Longman.

Markby, Thomas (1863) *In the Two books of Francis Bacon: Of the Proficience and Advancement of Learning, Divine and Human* [1605]. London: J. W. Parker & Son.

McCrory, Donald (2010) *Nature's Interpreter: The Life and Times of Alexander von Humboldt*. Cambridge: The Lutterworth Press.

McGrew, William (2009) 'With a Little Help from My Friends'. *American Scientist* pp. 1-2. Available at: http://www.americanscientist.org/bookshelf/pub/with-a-little-help-from-my-friends (Accessed on 20 June 2014).

Melani, Lilia (2009) 'Romanticism'. English Department, Brooklyn College. Available at: http://academic.brooklyn.cuny.edu/english/melani/cs6/rom.html (Accessed on 09 December 2010).

Messer, Neil (2014) 'Contributions from Biology'. *Oxford Handbooks Online*, pp. 1 – 17. Available at: www.oxfordhandbooks.com (Accessed on 18 June 2014).

Miller, Gordon L., (2009) 'Introduction' in *Goethe, Johann Wolfgang von (2009) The Metamorphosis of Plants* [1790]. [Introduction and photography by Gordon L. Miller]. London: The MIT Press.

Montagu, Ashley (1971) in 'Forward' to Townsend, Joseph (1971) *Dissertation on the Poor Laws: By a Well-wisher to Mankind* [1788]. London: University of California Press.

Moorman, Mary (1965) *William Wordsworth: The Later Years 1803 – 1850*. Oxford: Oxford University Press.

Myers, F. W. H. (1899) *Wordsworth* [English Men of Letters series edited by John Morley]. London: Macmillan and Co., Limited.

National Gallery (2014) *The Raising of Lazarus.* Available at: http://www.nationalgallery.org.uk/paintings/sebastiano-del-piombo-the-raising-of-lazarus (Accessed on 13 May 2014).

Nichols, Ashton (ed) (2004) *Romantic Natural Histories*. Boston & New York: Houghton Mifflin Company.

Nicolsen, Malcolm (1995) 'Historical Introduction' in Humboldt, Alexander von, abridged and translated by Jason Wilson. *Personal Narrative* [1799-1804]. London: Penguin.

O'Hear, Anthony (1999) *Beyond Evolution: Human Nature and the Limits of Evolutionary Explanation*. Oxford: Oxford University Press.

O'Neill, Michael (1997) *Romanticism and the Self-Conscious Poem*. Oxford: Clarendon Press.

Owen, Richard (1847) *Report on the Archetype and Homologies of the Vertebrate Skeleton, in Report of the Sixteenth Meeting of the British Association for the Advancement of Science; held at Southampton in September 1846*. London: Murray.

Owen, Richard (1849) *On the Nature of limbs, a Discourse delivered on Friday, February 9, at an Evening Meeting of the Royal Institution of Great Britain*. London: John Van Voorst.

Page, Michael R. (2012) *The Literary Imagination from Erasmus Darwin to H. G. Wells: Science, Evolution, and Ecology.* Farnham, Surrey: Ashgate Publishing Ltd.

Patmore, Coventry (2012) 'The Angel in the House' [1854], PoemHunter.com – The World's poetry Archive. PP 52 – 145. Available at: http://www.poemhunter.com/i/ebooks/pdf/coventry_patmore_2012_3.pdf (Accessed on 12 June 2014).

Paley, William (2005) *Natural Theology or, Evidences of the Existence and Attributes of the Deity* [1802]. Landisville, Pennsylvania: Coachwhip Publications.

Phillips, Adam (1999) *Darwin's Worms*. London: Faber and Faber.

Plato (1971) *The Republic* [translated by H. D. P. Lee]. London: Penguin Books.

Qvortrup, Mads (2003) *The Political Philosophy of Jean-Jacques Rousseau: The Impossibility of Reason*. Manchester: Manchester University Press.

Radick, Gregory (2003) 'Is the theory of natural selection independent of its history?' in Hodge, J. and Radick, G. (eds) *The Cambridge Companion to Darwin*. Cambridge: Cambridge University Press, pp. 143 – 167.

Richards, J. Robert (1989) *Darwin and the Emergence of Evolutionary Theories of Mind and Behaviour*. Chicago: University of Chicago Press.

Richards, J. Robert (2000) 'Kant and Blumenbach on the Bildungstrieb: A Historical Misunderstanding', *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences,* Vol. 31, No. 1, pp.11-32.

Richards, Robert J. (2002) *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe*. Chicago and London: The University of Chicago Press.

Rogers, Kara (2009) 'Beyond Darwin: Eugenics, Social Darwinism, and the Social Theory of the Natural Selection of Humans'. *Encyclopaedia Britanica Blog.* Available at: http://www.britannica.com/blogs/2009/02/beyond-darwin-eugenics-social-darwinism-and-the-social-theory-of-the-natural-selection-of-humans/ (Accessed on 24 October 2014).

Roughgarden, Joan (2012) 'The social selection alternative to sexual selection'. *Philosophical Transactions of The Royal Society Biological Sciences*, pp. 2295 - 2303. Available at: http://rstb.royalsocietypublishing.org/content/367/1600/2294.full.pdf+html. (Accessed on 18 June 2014).

Rousseau, Jean-Jacques (1993) *Emile or on Education* [1762]. London: Everyman, J.M. Dent.

Rousseau, Jean-Jacques (2008) *The Social Contract* [1762]. Oxford: Oxford University Press.

Rupke, Nicolaas A. (1997) 'Introduction' in Humboldt, Alexander von *Cosmos: A Sketch of a Physical Description of the Universe Volume 1* [1845] [Translated by E. C. Otté;]. Baltimore and London: The John Hopkins University Press.

Sachs, Aaron (2007) *The Humboldt Current*. Oxford: Oxford University Press.

Schelling, Friedrich (1927) *System des transscendentalen Idealismus*, in *Schellings Werke*. Ed. Manfred Schröter. 3rd ed. 12 vols. Munich: C. H. Beck.

Schelling, Friedrich (1927b) *Einleitung zu Entwurf eines Systems der Naturphilosophie*, in *Schellings Werk*. Ed. Manfred Schröter. 3rd ed. 12 vols. Munich: C. H. Beck.

Schwartz, Janelle A. (2012) *Worm Work: Recasting Romanticism*. London: University of Minnesota Press.

Scofield, Martin (2003) 'Introduction' in Wordsworth, William and Coleridge, Samuel Taylor *Lyrical Ballads and Other Poems* [1801/1802].Wordsworth Poetry Library. Ware, Hertfordshire: Wordsworth Editions Limited.

Smiles, Samuel (1860) *Self-Help* [1859]. London: John Murray.

Smith, Norman Kemp (1970) *Immanuel Kant's Critique of Pure Reason*. Translated by Norman Kemp Smith [second edition]. London: Macmillan.

Stewart, Dugald (1829) *Philosophical Essays Vol IV Part 2: Essay Second: On the Sublime*. Cambridge: Hilliard and Brown.

Stott, Rebecca (2003) *Darwin and the Barnacle*. London: Faber and Faber.

Sweet, Matthew (2001) *Inventing the Victorians*. London: Faber and Faber.

Tennyson, Alfred Lord (2006) *Selected Poems*. Selection, Introduction and Notes by Ruth Padel. London: The Folio Society.

Townsend, Joseph (1971) *Dissertation on the Poor Laws: By a Well-wisher to Mankind* [1788]. London: University of California Press.

UCL (2015) *UCL Research helps paralysed man to recover function*. Available at: http://www.ucl.ac.uk/news/news-articles/1014/211014-UCL-research-helps-paralysed-man-recover-function#sthash.H0VjLXj4.dpuf (Accessed on 09 April 2015).

Uglow, Jenny (2003) *The Lunar Men: The Friends who made the Future 1730 – 1810*. London: Faber and Faber.

Vandenberg, Phyllis and DeHart, Abigail (2014) 'Frances Hutcheson (1748 – 1832)'. *Internet Encyclopedia of Philosophy*. Available at: http://www.iep.utm.edu/hutcheso/ (Accessed on 17 June 2014).

Wallace, Alfred Russel (1858) 'On the Tendency of Varieties to Depart Indefinitely from the Original Type' [1858]. Available at: http://darwin-online.org.uk/converted/published/1858_species_F350.html (Accessed on 07 February 2011).

James Davenport Welpley (1946) 'Humboldt's Cosmos', in *American Review: A Whig Journal of Politics, Literature, Art, and Science*, June, 3: 598 – 610.

Williams, Raymond (1983) *Keywords: A vocabulary of culture and society*. New York: Oxford University Press.

Wilson, Jason (1995) 'Introduction' in Humboldt, Alexander von, Personal Narrative [1799-1804]. London: Penguin.

Wilson, A. N. (2003) *The Victorians*. London: Arrow Books.

Winkler, R. O. C. (1975) 'Wordsworth's Poetry' in *The Pelican Guide to English Literature: Volume 5 From Blake to Byron*. Harmondsworth: Penguin Books.

Wohl, Anthony S. (1990) 'Racism and Anti-Irish Prejudice in Victorian England'. Available at: http://www.victorianweb.org/history/race/Racism.html (Accessed on 10 September 2014).

Wordsworth, William (1949) *Poetical Works. The Excursion* [1814] Vol V. [Edited by Ernest De Selincourt and Helen Darbishire. Oxford: Clarendon Press.

Wordsworth, William (1970) *The Prelude, or Growth of a Poet's Mind* [Text of 1805]. Edited by Ernest De Selincourt and updated by Stephen Gill. Oxford: Oxford University Press.

Wordsworth, William (2015) 'Ode to Duty' [1805]. Available at: http://www.online-literature.com/wordsworth/524 (Accessed on 05 March 2015).

Wordsworth, William (2015b) 'Lines Composed a Few Miles above Tintern Abbey, on Revisiting the Banks of the Wye during a Tour. July 13, 1798'. Available at : http://poetry.about.com/od/poems/l/blwordsworthtinternabbey.htm (Accessed on 30 April 2015).

Wordsworth, William (2015c) 'Ode: Intimations of Immortality from Recollections of Early Childhood' [1807]. Available at: http://www.poetryfoundation.org/poem/174805 (Accessed on 29 September 2015).

Wordsworth, William and Coleridge, Samuel Taylor (2003) *Lyrical Ballads and Other Poems* [1801/1802]. [Introduction and Notes by Martin Scofield]. Wordsworth Poetry Library. Ware, Hertfordshire: Wordsworth Editions Limited.

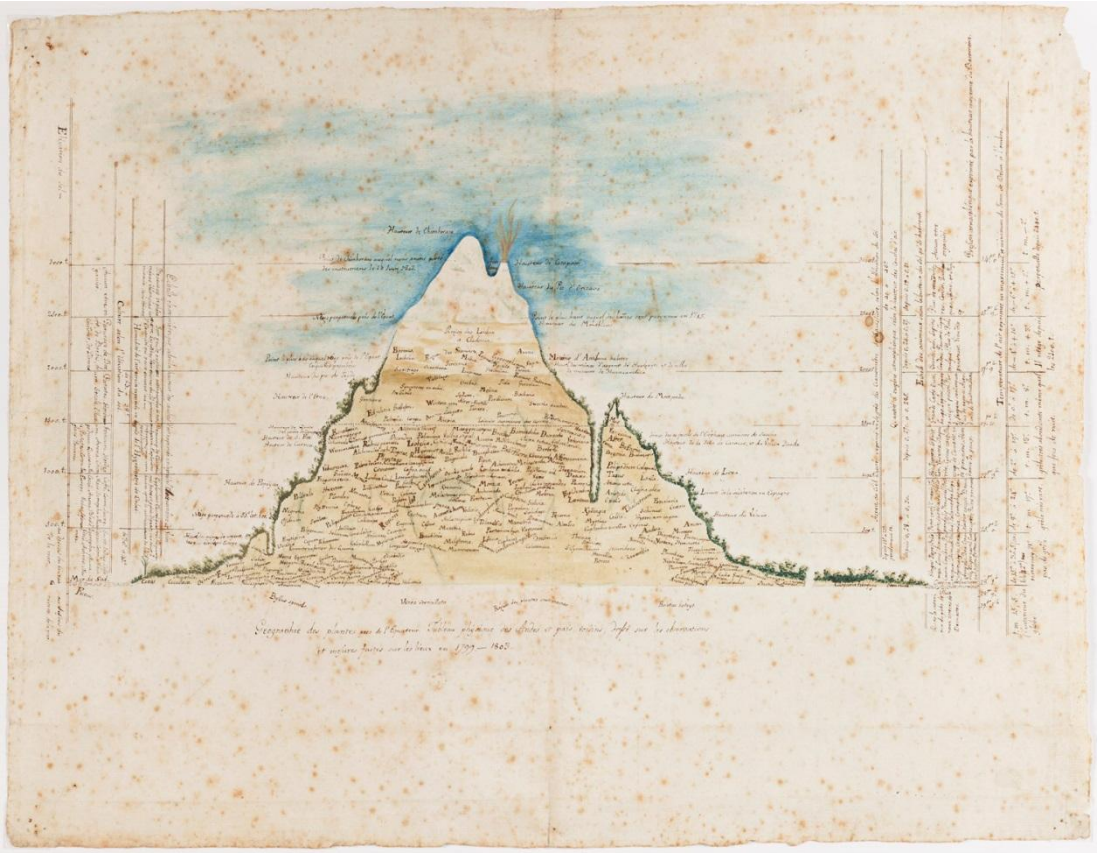
Wyhe, John van (2014) 'The Bridgewater Treatises On the Power, Wisdom and Goodness of God As Manifested in the Creation'. Available at: www.victorianweb.org/science/bridgewater.html (Accessed on 25 July 2014).

Young, Robert M. (1985) *Darwin's Metaphor: Nature's Place in Victorian Culture*. Cambridge: Cambridge University Press.

Zunjic, Robert (2014) 'Jeremy Bentham: An introduction to the *Principles and Morals of Legislation* (1789)'. Available at: http://www.uri.edu/personal/szunjic/philos/util.htm (Accessed on 16 June 2014).

APPENDIX A: PLATES 1 - 10

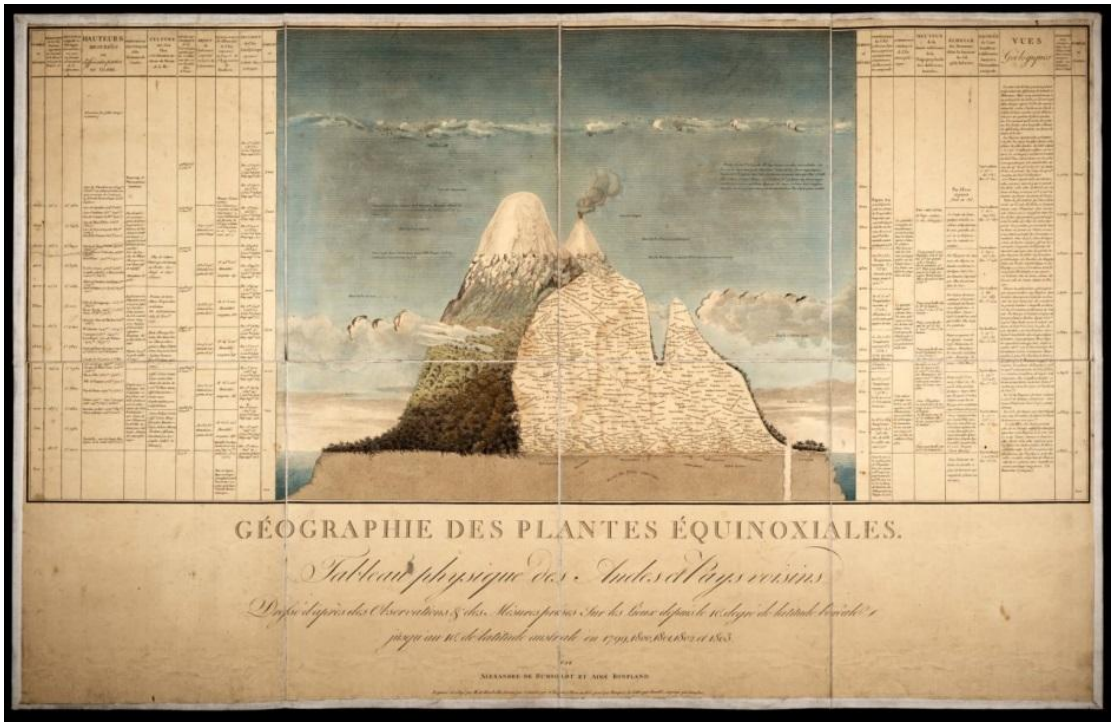
PLATE 1



A.v. Humboldt, *Geography of the Plants near the Equator*, 1803.

Alexander von Humboldt (1769/1859). Geografia de las plantas cerca del Ecuador. Tabla fisica de los Andes y paises vecinos, levantada sobre las observaciones y medidas tomadas en los lugares en 1799 – 1803, 1803. Acuarela y tinta sobre papel. 38,7 x 50,3 cm.
Reg. 1204. Colección Museo Nacional de Colombia.
Foto: ©Museo Nacional de Colombia / Ernesto Monsalve Pino.

PLATE 2

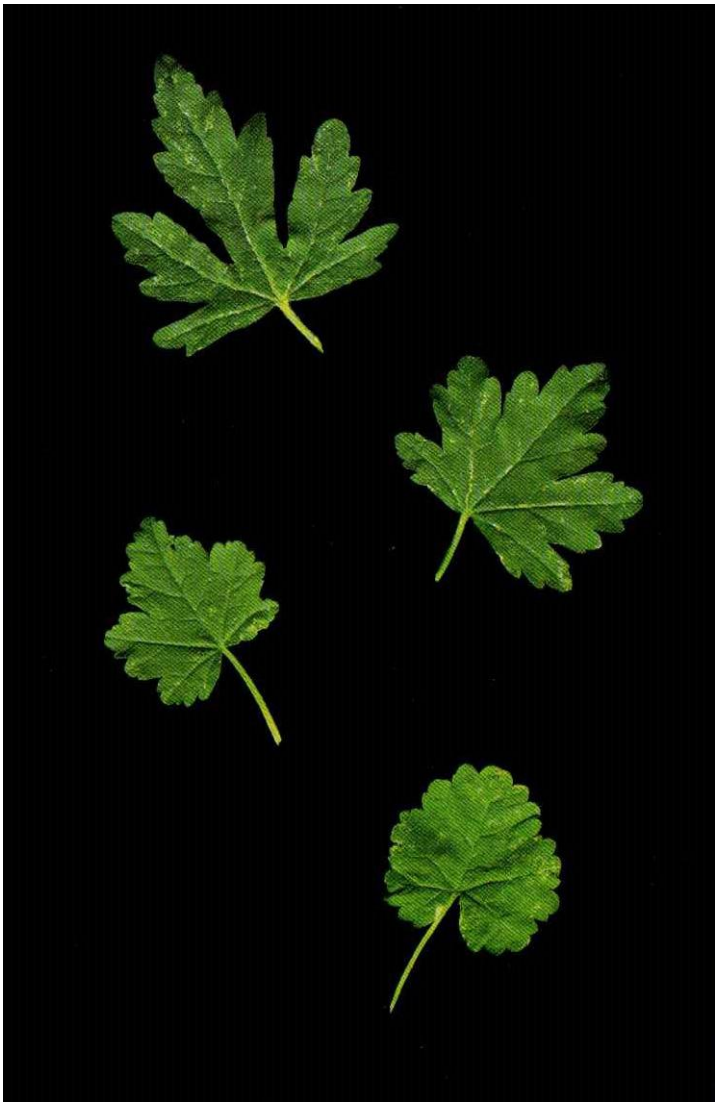


L. A. Schönberger and P. J. F. Turpin after A. v. Humboldt & A. Bonpland, *Geógraphie des plantes équinoxiales*, 1807.

Essai sur la geographie des plantes: accompagne d'un tableau physique des regions equinoxiales, fonde sur des mesures executes, depuis le dixieme degree de latitude boreale jusqu'au dixieme degree de latitude austral, pendant les annees 1799, 1800, 1801, 1802 et 1803 / par Al. de Humboldt et A. Bonpland; redigee par Al. de Humboldt.
A Paris, Chez Levrault, Schoell et compagnie, libraires, XIII – 1805.
http://www.biodiversitylibrary.org/bibliography/9309.

Item: http://www.biodiversitylibrary.org/item/37872 Page(s): Page 156.

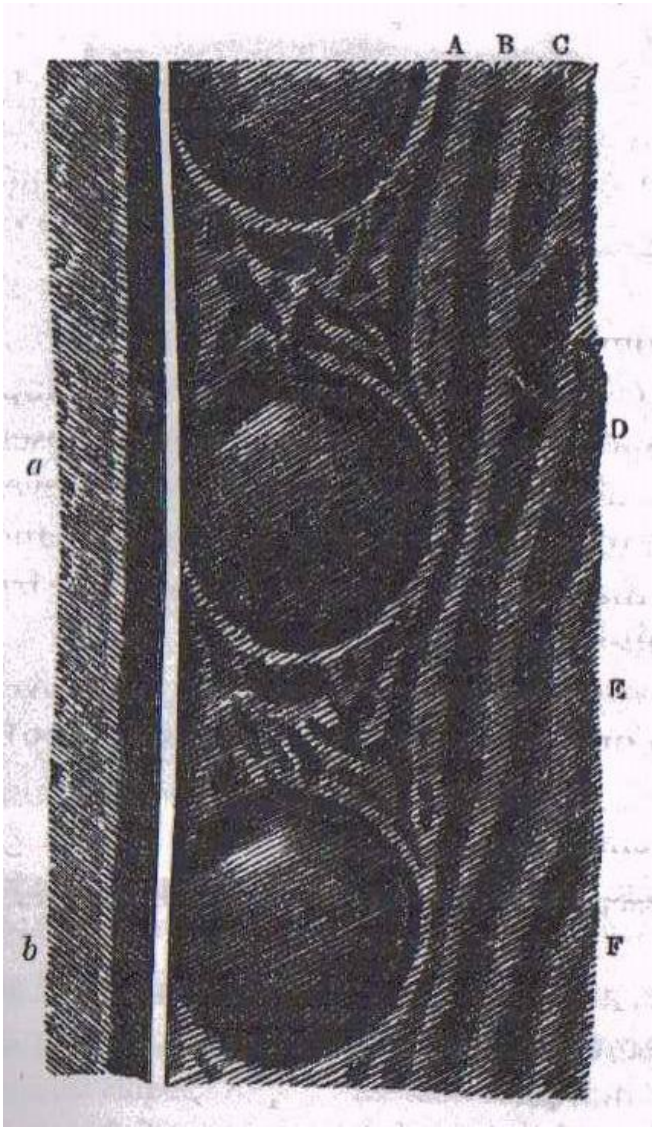
PLATE 3



Leaf Sequence in Sidalcea Malviflora.

From Miller, 2009, Image 55, p. 107.

PLATE 4



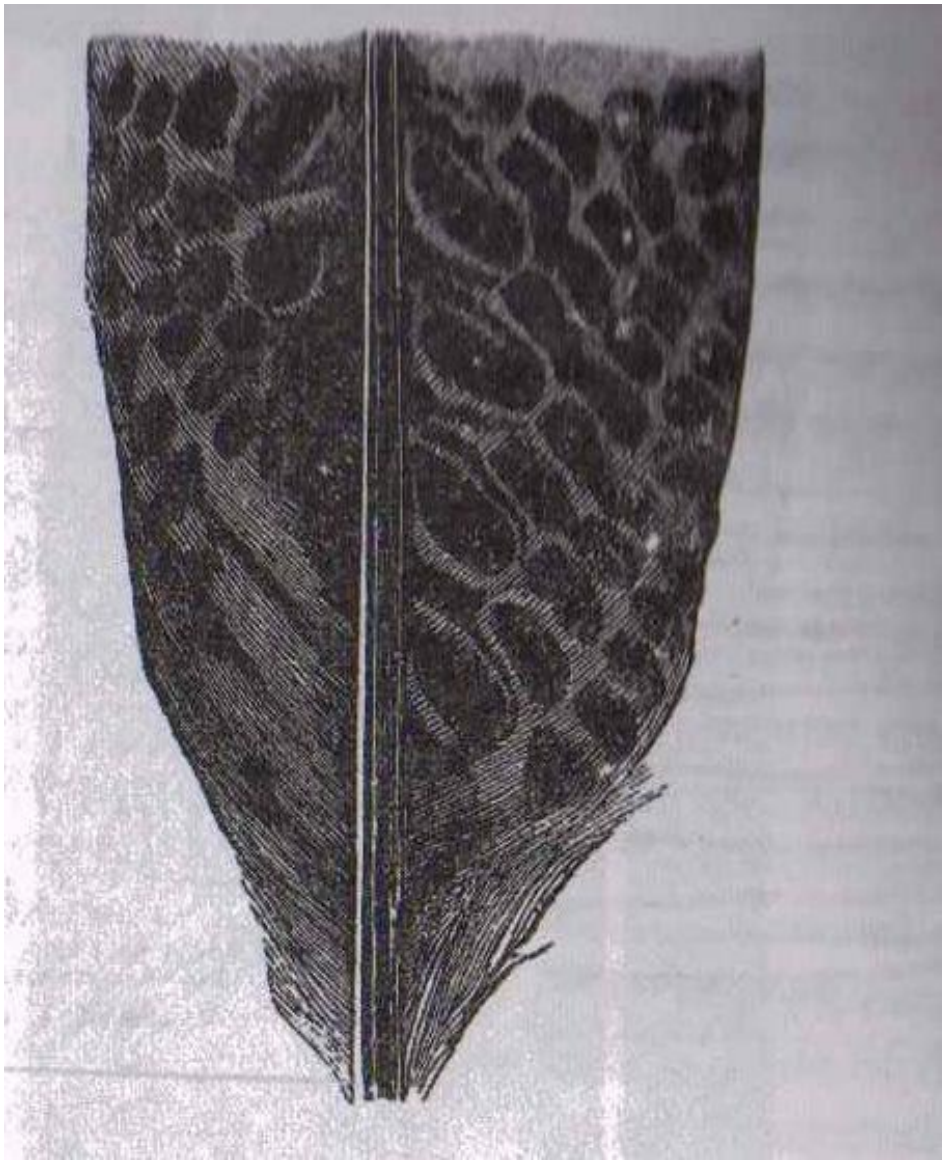
'Part of secondary wing-feather of Argus pheasant, shewing two perfect ocelli, *a* and *b*. A,B,C,D, &c., are dark stripes running obliquely down, each to an occelus. [Much of the web on both sides, especially to the left of the shaft, has been cut off.]'.

Text and drawing are from Fig. 57. in Darwin, 2004, p. 489.

Penguin Group UK, and the original publishers, John Murray, have no objection to the figures 57 – 61 being reproduced in Plates 4 – 8.[309]

[309] The Contracts and Permissions Executive of the Penguin Group UK (PUK) have no objection to the reproduction of the figures 57 - 61 from Darwin 2004, pp. 489 – 494 being used in the thesis. However, PUK have been unable to trace the original contract or any other rights information regarding the *Descent* title. They are therefore unable to give formal permission to use the images as they cannot warrant that such use would not infringe any third party rights. They therefore request that this disclaimer is entered in the acknowledgements.

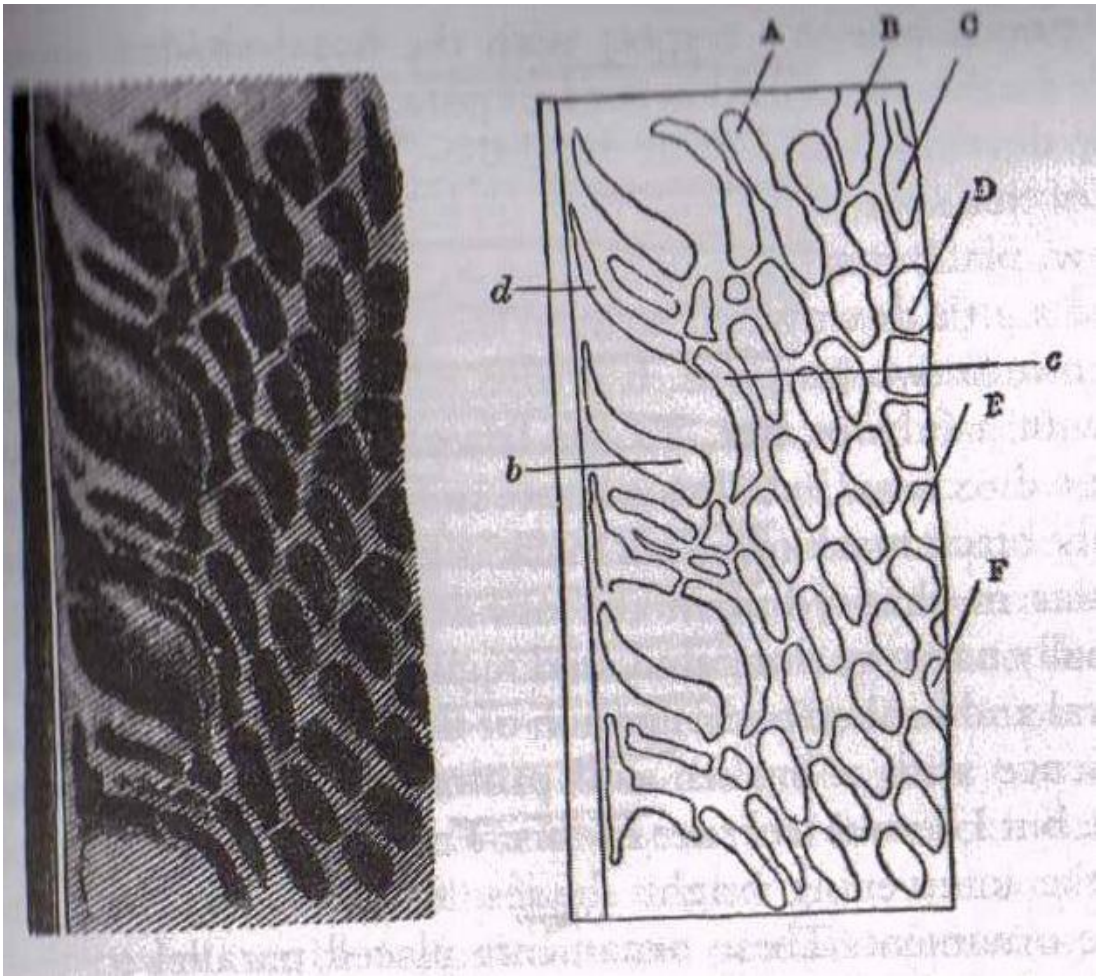
PLATE 5



'Basal part of the secondary wing-feather [of the Argus pheasant], nearest to the body'.

Text and drawing are from Fig. 58. in Darwin, 2004, p. 490.

PLATE 6



'Portion of one of the secondary wing-feathers [of the Argus pheasant] near to the body, shewing the so-called elliptic ornaments. The right-hand figure is given merely as a diagram for the sake of the letters of reference. A,B,C,D, &c. Rows of spots running down to and forming the elliptic ornaments. *B.* Lowest spot or mark in row B. *c.* The next succeeding spot or mark in the same row. *d.* Apparently a broken prolongation of the spot *c* in the same row B'.

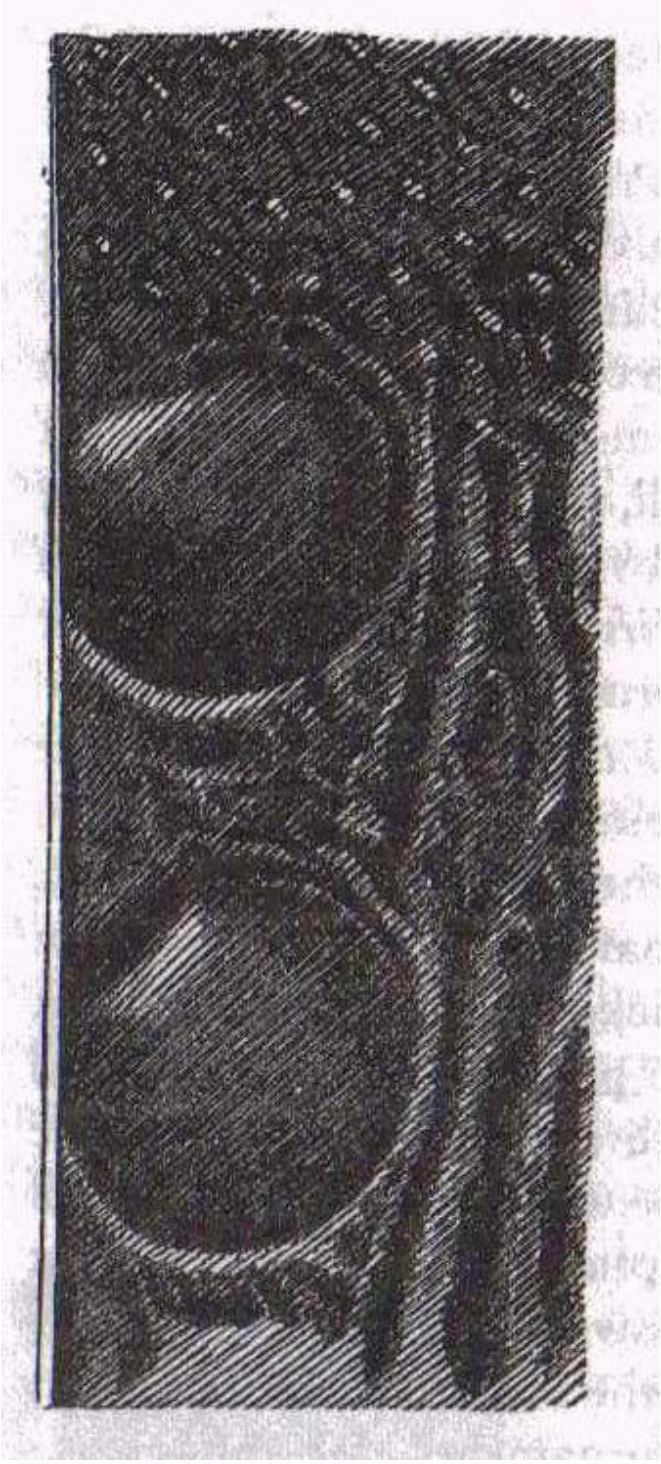
Text and drawing are from Fig. 59. in Darwin, 2004, p. 491.
See Plate 4 note and footnote for reproduction disclaimer.

PLATE 7

‘An ocellus in an intermediate condition between the elliptic ornament and the perfect ball-and-socket ocellus’.

Text and drawing are from Fig. 60. in Darwin, 2004, p. 492.
See Plate 4 note and footnote for reproduction disclaimer.

PLATE 8



'Portion near summit of one of the secondary wing-feathers [of the Argus pheasant], bearing perfect ball-and-socket ocelli. *a.* Ornamented upper part. *b.* Uppermost, imperfect ball-and-socket ocellus. (The shading above the white mark on the summit of the ocellus is here a little too dark.). *c.* Perfect occelus'.

Text and drawing are from Fig. 61. in Darwin, 2004, p. 494.

PLATE 9

The Raising of Lazarus [1517 – 1519] by Sebastiano del Piombo.

PLATE 10

Diana of Ephesus

Replica sculpture of Diana of Ephesus. This image has been reproduced with kind permission of Whetton & Grosch.

APPENDIX B: DRAMATIS PERSONAE

The *Dramatis Personae* draws its data from texts referred to in the Reference section at the end of the thesis and the *Biographical Register and Index to Correspondents* in Burkhardt (1985, pp. 611 – 661) for those in correspondence with Charles Darwin. References to Charles Darwin (1809-1882) are referred to as CD.

Agassiz, Jean Louis Rodolphe (1807 – 73). Swiss-born biologist and geologist . Emigrated to the US in 1847. Resisted Darwinian evolution supporting Polygenisism (that races could not alter their characteristics in new environments, and each had a separate origin).

Allen, Jessie (1777 – 1853). Daughter of John Bartlett Allen. Married Jean Charles Léonard Simonde de Sismondi in 1819. Emma Darwin's Aunt.

Angerstein, John Julius (1732 – 1823). Businessman patron and collector of the fine arts whose collection founded the British National Gallery.

Arago, François (1786 – 1853). French mathematician, physicist and astronomer.

Babbage, Charles (1791 – 1871). British mathematician and philosopher who nvented the mechanical computer.

Bacon, Frances (1561 – 1626). English philosopher, statesman and scientist.

Baden-Powell, Robert Stephenson Smyth 1st Baron , (1857 – 1941). Also known as Lord Baden-Powell. Lieutenant-general in the British Army, writer and founder of the Scout Movement.

Banks, Sir Joseph (1743 – 1820). British naturalist who joined Captain James Cook's first voyage (1768 – 1771) to Brazil, Tahiti, New Zealand and Australia. President of the Royal Society for forty one years, advising King George III on the Royal Botanical Gardens at Kew.

Bates, Henry Walter (1825 – 1892). English naturalist and explorer who went on an expedition to the Amazon with Alfred Russel Wallace in 1848.

Baudin, Nicolas-Thomas (1754 – 1803). French explorer and naturalist.

Bentham, Jeremy (1748 – 1832). British philosopher, jurist, and social reformer. Founder of modern utilitarianism.

Berzelius, Jöns Jakob (1779 – 1848). Swedish chemist.

Blake, William (1757 – 1827). English Romantic poet.

Blondin, Charles, born Jean François Gravelet (1824 – 1897). French tightrope walker and acrobat. Performed in America and died in London.

Blumenbach, Johann Friedrich (1752-1840). German natural historian, anthropologist, and comparative anatomist.

Bonpland, Aimé (1773 – 1858). Co-explorer and French naturalist with Alexander von Humboldt. Best student of the leading French botanists Antoine-Laurent Jussieu and Desfontaines

Bougainville, Louis-Antoine, Comte de (1729 – 1811). French admiral and explorer.

Brodie, Sir Benjamin Collins 1st Baronet (1783 – 1862) was an English physiologist and surgeon. Attended the 1860 Oxford debate on Darwin's theory of evolution.

Buch, Christian Leopold von (1774 – 1853). German geologist and palaeontologist.

Burke, Edmund (1729 – 1797). Anglo-Irish political theorist and philosopher.

Burns, Robert (1759 – 1796). Scottish Romantic poet.

Byron, Lord George Gordon (1788 – 1824). English Romantic poet.

Cameron, Julia Margaret (née Pattle). (1815 – 1879). British photographer known for her portraits of celebrities of the time, such as Darwin and Tennyson.

Carlyle, Thomas (1795 – 1881). Essayist and historian.

Chalmers, Rev Thomas (1780 – 1847). Scottish minister, professor of theology and political economist. Wrote the first 'Bridgewater Treatise' (1833) and supported the view that 'pauperism' is created by the poor.

Chambers, Robert (1802 – 1871). Co-founder and partner of W & R Chambers, publisher. Anonymously published *Vestiges of the Natural History of Creation* in 1844.

Coleridge, Samuel Taylor (1772 – 1834). English Romantic poet. Financially supported by Tom and Jos Wedgwood.

Combe, George (1788 – 1858). Scottish lawyer who founded the Edinburgh Phrenological Society in 1820.His publications included *System of Phrenology* (1824) and *The Constitution of Man* (1828).

Condamine, Charles Marie de La (1701 – 74). French explorer, geographer, and mathematician.

Conrad, Joseph (born Józef Teodor Konrad Korzeniowski) (1857 – 1924). A Polish author who wrote in English after settling in England.

Cook, James (Captain Cook) (1728 – 1779). British explorer, navigator, cartographer.

Darwin, Anne Elizabeth (Annie) (1841 – 1851). CD's daughter.

Darwin, Caroline Sarah (1800 – 1888). CD's sister. Married Josiah Wedgwood III in 1837.

Darwin, Charles Waring (1856 – 1858). CD's son.

Darwin, Emily Catherine (known as Catherine, Catty and Kitty) (1810 – 66). CD's sister.

Darwin, Erasmus (1731 – 1802). Physician, botanist and poet. Founding member of the Lunar Society, Birmingham. CD's grandfather.

Darwin, Erasmus Alvey (1804 – 1881). CD's brother.

Darwin, Major Leonard (1850 – 1943), a son of CD. A soldier, politician, economist, and eugenicist.

Darwin, Robert Waring (1766 – 1848). Physician. CD's father.

Darwin, Susan Elizabeth (1803 – 66). CD's sister, known as 'Granny'.

Darwin, Susannah (Sukey) (neé Wedgwood) (1765 – 1817). CD's mother.

Dawson, Sir John William (1820 – 1899). Canadian geologist. One of the founders of the science of palaeobotany. Accompanied Charles Lyell to Nova Scotia.

Desfontaines, René Louiche (1750 1833). French botanist.

Dickens, Charles John Huffam (1812 – 1870). English writer and social critic.

Egerton, Francis, Eighth Earl of Bridgewater (1756 – 1829). British eccentric, and supporter of natural theology.

Eliot, George (Mary Ann Evans) (1819 – 1880). Novelist. Lived with, without marrying, George Henry Lewes.

Emerson, Ralph Waldo (1803 – 1882). American essayist, lecturer, and poet. Led the Transcendentalist movement.

Engels, Friedrich (1820 – 1895). German philosopher who founded Marxist theory with Karl Marx. Died in London.

Eyre, Edward John (1815 – 1901). Controversial English Governor of Jamaica. Brutally suppressed a rebellion having many black peasants killed and flogged. He also had a mixed-race colonial assemblyman executed.

FitzRoy, Robert (1805 – 1865). Naval officer, hydrographer, and meteorologist. Commander of the *Beagle*, 1828 – 1836.

Forster, George (1754 – 94). Polish naturalist. From 1772 to 1775, George and his father Reinhold took part in James Cook's Second Voyage to the Pacific.

Forster, Reinhold (1729 98). Reformed pastor, naturalist and ornithologist from a Scottish background. From 1772 to 1775, Reinhold and his son George took part in James Cook's Second Voyage to the Pacific.

Gall, Franz Josef (1758 – 1828). German neuroanatomist and physiologist. Claimed to be the founder of phrenology – the belief that intelligence can be determined by the size of the skull.

Galton, Sir Francis (1822 – 1911). Scientist and founder of the eugenics movement. CD's half cousin.

Galvani, Luigi, (1737 – 98). Italian physician, physicist and philosopher.

Gauss, Carl Friedrich (1777 – 1855). German mathematician.

Gliddon, George Robbins (1809–1857). English-born American supporting Polygenisism (that races could not alter their characteristics in new environments, and each had a separate origin).

Goethe, Johann Wolfgang von (1749 – 1832). German philosopher, naturalist and poet.

Gray, Asa (1810 – 1888). Harvard professor of botany in regular correspondence with CD.

Greg, William Rathbone (1809 – 1881) was an English essayist and student friend of CD.

Haeckel, Ernst Heinrich Philipp August (1834 – 1919). German biologist and naturalist. Known for his recapitulation theory ('ontogeny recapitulates phylogeny') in which the adult form unfolds from a preexisting archetypal form in the embryo. He promoted Darwin's work in Germany.

Haggard, Sir Henry Rider (1856 – 1925). Known as H. Rider Haggard. English writer of adventure novels set in exotic locations. Wrote *King Solomon's Mines* (1885).

Hallam, Arthur Henry (1811 – 1833). English poet, best known as the subject his friend Alfred Tennyson's poem *In Memoriam A.H.H.* Engaged to Tennyson's sister Emily.

Harvey, William (1578 - 1657). Demonstrated the circulation of the blood

Henslow, Reverend John Stevens (1796 – 1861). CD's teacher and friend at Cambridge University. He was Professor of mineralogy and botany.

Henty, George Alfred (1832 –1902). English novelist known for his historical adventure stories. Accused of being xenophobic towards non-British people and glorifying British imperialism.

Herder, Johann Gottfried von (1744 – 18 1803).German philosopher, theologian, poet, and literary critic. Friend of Goethe and former student of Kant.

Herder, Karoline (neé Flachsland, 1750 – 1809) was married to Johann Gottfried Herder(1744 – 1803), a former student of Kant and an important influence on Goethe.

Herschel, John (1792 – 1871). Astronomer and naturalist.

Herz, Marcus (1747 – 1803). German physician and lecturer on philosophy. Pupil of Kant.

Hooker, Joseph Dalton (1817 – 1911). English botanist , Director of Royal Botanic Gardens, Kew 1865 – 85 and friend of Charles Darwin.

Hutcheson, the Rev. Francis (1694 – 1746). Scottish-Irish philosopher.

Hutton, James (1726 – 1797). Scottish geologist and naturalist who originated the theory of uniformitarianism which explains the features of the earth's crust as having developed by natural processes over geologic time.

Humboldt, Alexander von (1769 – 1859). German naturalist.

Huxley, Thomas Henry (1825 – 1895). Zoologist, comparative anatomist, essayist and educator. Famous for his debate in 1860 with Samuel Wilberforce bringing about a wider acceptance of the theory of evolution. For this reason known as 'Darwin's Bulldog'.

Jussieu, Antoine-Laurent (1748 – 1836). French biologist.

Kant, Immanuel (1724 – 1804). German philosopher.

Keats, John (1795 – 1821). English Romantic poet.

Kielmeyer, Carl Friedrich (1765 – 1844). German biologist and naturalist.

Kingsley, Charles (1819 – 1875). Church of England priest, historian and novelist. He was a friend of Charles Darwin.

Kitchener, Field Marshal Horatio Herbert Kitchener, 1st Earl (1850 – 1916). Senior British Army officer who won fame for his imperial campaigns.

Kunth, Carl Sigismund (1788 – 1850), a nephew of the one-time tutor of the two Humboldt brothers, and part editor of Humboldt's *Personal Narrative*.

Lamarck, Jean-Baptiste (1744-1829). French naturalist, soldier, biologist and academic. Known for his theory of inheritance of acquired characteristics.

Lavoisier, Antoine (1743 – 94). French founder of modern chemistry.

Lewes, George Henry (1817 – 1878). English philosopher and critic of literature and theatre. Lived with, but without marrying, Mary Anne Evans (George Eliot).

Lincoln, Abraham (1809 – 1865). The sixteenth President of the United States. Served from March 1861 until his assassination in April 1865.

Linnaeus (Carl von Linné) (1707 – 1778). Swedish botanist and zoologogist, regarded as the Father of Taxonomy.

Locke, John FRS (1632 – 1704). English empiricist philosopher.

Longinus, First Century AD, Greek teacher of rhetoric (known as Pseudo-Longinus as there is some uncertainty as to whether he is Dionysius of Halicarnassus, Cassius Longinus, Plutarch or others).

Lyell, Charles (1797 – 1875). Leading geologist known for his Principles of Geology supporting 'Uniformitarianism' believing that the earth was created by slow-moving processes as opposed to sudden catastrophes. Scientific mentor and friend of CD.

Mackintosh, Sir James (1765 – 1832). Scottish philosopher and politician. Brother-in-law of Charles Darwin's uncle, Josiah Wedgewood II [1769 – 1843].

Malaspina, Alessandro (1754 – 1810). Italian nobleman exploring the world under a Spanish naval officer commission

Malthus, Thomas (1766 – 1834). English cleric, scholar and political economist opposed to public welfare assistance.

Marshall, Mrs Mary Ann (1842-1884). The first British professional medium, through whom Alfred Russel Wallace obtained his introduction to the phenomena of Spiritualism.

Marx, Karl (1818 – 1883). German philosopher, economist and revolutionary socialist. Died in London.

Michelangelo di Lodovico Buonarroti Simoni (known as Michelangelo)(1475 – 1564). Italian sculptor, painter, architect, poet, and engineer of the High Renaissance.

Mill, John Stuart (1806 – 1873). British 'Utilitarian' philosopher, political economist.

Morton, Samuel George (1799 – 1851). American natural scientist who believed that the size of the skull of each race indicated its intelligence, with Caucasians being the most intelligent and Negroes being the least intelligent.

Newton, Isaac (1642 – 1727). Mathematician and physicist.

Niépce, Joseph Nicéphore (1765 – 1833). French inventor of photography.

Nott, Josiah Clark (1804 – 1873). American supporting Polygenisism (that races could not alter their characteristics in new environments, and each had a separate origin).

(Novalis), Georg Philipp Friedrich Freiherr von Hardenberg (1772 – 1801). German Romantic poet.

Owen, Richard (1804-92). Comparative anatomist. Assistant-conservator and Hunterian professor, Royal College of Surgeons. Superintendent of the Natural History departments, British Museum.

Ørsted, Hans Christian (1777 – 1851). Danish physicist.

Paley, William (1743 – 1805). Anglican clergyman, philosopher and utilitarian.

Patmore, Coventry Kersey Dighton (1823 – 1896).English poet known for *The Angel in the House* narrative poem about an ideal marriage.

Peel, Sir Robert (1788 – 1850). Served as Prime Minister of the United Kingdom from 10 December 1834 to 8 April 1835, and from 30 August 1841 to 29 June 1846.

Pictet, Marc-Auguste (1752 – 1825). French physicist, chemist, meteorologist and astronomer. A friend of Goethe.

Piombo, Sebastiano del. Born Sebastiano Luciani (c. 1485 – 1547). Italian painter of the High Renaissance and early Mannerist periods.

Playfair, John (1748 – 1819). Scottish scientist and mathematician who su*mmarised* the work of James Hutton in his book *Illustrations of the Huttonian Theory of the Earth* [1802] bringing his theory of uniformitarianism (later taken up by Charles Lyell) to a wider public.

Pope, Alexander (1688 – 1744). English poet.

Priestley Joseph, (1733 – 1804). , Dissenting English clergyman, natural philosopher, chemist, educator, and Liberal political theorist. Forced to flee to the USA in 1791.

Raffaello Sanzio da Urbino (known as Raphael) (1483 – 1520). Italian painter and architect of the High Renaissance.

Rhodes, The Rt Hon Cecil John (1853 – 1902). British businessman, mining magnate and believer in British colonialism, who founded the southern African territory of Rhodesia, named after him in 1895.

Quesnay, François (1694 – 1774). French physiocrat. Saw Economics as a natural law of science. Influenced by William Harvey's demonstration of the circulation of the blood.

Rousseau, Jean-Jacques (1712 – 78). French philosopher.

Ruskin, John (1819 – 1900). English art critic.

Sabine, General Sir Edward (1788 – 1883). Irish astronomer, geophysicist, ornithologist and soldier.

Schlegel, Karl Wilhelm Friedrich von (1772 – 1829). German Romantic poet, literary critic, philosopher and philologist.

Sedgwick, The Reverend Adam (1785-1873). Geologist and clergyman. Professor of Geology at Cambridge University and a Fellow of the Royal Society.

Shelley, Percy Bysshe (1792 – 1822). English Romantic poet.

Schelling, Friedrich Wilhelm Joseph (1775 – 1854). German Romantic philosopher.

Schiller, Johann Christoph Friedrich von (1759 – 1805). German Romantic poet.

Scott, Sir Walter (1771 – 1832). Scottish Romantic novelist and poet.

Sismondi, Jean Charles Léonard Simonde de (1773 – 1842), whose real name was Simonde. Swiss French and Italian historian and economist. Married to Jessie Allen, Emma Darwin's aunt.

Smiles, Samuel (1812 – 1904). Scottish author and government reformer known for his Self-help books.

Spinoza, Baruch (1632 – 1677), later known as Benedict de Spinoza, Jewish-Dutch philosopher.

Stephenson, Robert (1803 – 1859). English railway engineer.

Stevens Henslow, John (1796 – 1861). Clergyman, botanist, and mineralogist. Professor of mineralogy and botany at Cambridge University. CD's teacher and friend.

Stewart, Dugald (1753 – 1828). Scottish philosopher and mathematician.

Tennyson, Alfred 1st Baron (1809 – 1892). Poet Laureate of Great Britain and Ireland.

Tollet, Georgina (1767 – 1855). A close friend of the Wedgwood family.

Torbitt, James (c. 1822–1895). Irish spirit merchant who corresponded with Charles Darwin regarding the artificial breeding of potato plants resistant to blight.

Townsend, Joseph (1739 – 1816). English physician, geologist and vicar. He anticipated Malthus' argument against public welfare assistance but proposed compulsory membership of friendly societies to pay for it.

Trollope, Anthony (1815 – 1882). English novelist.

Volta, Alessandro, (1745 – 1827). Italian physicist and chemist.

(Voltaire), François-Marie Arouet (1694-1778). French philosopher and advocate of civil liberties.

Wallace, Alfred Russel (1823 – 1913). English naturalist engaged in fieldwork in the Malay Archipelago independently conceiving the theory of natural selection prompting Darwin to publish his Origin of Species.

Wedgwood, Frances (Fanny) (1800 – 1889). Sir James Mackintosh's daughter. Married to Emma Darwin's brother Hensleigh Wedgwood.

Wedgwood, Hensleigh (1803 – 1891). Emma Darwin's brother.

Wedgwood, Josiah I (1730 – 1795). Founded the Wedgwood pottery company.

Wedgewood, Josia II (Jos) (1769 – 1843). Son of the English potter Josiah Wedgwood continuing his father's firm. Member of Parliament for Stoke-upon-Trent from 1832 to 1835. CD's uncle and Emma Darwin's father. Patron of Samuel Taylor Coleridge.

Wedgwood, Thomas (Tom) (1771 – 1805). Son of Josiah Wedgwood I and brother of Jos Wedgwood. The father of photography. Patron of Samuel Taylor Coleridge. Died of opium addiction.

Welpley, James Davenport (1817- 72). An American editor of a Whig journal. The Whig movement in America supported the interdependence of different classes, regions, and interest groups.

Whewell, William (1794 – 1866). English mathematician, historian and philosopher of science.

White, Gilbert (1720 – 1793). Parson, naturalist and ornithologist.

Whitley, Charles Thomas (1808 – 1895). Reader in natural philosophy and mathematics at Durham University and Vicar of Bedlington. CD's school and Cambridge University friend.

Wilberforce, Bishop Samuel (1805 – 1873). Third son of William Wilberforce. Given the nickname "Soapy Sam" due to a comment by Benjamin Disraeli that the bishop's manner was "unctuous, oleaginous, saponaceous". Remembered for his 1860 speech against Charles Darwin's theory of evolution.

Wilberforce, William (1759 -1833). English politician, philanthropist, and leading campaigner in the run-up to the passing of The Slave Trade Act in 1807 (making the carrying of slaves on British ships illegal) and The Slavery Abolition Act in 1834 shortly after his death (abolishing slavery in most of the British empire).

Williams, Charles (dates unknown). English Victorian medium unmasked as a fraud in 1878 (caught at a séance with yards of white muslin, a false beard and a bottle of phosphorized oil). (Buckland, 2005, p. 432).

Wordsworth, Dorothy Mae Ann (1771 – 1855). English poet, diarist and sister of William Wordsworth.

Wordsworth, William (1770 – 1850). English Romantic poet.