

Origin of Species or Specious Origins?

A Reformed Presuppositional Apology
to Darwin's Origin of Species and Descent of Man

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ABSTRACT

Charles Darwin has achieved both notoriety and fame for his evolutionary ideas encapsulated principally in *The Origin of Species* and *The Descent of Man*. Although credited for much originality in his writings, Darwin's legacy borrowed extensively from many who had propounded similar speculations centuries before him. His naturalistic argument for origin and species reveals both logical and theological problems with his thesis, and further unavoidable ramifications. The contention is that even Darwin himself could not, and did not, live by the ideas he boldly espoused. His ideas, if true, would destroy the very basis upon which his thesis depended. His evolutionary paradigm had to take for granted a world he could give no account for. Yet his antipathy of Biblical Christianity, and its God, inspired him to pursue his personal naturalistic agenda with little regard to the logical consequences. Modern evolutionary science may look back today with pride on its founder, Charles Darwin, yet the problems which were intrinsic to his thesis remain unanswered yet.

Key terms: Darwin, Origin of Species, evolution, Genesis, apology, presuppositional apologetics

SAMEVATTING

Charles Darwin het bekendheid en faam verwerf vir sy evolusionêre idees. Van sy bekendste werke is *The Origin of Species* en *The Descent of Man*. Alhoewel hy erkenning verkry het met die oorspronklikheid van sy publikasies het Darwin grootendeels geleun op diegene wat soortgelyke bespiegelings eeue voor hom gemaak het. Sy naturalistiese argument vir oorsprong en spesies toon logiese en teologiese probleme met sy tese en die daaruit voortspruitende vertakkings. Sy idees, as dit inderdaad waar is, sal die basis vernietig waarop sy proefskrif gebaseer is. Sy evolusionêre paradigma moes 'n wêreld waarvoor hy nie kon rekenskap gee nie as gegewene aanvaar. Nietemin, sy teensin van Bybelse Christenskap, en die God van die Bybel het hom geïnspireer om sy naturalistiese agenda na te streef met min inagneming vir logiese gevolge. Moderne evolusionêre wetenskap mag dalk met trots terugkyk na sy stigter, Charles Darwin, maar die probleem wat intrinsiek is aan sy tese bly onbeantwoord.

Sleutel terme: Darwin, Origin of Species, evolusie, Genesis, verdediging, voorveronderstellende apologetiek

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1. INTRODUCTION

1.1 FORMULATING THE PROBLEM

1.1.1 BACKGROUND AND MOTIVATION FOR RESEARCH

Last year thousands of scientists and devotees celebrated the 200th anniversary of Charles Darwin's birthday and the 150th anniversary of his literary legacy, *The Origin of Species* (1859). As we look back we cannot deny the impact which Darwin's contribution has wrought within science, philosophy and theology by his theory of "descent with modification", commonly popularised as the Theory of Evolution, or Darwinism.

In recent times, Darwin has found much support in theological circles and many contemporary apologists are sympathetic to the Theory of Evolution. Of this school, a more accommodating approach has been encouraged (notably Zygon and Biologos) in order to bridge the gap between theology and science.

It is the conviction of some theologians, however, that the Theory of Evolution has undermined and threatened the sufficiency and authority of the Bible as understood by the Reformed Tradition (cf. Jarvis, 2007:225; Weeks, 1988:95; Burgess, 2004:158). The concern is that Darwinism is in antithesis to the Christian worldview (e.g. Berkhof, 1976:139-140; Sproul, 2006:123-125; Piper, 2004:61; Carson, 1996:196-203). This has been illustrated in the claims of many popular misotheists (eg. Sam Harris, Daniel Dennett, and Christopher Hitchens), and most notably Richard Dawkins, who has stated, "although atheism might have been logically tenable before Darwin, Darwin made it possible to be an intellectually fulfilled atheist" (1986:6).

The growing popularity of Darwinian science, irrespective of its atheistic orientation, has challenged Christians to reconsider the origin of species portrayed in Genesis, and the relationship of Scripture to Science. Consequently, there has been an enthusiastic promulgation of many competing interpretative theories of Genesis 1-11 which have each tried to accommodate or address this challenge.

Given these concerns, the historical catalyst to this modern debate, Darwin's *Origin of Species* (1859), deserves a theological reappraisal. For similar reasons, *The Descent of Man* (1871) is included in this study as the second most influential production of Darwin's legacy. In *Descent*, he completed the overall thesis of *Origin*, and illustrated the logical extension of his ideas for society. Henceforth, the goal of this dissertation will be to analyse and provide a theological and presuppositional apology to Darwin's thesis using the framework of origin and species as developed by him in *The Origin of Species* and *The Descent of Man*.

1.1.2 CENTRAL RESEARCH QUESTION

The central research question to be addressed in this dissertation is:

How should a reformed presuppositional apology be constructed in order to address the antithesis between Darwin's view of origin and species as presented in *The Origin of Species* and *The Descent of Man* and that of Genesis 1-11?

Specifically, the individual problems which will be researched are the following:

1. What were the historical and theological origins of Darwin's evolutionary ideas?
2. How did Darwin develop his theory of "descent with modification", first published in *The Origin of Species* (1859)?
3. How does Darwin use the concepts of origin and species in his theory and in what way do they support his overall thesis?
4. What is the antithesis between Darwin's theory of descent and that of Genesis 1-11, and what would be an appropriate theological and presuppositional response?

1.2 FOCUS AND DEMARCATION OF THIS INVESTIGATION

The theological presuppositions governing the research of this dissertation are founded on the basis of the classic reformed tradition, as modelled primarily by John Calvin (1509-1564) in the *Institutes of Christian Religion* (1559). Other theological stances have favoured a more sympathetic view of Darwin's theory of descent. But a critique of alternative theological positions, and their consequent apologetic methodologies, lies outside the bounds of this dissertation.

Henceforth, the purpose of this research is to analyse and establish the antithesis between Darwin's view of origin and species in *The Origin of Species* and *The Descent of Man* in relation to the historically orthodox and reformed understanding of Genesis 1-11, in order to construct a reformed theological and presuppositional apology.

Specifically, this will include the following objectives:

1. To investigate to what extent Darwin's ideas were original and explore their historical origins.
2. To gain an understanding of the historical and theological influences which led to the development of Darwin's theory of descent as first published in *The Origin of Species* (1859).

3. To gain an understanding of how Darwin used the concepts of origin and species in his theory of descent.
4. To evaluate Darwin's theory of evolution on theological grounds with regard to the concepts of origin and species and provide a relevant theological and presuppositional apology.

1.3 METHODOLOGY AND STRUCTURE OF THIS DISSERTATION

Although there are other apologetic models which have been used to address the challenge of Darwin's theory, this study will adopt the reformed presuppositional approach. In order to construct the apology and address the central research question several pertinent literature reviews will be necessary. In particular, the methodological approaches pertaining to the four specific questions raised in section 1.1.2 will be as follows:

1. Review and analyse a selection of influential literature prior to Darwin, as guided by Glass *et al.* (1959) and Mortenson (2004). [literature study]
2. Review and analyse a selection of influential literature contemporaneous with Darwin, as guided by his own writings (including autobiography and letters), Janet Browne (1995), David Herbert (2009) and others. [literature study]
3. Review and analyse the source documents represented by *The Voyage of the Beagle* (1839), the six editions of *The Origin of Species* (1859, 1860, 1861, 1866, 1869, 1872), and the two editions of *The Descent of Man* (1871, 1874). [literature study]
4. Read and evaluate published reviews, comments and criticisms of the Theory of Descent with Modification as originally expressed in *The Origin of Species* and *The Descent of Man* from 1859 to 1882. [literature study]
5. Review a selection of prominent reformed commentaries of Genesis 1-11 prior to 1859 in order to establish the historically orthodox theological understanding of origin and species and thereby identify the antithesis between Darwin's theory of descent and Genesis 1-11. [literature study]
6. Use the general principles derived from Van Til's presuppositional apologetic methodology, as developed by Bahnsen (2008) and Frame (1995), to provide an apology to Darwin's thesis. [literature study]

2. THE ORIGIN OF DARWIN'S IDEAS

2.1 INTRODUCTION

Charles Darwin was undoubtedly an accomplished scientist. But it has been claimed by some that, “Darwin was the greatest scientist who ever lived” (Larry Moran, quoted by Laidlaw, 2009; cf. Reidy et al., 2006:131). Janet Browne, Aramont Professor in the History of Science at Harvard University, adds, “Charles Darwin’s *Origin of Species* is surely one of the greatest scientific books ever written” (Browne, 2006:1). Others, like the American philosopher Daniel Dennett, have even suggested that Darwin has given mankind “the single best idea anyone has ever had” (Dennett, 1995:21; cf. Rajendran, 2009:854).

These are astounding claims for a man who must compete for prestige with the likes of Albert Einstein, Sir Isaac Newton, Galileo Galilei, Thomas Edison and others. As Jonathan Wells (2006:71) has wryly pointed out, “You’d think Darwin created the internet.” But a fair appraisal of Darwin would require answers to at least two questions: first, of what value was his legacy? And second, to what extent can he take the credit for it?

To begin with, what was the *real* origin of Darwin’s *Origin of Species*?

2.2 ANCIENT VESTIGES OF DARWIN'S IDEAS

Evolution is an old idea. Almost every facet of evolutionary theory, therefore, can be found in the annals of antiquity.

2.2.1 SPONTANEOUS GENERATION AND AQUATIC ORIGINS

Six centuries before Christ, along the Aegean coast of Anatolia in a town called Miletus, a school of philosophy developed which set aside former Greek theogonies, preferring instead an entirely new naturalistic philosophy of reality (Guthrie, 1962:56). The first of these natural philosophers, according to Aristotle (1952a:501), was Thales (ca. 640-546 BC). Aristotle informs us in the first book of *Metaphysics* that Thales considered matter to be the “only principle of all things”, claiming that the fundamental principle of all matter was water (Aristotle, 1952a:501). His reasons for these conclusions were twofold, considering firstly that, “the nutriment of all things is moist, and that heat itself is generated from the moist and kept alive by it” (Aristotle, 1952a:502), and secondly that, “the seeds of all things have a moist nature, and that water is the origin of the nature of moist things” (Aristotle, 1952a:502). This is arguably the oldest evolutionary account of spontaneous generation on record, foreshadowing the so-called modern idea of aquatic origins by more than two millennia (Osborn, 1929:46; cf. Darwin, 1887c:18; Carrol, 2005:38-39).

2.2.2 ABIOGENESIS AND TRANSMUTATION

Thales's student, Anaximander (ca. 611–547 BC), developed these ideas further. In his theory of origin, man developed from a fish-like form into a land-dwelling creature over vast eons of time (Osborn, 1929:47-48). This has been preserved by Theophrastus (371–287 BC) who quotes some of Anaximander's ideas:

“Man was like another animal, namely, a fish, in the beginning... at first human beings arose in the inside of fishes, and after having been reared like sharks, and become capable of protecting themselves, they were finally cast ashore and took to land” (cited in Burnet, 1963:70-71.)

According to Osborn (1929:47-48), this is arguably the earliest record of an abiogenesis theory in history. Interestingly, Anaximander also had a concept of survival of the fittest, which can be found in his rationale for man's ichthyological descent. Theophrastus records,

“His reason is that while other animals quickly find food by themselves, man alone requires a lengthy period of suckling. Hence, had he been originally as he is now, he would never have survived.” (Burnet, 1963:70-71.)

Anaximenes (ca. 588-524 BC), Anaximander's student, also accepted the general principle of abiogenesis but thought that life had evolved from air rather than water (Osborn, 1929:49). Anaxagoras (ca. 500–428 BC) built upon Anaximenes' cosmology but believed instead, after Thales, that “animals first arose in the moist element” (Burnet, 1963:273), and that man was only an animal, albeit the “wisest of animals” (Burnet, 1963:272). Thus, amongst these three prominent Milesian philosophers, we find some of the seminal aspects of the modern evolutionary theory (cf. Guthrie, 1962:142).

2.2.3 ANTIQUITY OF THE EARTH

Xenophanes (ca. 576-480 BC), a contemporary poet of the Milesians, built upon these naturalistic ideas, but “abandoned the Milesian tradition” (Guthrie, 1962:401), and describing instead a self-sufficient, ungenerated, eternal world (Guthrie, 1962:389), he thereby developed a pantheistic or monistic worldview. This was a significant development in the prehistory of Darwinism because these concepts later provided the macro time scale required for evolutionary processes to act. Xenophanes is also credited for suggesting that life had spontaneously generated from the earth itself, “believing that the sun in warming the earth produces both animals and plants” (Osborn, 1929:50). As one of the earliest palaeontologists, he even discussed some of the fossils he had observed (Haber, 1959a:6-7). On this latter subject, he differed from the popular Darwinian view in that he attributed the fossil record to the catastrophic flood of Deucalion which was the Greek equivalent to the Babylonian flood of Gilgamesh, or the Noahic deluge mentioned in Genesis (Guthrie, 1962:388). Xenophanes argued that, “all things originally were embedded in mud, and that an impression of them was

dried in the mud, but that all men had perished when the earth, being precipitated into the sea, was converted into mud” (Hippolytus, 1990:17).

2.2.4 NATURAL SELECTION AND SURVIVAL OF THE FITTEST

After Xenophanes, Empedocles (495-435 BC) took his ideas even further, structuring the order of evolutionary development into progressive stages, placing the biogenesis of plants before animals (Burnet, 1963:242-243). His conception of exactly how plants evolved into animals was notably different, however, from how Darwin would conceive it more than two millennia later. According to Lucretius’ interpretation of Empedocles in *De rerum natura*, animals evolved limb by limb, disembodied from the beginning and only joined together gradually by the battle of “love over hate” (Osborn, 1929:52-53; Burnet, 1963:242-243). Lucretius employed strong mythological overtones in *De rerum natura*, but Osborn (1929:56-57) has identified at least four elements of Empedocles which accurately prefigure modern evolutionary theory: gradualism, the order of evolution (from simple to more complex), the perfection of imperfect forms by replacement, and the mechanism of replacement: extinction. Osborn (1929:54) goes so far as to say that, “in the ancient teachings of Empedocles we find the germ of the theory of the *survival of the fittest*, or of natural selection”. It is not surprising, therefore, that Empedocles has often been thought of as the father of evolutionary naturalism (Bergman, 2001:77).

2.2.5 PANGENESIS

Democritus (ca. 460-370 BC) was a contemporary of Empedocles and is famously remembered for his development of atomism. Democritus’ zeal for materialism motivated him to dispense with any teleology in nature, thereby maintaining the atheism of his predecessors with regards to a creator (Osborn, 1929:58-59). In this way, those who have maintained a disparaging view of Christianity have thought him to have been highly influential in the inception of the natural sciences, specifically physics (cf. Francesco Patrizi, cited by Lüthy, 2000:450). Democritus has also been credited for being the first to formulate a theory of “pangenesi s” in which the emerging embryo is produced by a process in which the existing organs in the parent each contribute their distinctive semen to create the new organism (O’Rourke, 2004:9). Darwin later coined the term “pangenesi s” as his mechanism to explain heredity in terms of “gemmules” so that he could incorporate Lamarck’s hypothesis of the “inheritance of acquired characteristics” to produce new genetic information (Olby & Darwin, 1963:257-259; Bergman, 2003:19).

2.2.6 ANTI-CREATIONISM AND THE ETERNALITY OF THE UNIVERSE

Through the subsequent centuries these vestigial ideas generally prevailed, with some modification by the Greeks until the time of Aristotle (384–322 BC) who, according to Osborn (1929:356), also believed in human evolution along the lines of “ascent with modification”. Osborn based this idea largely upon what Aristotle wrote in *Physics* (cf. Osborn, 1929:86-87).

This conception, however, finds its authority from an errant translation of *Physics* by Thomas Taylor; as Torrey & Felin (1937:4) explain,

“Finally, it should be said that whatever may have been Aristotle's views on the ‘Evolution of life, from a primordial, soft mass of living matter,’ the text of Book 2. of the *Physics* does not reveal them. The words that Taylor rendered ‘that soft mass which first subsisted’ are the words, not of Aristotle, but of Empedocles.”

So there is some debate amongst historians as to whether these evolutionary ideas can really be found in Aristotle. Most of those who have diligently tried to show it have depended largely upon Osborn's work *From The Greeks To Darwin* (1929). Thus Torrey & Felin (1937:6) write, “after more than thirty years it is to Osborn and not to Aristotle himself that writers of widely read textbooks continue to acknowledge their indebtedness for materials that Aristotle alone could have known at first hand” (an example of this would be Edward Clodd, 1897). Given that Aristotle has been recognised by many as being the “founder of biology as a science” (O'Rourke, 2004:7), it stands to reason that any support of evolutionary ideas in his writings would provide some strength to the general acceptability of Darwin's ideas as a whole. But this connection has yet to be made convincing.

The other text which is often taken from Aristotle in support of Darwinism can be found in his *On the Generation of Animals* where he writes,

“Hence one might suppose, in connexion with the origin of men and quadrupeds, that, if ever they were really 'earth-born' as some say, they came into being in one of two ways; that either it was by the formation of a scolex at first or else it was out of eggs... It is plain then that, if there really was any such beginning of the generation of all animals, it is reasonable to suppose to have been one of these two, scolex or egg.” (Aristotle, 1952c:303-304.)

This cannot be used as an example of common ancestry because the broader context informs us that Aristotle is arguing instead that each species would have had its own separate beginning from its *own* scolex (Platt, in Torrey & Felin, 1937:5). Additionally, in his *On the Generation of Animals (Book I.xviii)*, Aristotle explicitly rejects Democritus' pre-Darwinian theory of “pangeneses” arguing that “organs emerge gradually and successively” to produce new structures as the embryo grows (O'Rourke, 2004:9). In this way Aristotle was actually the first to develop a concept of “epigenesis”, articulated many years later by William Harvey in 1651 (O'Rourke, 2004:10).

Therefore, in spite of the latter semblances to evolution in Aristotle's writings, it stretches plausibility to classify him as one of Darwin's forerunners (Benn, 1911:243; Edelstein, 1944:150). It can be ascertained, in fact, from Aristotle's *On the Generation of Animals* and *History of Animals* that Aristotle believed, *contra* Darwin, in the fixity of animal species (Benn, 1911:244).

Nevertheless, there are two other ways in which Aristotle *can* be seen to have anticipated Darwin. In the first sense, Aristotle's opinion of the antiquity of the universe (with Xenophanes) supports a major underlying assumption upon which Darwin built his thesis. Thus, in *Meteorology*, he wrote,

“But the whole vital process of the earth takes place so gradually and in periods of time which are so immense compared with the length of our life, that these changes are not observed, and before their course can be recorded from beginning to end whole nations perish and are destroyed.” (Aristotle, 1952b:457.)

But Aristotle was perhaps more extreme than Darwin in that he held that the universe was not only ancient but eternal (*On the Heavens*, 279^b13; 289^a9):

“That the heaven as a whole neither came into being nor admits of destruction, as some assert, but is one and eternal, with no end or beginning of its total duration, containing and embracing in itself the infinity of time, we may convince ourselves not only by the arguments already set forth but also by a consideration of the views of those who differ from us in providing for its generation.” (Aristotle, 1952d:375; 283^b26.)

In the second sense, it can be argued that Aristotle foreshadowed Darwin by virtue of his case *against* creation. Thus in *Physics*, he wrote, “But so far as time is concerned we see that all with one exception are in agreement in saying that it is uncreated” (Aristotle, 1952e:335).

2.2.7 ANTI-THEISM AND ANTI-SUPERNATURALISM

The last significant Greek philosopher to anticipate Darwinian ideas was Epicurus (341-270 BC). Epicurus disliked the prospect of a god who might judge people after death so he eagerly embraced the vision of Empedocles and Democritus, and constructed a entirely mechanistic view of the world, devoid of any supernaturalism or teleology (Osborn, 1929:90-91; Crowe, 2009:23). Epicurus thereby preserved their ideas in his own writings which endured for almost two centuries to await Lucretius. Titus Lucretius Carus (99-55 BC) was a Roman poet and philosopher who, like Epicurus, greatly admired the aspirations of Empedocles and Democritus (Osborn, 1929:90-91). Lucretius eagerly continued the quest for a truly naturalistic explanation of life, but differed from his predecessors, rejecting the idea of descent by gradual modification. Instead he argued that animals and plants were generated spontaneously and fully formed from the earth (Osborn, 1929:97). The one important vision which Epicurus and Lucretius did not disagree upon, however, as they applied their minds to this world, was to utterly remove God or any other supernatural being(s) from the picture; and in this way, they captured Darwin's agenda precisely (Lucretius, 1950:102; Darwin, 1958:71-72; cf. Browne, 2001:2).

2.2.8 NON-LITERALISM AND THE SCIENTIFIC HERMENEUTIC

After the Greeks and the early Roman period, there is a conspicuous gap in our knowledge of any development or progression of evolutionary ideas. Some Darwinists have felt obliged to explain this lacuna, like Edward Clodd, who chooses to blame the church for this phenomenon:

“Between birth and revival [referring to the period between the Greeks and the Renaissance] there were the centuries of suspended animation, when the nepenthe of dogma drugged the reason; the Church teaching, arid the laity mechanically accepting, the sufficiency of the Scriptures and of the General Councils to decide on matters which lie outside the domain of both. Hence the necessity for particularizing the causes which actively arrested advance in knowledge for sixteen hundred years.” (Clodd, 1897:v.)

There are others though, who argue from this period that Augustine (AD 395-430) can be considered a “Father of Evolution” (McKeough, cited in Guinagh, 1946:27). Consequently, the first use of Augustine in support of Darwin can be found in George Mivart’s work, “The Genesis of Species” (1871), in which he appeals to Augustine’s commentary on Genesis, *De Genesi ad litteram* (Mivart, 1871:280-281). This has caused some debate amongst theologians and scholars, given that Augustine has been considered the greatest Christian philosopher and theologian of the early church (Lee, 1978:115). But Guinagh (1946:30) argues that Augustine could be used plausibly both in favour of and against Darwinism depending on which portions one chooses to read, leaving the problem largely unresolved. Therefore we will review, in summary, the major arguments used in both cases.

The first argument against the contention that Augustine taught Darwinian ideas is based on Augustine’s philosophical associations with Platonic thought via Neoplatonism. In Platonic thought there are unchanging universals or forms from which the particulars are merely shadows (*The Republic, VII*). The logical implication of these universals would support the fixity of species rather than the transmutation of species (Guinagh, 1946:27). Second, Augustine’s view of creation *ex nihilo* directly undermines the philosophical naturalism of Darwinism. Third, Augustine’s view of origin is in antithesis to the gradualism advocated by Darwin, when he states that God made “all things in a mathematical moment” (Guinagh, 1946:28). Finally, Augustine’s view of the age of the earth does not support the time frame required for Darwinian processes to work; thus Augustine writes, “They are deceived, too, by those highly mendacious documents which profess to give the history of many thousand years, though, reckoning by the sacred writings, we find that not 6000 years have yet passed.” (Augustine, 1890a:373).

On the other side of the debate, historians like Lindberg have argued that Augustine allows for “process creation” (cited in Morris, 2005:202-203), quoting Augustine in *De Trinitate*:

“...what is created may come forth into being at this time or at that, and in this or that way. For all these things in the way of original and beginning have already been created

in a kind of texture of the elements, but they come forth when they get the opportunity.” (Augustine, 1890c:95.)

This encouraged one of the earliest Darwinian Christians, Aubrey Moore (1848-1890), to state rather presumptuously that, “Augustine distinctly rejected Special Creation in favor of a doctrine which, without any violence to language, we may call a theory of Evolution.” (cited by Osborn, 1929:110). Although this conclusion may seem incredulous, Augustine’s accommodation of “natural laws” have lent support to the claim that there is still a “satisfactory philosophical basis for Evolution” in his writings (McKeough, cited in Guinagh,1946:27). Not surprisingly, subsequent theologians and scientists have often used Augustine in this regard to try and justify the theological flexibility required to let popular scientific views dictate the interpretation of a biblical text (cf. Augustine, 2006:186-187). As an example of such influence, Galileo repeatedly cited Augustine in his *Letter to the Grand Duchess Christina (1615)* in support of such a hermeneutic which he hoped would accommodate his theory of heliocentricity.

Augustine felt that, for evangelistic purposes, “Scripture *should* be so interpreted as not to contradict the science of his day” (emphasis mine; Guinagh, 1946:28). Thus Alister McGrath (2001:61-62) comments, “It was therefore important to allow scientific research to assist in the determination of which was the most appropriate mode of interpretation for a given passage”, specifically, “medieval biblical exposition and systematic theology can be shown to have followed Augustine’s advice in deferring to science”. It is not hard to conceive, therefore, how centuries later, by appealing to none other than Augustine, Darwin’s own ideas of origin and species could be incorporated with less difficulty into the Genesis account (cf. Wilkinson, 2009:130).

2.2.9 SUMMARY OF PRE-DARWINIAN EVOLUTIONARY CONCEPTS

	Ancient Greek Source	Charles Darwin
Philosophical Naturalism	<p>Thales (c. 624-546 BC): “the principles which were of the nature of matter were the only principles of all things” Aristotle in <i>Metaphysics, Book I.III</i>, (1952a:501).</p>	<p>“Everything in nature is a result of fixed laws.” In <i>The Autobiography of Charles Darwin</i>, (Darwin, 1958:73).</p>
Spontaneous Generation or Abiogenesis and Aquatic Origins	<p>Anaximander (c. 610-546 BC), according to Hippolytus¹: “animals are produced [in moisture] by evaporation from the sun” in <i>The Refutation of all Heresies, Book I.V</i>, (Hippolytus, 1870:38).</p> <p>Anaximenes (c. 585-525 BC), according to Hippolytus (c. AD 170-236), “affirmed that the originating principle is infinite air, out of which are generated things existing, those which have existed, and those that will be” in <i>The Refutation of all Heresies, Book I.VI</i>, (Hippolytus, 1870:39).</p> <p>Anaxagoras (c. 500-428 BC), according to Hippolytus: “animals originally came into existence in moisture, and after this one from another; and that males are procreated when the seed secreted from the right parts adhered to the right parts of the womb, and that females are born when the contrary took place.” in <i>The Refutation of all Heresies, Book I.VII</i>, (Hippolytus, 1870:42; cf. Burnet, 1963:273).</p> <p>According to Diodorus Siculus (c. 50 BC): “some of the liquid particles swelled up in many places, and tumours were formed about them surrounded by thin membranes, a thing which may still be seen going on in stagnant pools and marshy places, ...The moist parts then being quickened into life by the warmth in the way mentioned, ... all various types of living things sprang up. And those of them which had received the largest share of heat went off into the upper regions, and became birds; while those which retained an earthy consistency were counted in the order of reptiles and of the other land animals; and those which had partaken most largely of the watery element ran together to the place congenial to their nature, and were called aquatic...” in <i>Eusebius’ Praeparatio Evangelica, Book I.VII</i>, (Gifford, 1903).</p>	<p>“It is often said that all the conditions for the first production of a living organism are now present, which could ever have been present. But if (and oh! what a big if!) we could conceive in some warm little pond, with all sorts of ammonia and phosphoric salts, light, heat, electricity, etc., present, that a proteine [<i>sic</i>] compound was chemically formed ready to undergo still more complex changes, at the present day such matter would be instantly devoured or absorbed, which would not have been the case before living creatures were formed.” In a letter to Joseph Hooker in 1871, (Darwin, 1887c:18).</p>

¹ Primary source has been lost.

Transmutation	<p>Anaximander (c. 610–546 BC): according to Hippolytus: “man was, originally, similar to a different animal, that is, a fish” in <i>The Refutation of all Heresies, Book I.V</i>, (Hippolytus, 1870:38).</p> <p>Anaximander (c. 610–546 BC), according to Plutarch², “says that fish and men were not produced in the same substances, but that men were first produced in fishes, and, when they were grown up and able to help themselves, were thrown out, and so lived upon the land” in <i>Plutarch’s Morals III: Symposiacs, Question VIII</i>, (Goodwin, 1878:426).</p> <p>Empedocles (c. 490–430 BC): “the first of all animals were trees, and they sprang from the earth before the sun in its glory enriched the world, and before day and night were distinguished” in <i>Plutarch’s Morals III: Of Those Sentiments Concerning Nature With Which Philosophers Were Delighted, Book V.XXVI</i>, (Goodwin, 1878:190-191).</p> <p>Archelaus (c. 450 BC), according to Hippolytus (c. AD 170-236): “with regard to animals, he affirms that the earth, being originally fire in its lower part, where the heat and cold were intermingled, both the rest of animals made their appearance, numerous and dissimilar, all having the same food, being nourished from mud; and their existence was of short duration, but afterwards also generation from one another arose unto them; and men were separated from the rest [of the animal creation]” in <i>The Refutation of all Heresies, Book I.VIII</i>, (Hippolytus, 1870:43).</p>	<p>“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.” In <i>On the Origin of Species</i>, (Darwin, 1859:484).</p> <p>“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.” In <i>On the Origin of Species</i>, (Darwin, 1859:490).</p> <p>“We must, however, acknowledge, as it seems to me, that man with all his noble qualities, with sympathy which feels for the most debased, with benevolence which extends not only to other men but to the humblest living creature, with his god-like intellect which has penetrated into the movements and constitution of the solar system—with all these exalted powers—Man still bears in his bodily frame the indelible stamp of his lowly origin.” In <i>The Descent of Man</i>, (Darwin, 1882a:619).</p>
Antiquity of the Earth	<p>Aristotle (384-322 BC): “But the whole vital process of the earth takes place so gradually and in periods of time which are so immense compared with the length of our life, that these changes are not observed, and before their course can be recorded from beginning to end whole nations perish and are destroyed.” in <i>Meteorology</i>, (Aristotle, 1952b:457).</p>	<p>“it is highly important for us to gain some notion, however imperfect, of the lapse of years... What an infinite number of generations, which the mind cannot grasp, must have succeeded each other in the long roll of years!” in <i>On the Origin of Species</i>, (Darwin, 1859:287).</p>

² Primary source has been lost.

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Natural Selection and Survival of the Fittest</p>	<p>Empedocles (c. 490–430 BC), according to Aristotle³: “Why then should it not be the same with the parts in nature, e.g. that our teeth should come up of necessity – the front teeth sharp, fitted for tearing, the molars broad and useful for grinding down the food – since they did not arise for this end, but it was merely a coincident result; and so with all other parts in which we suppose that there is purpose? Wherever then all the parts came about just what they would have been if they had come be for an end, such things survived, being organized spontaneously in a fitting way; whereas those which grew otherwise perished and continue to perish, as Empedocles says his ‘man-faced ox-progeny’ did.” in Aristotle’s <i>Physics, Book II.VIII</i> (Aristotle, 1952e:276; cf. Osborn, 1929:54; Adler & Gorman, 1952:464).</p>	<p>“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.” In <i>On the Origin of Species</i>, (Darwin, 1859:490).</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">The Inheritance of Acquired Characters and “Pangeneses”</p>	<p>Democritus (c. 460-370 BC): “Aristotle says, that seed is that thing which contains in itself a power of moving, whereby it is enabled to produce a being: like unto that from whence it was emitted... Democritus, that it proceeds from all the parts of the body, and chiefly from the principal parts, as the flesh and muscles.” In <i>Plutarch’s Morals III: Of Those Sentiments Concerning Nature With Which Philosophers Were Delighted, Book V.III</i>, (Goodwin, 1878:177)</p> <p>Hippocrates (c. 460-370 BC): “for the semen comes from all parts of the body, sound from the sound parts, and unhealthy from the unhealthy parts. If, then, children with bald heads are born to parents with bald heads; and children with blue eyes to parents who have blue eyes; and if the children of parents having distorted eyes squint also for the most part; and if the same may be said of other forms of the body, what is to prevent it from happening that a child with a long head should be produced by a parent having a long head?” in <i>On Airs, Waters, and Places (section XIV)</i> (Hippocrates, 1849:208).</p>	<p>“How can the use or disuse of a particular limb or of the brain affect a small aggregate of cells in the reproductive organs, in such a manner that the being developed from these organs inherits these newly acquired characters of either one or both parents? ...I am led to believe... that as each tissue or cell becomes developed, a superabundant atom or gemmule as it may be called of the formative matter is thrown off;—that these almost infinitely numerous and infinitely minute gemmules unite together in due proportion / to form the true germ;—that they have the power of self-increase or propagation; and that they here run through the same course of development, as that which the true germ, of which they are to constitute elements, has to run through, before they can be developed into their parent tissue or cells. This may be called the hypothesis of Pangeneses.” In <i>Charles Darwin’s Manuscript of Pangeneses</i>, (Olby & Darwin, 1963:257-259).</p>

³ Primary source has been lost.

<p style="text-align: center;">Man is an Animal</p>	<p>Aristotle (384-322 BC):“Thus we should say, because man is an animal with such and such characters, therefore is the process of his development necessarily such as it is; and therefore is it accomplished in such and such an order, this part being formed first, that next, and so on in succession; and after a like fashion should we explain the evolution of all other works of nature.” In <i>On the Parts of Animals, Book I.I</i>, (Aristotle, 1952f:163).</p>	<p>“Man in the rudest state in which he now exists is the most dominant animal that has ever appeared on this earth.” In <i>The Descent of Man</i>, (1882a:48).</p>
<p style="text-align: center;">Uniformitarianism and Gradualism</p>	<p>Democritus (c. 460-370): “Democritus reduces the causes that explain nature to the fact that things happened in the past in the same way as they happen now: but he does not think fit to seek for a first principle to explain this ‘always’: so, while his theory is right in so far as it is applied to certain individual cases, he is wrong in making it of universal application.” In Aristotle’s <i>Physics, Book VIII.I</i> (Aristotle, 1952e:336).</p>	<p>“Natural selection can act only by the preservation and accumulation of infinitesimally small inherited modifications, each profitable to the preserved being; and as modern geology has almost banished such views as the excavation of a great valley by a single diluvial wave, so will natural selection, if it be a true principle, banish the belief of the continued creation of new organic beings, or of any great and sudden modification in their structure.” <i>On the Origin of Species</i>, (Darwin, 1859:95-96).</p> <p>“Nature acts uniformly and slowly during vast periods of time on the whole organisation” <i>On the Origin of Species</i>, (Darwin, 1859:269).</p> <p>“As species are produced and exterminated by slowly acting and still existing causes, and not by miraculous acts of creation and by catastrophes... it follows, that the amount of organic change in the fossils of consecutive formations probably serves as a fair measure of the lapse of actual time.” <i>On the Origin of Species</i>, (Darwin, 1859:487-488).</p>
<p style="text-align: center;">Anti-Creationism</p>	<p>Aristotle (384-322 BC): “But so far as time is concerned we see that all with one exception are in agreement in saying that it is uncreated: in fact, it is just this that enables Democritus to show that all things cannot have had a becoming: for time, he says, is uncreated.” in <i>Physics, book VIII.I</i>, (Aristotle, 1952e:335).</p>	<p>“I can indeed hardly see how anyone ought to wish Christianity to be true; for if so the plain language of the text seems to show that men who do not believe, and this would include my Father, Brother and almost all my best friends, will be everlastingly punished. And this is a damnable doctrine.” In <i>The Autobiography of Charles Darwin</i>, (Darwin, 1958:72).</p> <p>“He who is not content to look, like a savage, at the phenomena of nature as disconnected, cannot any longer believe that man is the work of a separate act of creation.” In <i>The Descent of Man</i>, (Darwin, 1882a:607).</p>

Chance	<p>Empedocles (c. 490–430 BC): “[Empedocles] tells us also that most of the parts of animals came to be by chance.” in <i>Physics, Book II.IV</i> (Aristotle, 1952e:272).</p> <p>The Ionian Philosophers, according to Plato (c. 428–347 BC): “They say that the greatest and fairest things are the work of nature and of chance... They say that fire and water, and earth and air, all exist by nature and chance” in Plato’s <i>Laws X.889</i> (Plato, 1952:760; Guthrie, 1962:144).</p> <p>Lucretius (c. 99-55 BC): “For so many first-beginnings of things in many ways, driven on by blows from time everlasting until now, and moved by their own weight, have been wont to be borne and to unite, in every way, and essay everything that they might create, meeting one with another, that it is no wonder if they have fallen also into such arrangements... that by no means has the nature of things been fashioned for us by divine grace.” in <i>On the Nature of Things, Book V</i> (Bailey, 1950:192).</p>	<p>“every slight modification, which in the course of ages chanced to arise, and which in any way favoured the individuals of any of the species, by better adapting them to their altered conditions, would tend to be preserved” in <i>On the Origin of Species</i>, (Darwin, 1859:82).</p> <p>“Mere chance, as we may call it, might cause one variety to differ in some character from its parents, and the offspring of this variety again to differ from its parent in the very same character and in a greater degree” in <i>On the Origin of Species</i>, (Darwin, 1859:111).</p> <p>“The birth both of the species and of the individual are equally parts of that grand sequence of events, which our minds refuse to accept as the result of blind chance. The understanding revolts at such a conclusion, whether or not we are able to believe that every slight variation of structure,—the union of each pair in marriage, the dissemination of each seed,—and other such events, have all been ordained for some special purpose.” In <i>The Descent of Man</i>, (Darwin, 1882a:613).</p>
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Despite the selective nature of this literature review, it is worth noting the extent to which some of Darwin’s key ideas were not only unoriginal, but unoriginal by more than two thousand years. In summary, his views on philosophical naturalism, abiogenesis, transmutation, cosmic antiquity, natural selection, pangenesis, antitheism, and his attack on the biblical account of creation can all be identified in ancient Greek writings. The one facet notably absent from the ancient Greeks, admittedly, was Darwin’s conception of common ancestry. Yet, even in this regard, it will be shown that Darwin was not the first to propose such a scheme.

2.3 THE “SCIENTIFIC REVOLUTION”

2.3.1 THE MYTH OF THE “DARK AGES”

Charles Darwin has often been portrayed as a man who finally helped free mankind from the doggedly persistent influence of the “Dark Ages”. This is the belief which Warren and Mellman encourage concerning *The Origin of Species* (hereafter abridged to *Origin*):

“The greatest scientific advance of the last 1000 years was providing the evidence to prove that human beings are independent agents whose lives on earth are neither conferred nor controlled by celestial forces..... nothing was more important than

providing the means to release men and women from the hegemony of the supernatural.” (cited by Berry et al., 2009:98.)

In fact, the term “Dark Ages” has comparatively recent origins, occurring for arguably the first time in Henry Buckle’s *History of Civilization in England* which was published in the same year as *Origin*: 1859 (Stark, 2003:129). Buckle (1903:261) writes concerning this period, “In the Dark Ages, men were credulous and ignorant; they therefore produced a religion which required great belief and little knowledge.”

In 1874, John William Draper went to great lengths in his *History of the Conflict between Religion and Science* to emphasise the negative impact Christianity had made over the centuries. He wrote,

“In the annals of Christianity the most ill-omened day is that in which she separated herself from science... In vain through many subsequent centuries did her leading men spend themselves in—as the phrase then went—‘drawing forth the internal juice and marrow of the Scriptures for the explaining of things.’ Universal history from the third to the sixteenth century shows with what result. *The dark ages owe their darkness to this fatal policy.*” (emphasis mine; Draper, 1875:215-216.)

In fact, Draper informs us that it was Christians who, in their religious ignorance and zeal, popularised the notion that the earth was flat:

“With respect to... the grandest of all human undertakings [the circumnavigation of the earth], it is to be remembered that Catholicism had irrevocably committed itself to the dogma of a flat earth, with the sky as the floor of heaven, and hell in the under-world.” (Draper, 1875:294.)

To claim this, Draper depended upon an earlier source, namely, *The Life and Voyages of Christopher Columbus*. Its author, Washington Irving (1783-1859), argued that Columbus had bravely contended with the existing religious establishment of his day that the earth was round, finally proving to the world by his voyage that his claims were true. The story goes that, prior to this demonstrable proof, Columbus was examined by church dignitaries, friars and professors at a council in the Dominican convent of St. Stephen, Salamanca. Irving would have us believe that Columbus was made to defend his intentions to travel around the globe against simple-minded Biblicists who maintained that it was flat and therefore impossible to circumnavigate. In this regard he relates an argument which was used:

“Is there any one so foolish...as to believe that there are antipodes with their feet opposite to ours; people who walk with their heels upward and their heads hanging down? That there is a part of the world in which all things are topsy-turvy; where the trees grow with their branches downward, and where it rains, hails, and snows upwards? The idea of the roundness of the earth...was the cause of inventing this fable; for these philosophers, having once erred, go on in their absurdities, defending one with another.” (Irving, 1914:35.)

But the facts are actually far less dramatic. In recent years this dramatic story-telling has been exposed by scholars who have gone back to the historical sources. Jeffery Russell concludes, in *Inventing the Flat Earth*, “The Error is not the alleged medieval belief that the earth was flat, but rather the modern error that such a belief ever prevailed.” (Russell, 1997:3). Unfortunately, this myth has prevailed and become entrenched in modern folklore as many students of history are taught that Christopher Columbus was a “bold young rationalist who overcame ignorant and intractable churchmen and superstitious sailors” (Russell, 1997:5). It is disappointing that Irving failed to consult one of the most influential theologians of the Middle Ages before he published his speculations. The rotundity of the earth was clearly mentioned by Thomas Aquinas in his *Summa Theologica* as a well-known and accepted scientific truth of the 13th century (Franklin, 1982:51). It seems that the “Dark Ages” were not so dark after all. In fact, Aristotle actually argued for a spherical earth as early as 4th century B.C. refuting Anaximenes, Anaxagoras and Democritus who presumed the earth was flat (Aristotle, 1952d:386). Even earlier than this, it can be shown in Judaic thought that the accepted scientific understanding was of a spherical earth. In 740 BC, Isaiah wrote, “It is he who sits above the circle⁴ of the earth, and its inhabitants are like grasshoppers; who stretches out the heavens like a curtain, and spreads them like a tent to dwell in” (Isaiah 40:22).

In contradiction to the prevailing stigma attached to the so-called “Dark Ages”, modern civilization is greatly indebted to the influence which Christianity enjoyed during this period (*contra* Mayr, 1982:307). It was during these centuries that Christianity inspired the establishment of universities, and consequently, higher learning (Stark, 2003:62). Specifically, it was in about 1200 AD that the prestigious Oxford and Cambridge Universities were founded (Stark, 2003:62). The term “Scientific Revolution” is therefore equally misleading because modern science was not invented at the time of Copernicus, Galileo, and Newton (Stark, 2003:134). In fact, medieval science, in its methods, was not entirely different from modern science. One of the eminent English scientists and philosophers of that period, Roger Bacon (c. 1214-1294), strongly defended experimental science and mathematics, believing that, “no rational activity can hope to succeed unless founded on Christian faith and set to work on the data of revelation; the pathway even to nature’s secrets...leads through biblical studies” (Lindberg, 1987:535). It is therefore misleading of Andrew White to use Roger Bacon as an example of Enlightenment thinking in this period when he writes,

“In an age when theological subtilizing was alone thought to give the title of scholar, he insisted on real reasoning and the aid of natural science by mathematics; in an age when experimenting was sure to cost a man his reputation, and was likely to cost him his

⁴ אָרְבַּע (Strong’s Hebrew: #2328 & #2329). See also Job 26:7

life, he insisted on experimenting, and braved all its risks. Few greater men have lived.” (White, 1896:387; cf. Lindberg, 1987:519.)

As we have already seen, the converse is true. Roger Bacon actually exposed Aristotle’s failures as a scientist for misunderstanding the nature of the rainbow *because Aristotle had not referred to Scripture to guide his thinking* concerning its purpose in the sky (Lindberg, 1987:529). History repeatedly demonstrates that where men have built their epistemic foundations upon Scripture, their science has flourished. Rodney Stark supports this notion in his claim that, “Christian theology was essential for the rise of science” (Stark, 2003:123). Some of the technological advancements during this period included the invention of waterwheels, mills, camshafts, mechanical clocks, spectacles, glass mirrors, the introduction of double-entry bookkeeping, blast furnaces, the utilization of gunpowder and the development of the magnetic compass and maritime navigation (Stark, 2003:133; Franklin, 1982:52; Hannam, 2009:5). It should not be surprising therefore that, “the so-called Scientific Revolution of the sixteenth century was the normal result of the development begun by Scholastic scholars starting in the eleventh century” (Stark, 2003:123).

Later, in 1455, the first printing press was established by Johannes Gutenberg (c. 1398-1468) whose intentions were to print the Bible. This led to a copious amount of other scholarly literature being printed and circulated in Europe which, in turn, increased the general literacy of the public during those ages. This is why the “smell of printer’s ink” has been called “the incense of the Reformation” (Johnson, 1976:271). It was Christianity which provided the necessary preconditions for the flourishing of science in this period. This was, as Stark (2003:147) points out, because “Christianity depicted God as a rational, responsive, dependable, and omnipotent being and the universe as his personal creation, thus having a rational, lawful, stable structure, awaiting human comprehension.” Without Christianity to provide the necessary preconditions for intelligibility and science, the modern technological age we live in today might really have been the “Dark Ages”.

2.3.2 THE PROTESTANT REFORMATION (1517)

During the time of the Middle Ages (the less pejorative description of the “Dark Ages”), the popularisation of Aristotle led to an unfortunate synthesis between Greek philosophy and scripture. The Bible was no longer seen as being authoritative alone (Amos, 2007:209). Thomas Aquinas (1225-1274) was instrumental in this regard. Believing all truth to be God’s truth, and having a great appreciation for Aristotle and Greek philosophy, he was convinced that such a synthesis was possible and thereby attempted it in his *Summa Theologica*. This, in turn, led to Peter Lombard’s *Sentences* which became the second most significant theological work during this period. The ramifications on theology were unquestioningly detrimental. The Bible was no longer understood on its own terms; and philosophical ideas soon encouraged further

speculation away from the text (Amos, 2007:210). Reason was placed on the same plateau as revelation, taking Aristotle's philosophy as the basis for reason, and Scripture as the basis for revelation (Amos, 2007:213). As with all syntheses, this compromise subjected the epistemological authority of Scripture to human reason. It was against this system of thought that Martin Luther (1483-1546) spoke out:

“It is wrong to say that a man cannot become a theologian without Aristotle... The truth is that a man cannot become a theologian unless he becomes one *without* Aristotle. In short, compared with the study of theology, the whole of Aristotle is as darkness is to the light...” (emphasis mine; Luther, 1957:31.)

Thus the Protestant Reformation, catalyzed by Luther, provided an epistemological revolution in theology, restoring Scripture to its rightful place above human reason and philosophy. Luther argued that “reason's place is ministerial, serving Scripture, not magisterial, lording it over Scripture” (Amos, 2007:214). His conscience was “ultimately bound by Scripture, not reason” (Amos, 2007:214). It was quite fitting, therefore, for Luther and the reformers to adopt as their slogan the principle *sola Scriptura*.

Frame (1995:40) has helpfully delineated reformations into three phases: confrontation, consolidation and continuation. Within this scheme, Luther provided the confrontation, and John Calvin (1509-1564) provided the consolidation. The expression of Calvin's theology is best captured in his *magnum opus*, *Institutes of Christian Religion* (1559). This marked a masterly endeavour in the history of Christianity to formulate and systematize all Christian doctrine upon the grounds of Scripture alone. In this work, Calvin argues strongly, *pro* Luther, for the authority of Scripture over human reason, stating, “the testimony of the Spirit is more excellent than all reason” (Calvin, 2006:79), and concerning the sciences:

“...all the sciences by which wisdom is acquired, are gifts of God. They are confined, however, within their own limits; for into God's heavenly kingdom they cannot penetrate. Hence they must occupy the place of handmaid, not of mistress: nay more, they must be looked upon as empty and worthless, until they have become entirely subject to the word and Spirit of God. If, on the other hand, they set themselves in opposition to Christ, they must be looked upon as dangerous pests, and, if they strive to accomplish anything of themselves, as the worst of all hindrances.” (commentating on 1 Corinthians 4:19, in Calvin, 1848:145.)

This has led some historians to argue that both Luther and Calvin held back the progress of science. To support such an indictment they cite Luther's 1539 “table talk” denunciation of Copernicus as a fool; and claim, on similar grounds, that Calvin once said, “Who will venture to place the authority of Copernicus above that of the Holy Spirit?” (White, 1896:126,127; Rosen, 1960:431). But both these quotations, with their extrapolations, suffer from severe anachronism and deliberate misrepresentation. Rosen (1960:441) has shown the latter claim to be entirely apocryphal on the grounds that Calvin had probably never even *heard* of Copernicus let alone read any of his writings. The Luther quote also suffers from a poor appreciation of both Luther's

scientific credentials and the fact that his comment was made four years before Copernicus finally published his work in 1543. Norlind (1953:274) tells us that Luther, at the time of this quote, “had studied logic and psychology, spherical astronomy, metaphysics, mathematics and arithmetic, was well acquainted with the theory of music and perspective, natural and moral philosophy, politics and economics”. In fact, the reason why Luther’s cosmology clashed with Copernicus was primarily because of his dependence upon Aristotelian science not his theology (Pelikan, 1961:468; Norlind, 1953:274). In this regard Luther was merely a child of his time, and an example to subsequent generations of the damage caused by an inflexible Aristotelian allegiance. It is with this in mind that Pelikan (1961:468-469) adds, “the Aristotle who had been a bridge between theology and science became a barrier instead”. Therefore we can see that the Protestant Reformation actually allowed theologians and scientists to break free from the hegemony of both the Catholic church and Aristotelian philosophy, thereby encouraging science to blossom as “the handmaiden of theology” (Stark, 2003:149). In particular, Harrison (2006:130) claims that the literal interpretation of the Genesis narrative had a “major impact on the development of experimental science in seventeenth-century England”. In support, Snobelen (2004) writes,

“Recent work on early modern science has demonstrated a direct (and positive) relationship between the resurgence of the Hebraic, literal exegesis of the Bible in the Protestant Reformation, and the rise of the empirical method in modern science. I’m not referring to wooden literalism, but the sophisticated literal-historical hermeneutics that Martin Luther and others (including Newton) championed.”

During the Protestant Reformation reason was not annulled by Scripture, it was given wings to fly.

2.3.3 THE “COPERNICAN REVOLUTION” (1543)

In 1543, just before his death, Nicholas Copernicus (1473-1543) published *On the Revolutions of the Celestial Spheres*. He had, in fact, written the manuscript 34 years before this time but had been reticent to publish it because of the reception he thought it expected. In this volume he discussed a new cosmology; a cosmology which radically departed from the Aristotelian paradigm perfected by Ptolemy in the early second century. Under this new scheme, Copernicus proposed a heliocentric model of the universe.

But contrary to common belief, propagated unhelpfully by A.D. White’s *A History of the Warfare of Science with Theology in Christendom*⁵ (1896), Copernicus did *not* discover that the “sun and

⁵ White has also been credited with popularising the myth that in Columbus’s day the majority believed the earth to be flat. But Stark (2003:122) has illustrated with evidence that, “almost every word of White’s account of the Columbus story is a lie”.

planets do not revolve around the earth” (White, 1896:121). In fact, Bernard Cohen suggests that, “the idea that a Copernican revolution in science occurred goes counter to the evidence...and is an invention of later historians.” (quoted by Stark, 2003:139; cf. Kuhn, 1996:66-69). Stark (2003:136-138) records a number of scientists prior to Copernicus who effectively worked out, and provided the essential elements of his heliocentric model. Among these great predecessors of Copernicus were Jean Buridan (ca. 1295-1358) who proposed that the earth rotated on its axis; Nicole d’Oresme (1325-1385) who strengthened this hypothesis with further evidence; and Nicholas of Cusa (1401-1464) who questioned the fixity of the earth in space, observing that the perception of motion was determined by one’s reference point. Copernicus got his ideas primarily from the professors he studied under in the universities of Cracow, Bologna, Padua and Ferrara. Stark (2003:138-139) argues that Copernicus actually contributed very little to the existing knowledge of his day, developing a model which was in many respects wrong: having circular orbits instead of ellipses and disproportionate distances between planets and the sun.

Nevertheless, Copernicus’s ideas did stimulate greater enthusiasm for heliocentric cosmology because he was better able to substantiate the model on empirical grounds. By the time Galileo Galilei (1564-1642) appeared on the scene, the Jesuit astronomers of his day were already avid Copernican followers (Schirrmacher, 2000:92). With his telescope, and an entirely new paradigm, Galileo was able to explain stars and planets in from a fresh perspective. In 1611, he finally published his findings in the significant work *Messenger from the Stars*. So it transpired that the scientific proof for the Copernican system only came several decades later with the contributions of Galileo and Kepler (1571-1630) who were able to confirm the hypothesis with their telescopes. In fact, recent historical studies have shown that it was Kepler, not Galileo, who finally proved heliocentricism (Hannam, 2009:299). Later, in 1684, Sir Isaac Newton (1643-1727) provided the world with three laws to describe the motion of heavenly bodies – laws describing inertia, acceleration and reciprocal actions (Hoffecker, 2007:246). Within a period of 150 years, the “Copernican Revolution” was completed and the Ptolemaic model replaced (Mortenson, 2004b:19).

2.3.4 THE CONFLICT BETWEEN FAITH AND SCIENCE

The inaugural period of the “Scientific Revolution”, and its subsequent interpretation, has shaped, to a large extent, the popular perception of the relationship between faith and science. It has continued to sustain a false, yet iconic depiction of the conflict between science and scripture (cf. Finocchiaro, 2007:132; Pannenberg, 2006:106). The two books largely responsible for this mischaracterisation were written with Darwin’s own era: John Draper’s *History of the Conflict between Religion and Science* (1875), and Andrew White’s *A History of the Warfare between Science with Theology in Christendom* (1896). Both works alleged that

the church blindly held back the progress of science during the Middle Ages, whilst unreasonably suppressing the likes of Copernicus, Galileo and Kepler; and all because of a literalistic reading of the biblical text (Huxley, 1859:8; Einstein, 1940:181; Lisonbee, 1965:200-201). Pertinent to the Darwinian period, the professing Christian, Asa Gray, wrote a pamphlet in 1861 called *Natural Selection not inconsistent with Natural Theology* in which he lambasted the church for making the same mistakes with Darwin as it had with Galileo. Charles Darwin, in his astuteness, realised the potential of such a paper and paid for its circulation in print, hoping that church-goers would be more inclined to accept the theological respectability of his thesis (Browne, 2002:155). Later, in the sixth edition of *Origin*, Darwin appealed to the same iconic conflict between science and faith to bolster his case for the evolution of the eye:

“When it was first said that the sun stood still and the world turned round, the common sense of mankind declared the doctrine false; but the old saying of *Vox populi, vox Dei*, as every philosopher knows, cannot be trusted in science.” (Darwin, 1872:143.)

Thomas Huxley, Darwin’s infamous “bulldog”, continued to popularise this conflict in his sympathetic review of *Origin*:

“Who shall number the patient and earnest seekers after truth, from the days of Galileo until now, whose lives have been embittered and their good name blasted by the mistaken zeal of Bibliolaters? Who shall count the host of weaker men whose sense of truth has been destroyed in the effort to harmonize impossibilities whose life has been wasted in the attempt to force the generous new wine of Science into the old bottles of Judaism, compelled by the outcry of the same strong party... *Extinguished theologians lie about the cradle of every science as the strangled snakes beside that of Hercules; and history records that whenever science and orthodoxy have been fairly opposed, the latter has been forced to retire from the lists, bleeding and crushed, if not annihilated; scotched, if not slain.*” (emphasis mine; Huxley, 1915:278.)

Another man to use Galileo in favour of Darwin, but against the church, was George Foote, who founded *The Freethinker* in 1881 and wrote several diatribes against Christianity. Foote claimed that Darwin was in the same league of scientists as Galileo and Copernicus who by their theories had disproved the Bible. He wrote the following in a pamphlet called *Darwin on God*,

“They did not understand [Darwin’s ideas] any more than the Inquisitors who burnt Bruno⁶ and tortured Galileo understood the Copernican astronomy; but they felt, with a true professional instinct, with that cunning of self-preservation which nature bestows on every species, including priests, that the Darwinian theory was fatal to their deepest dogmas, and therefore to their power; their privileges, and their profits... *The popular triumph of Darwinism must be the death-blow to theology.* The Copernican astronomy destroyed the geocentric theory, which made the earth the centre of the universe, and all the celestial bodies its humble satellites. From that moment the false astronomy of the

⁶ This claim is also in error. Bruno’s heresies related exclusively to his portrayal of the Incarnation and the Trinity. Durant (1961:623) tells us that no reference was made to Copernicus or his views during Bruno’s trial.

Bible was doomed, and its exposure was bound to throw discredit on ‘the Word of God’.” (emphasis mine; Foote, 1889:4.)

In consequence, many historians and scientists in support of Darwin have elevated Galileo above his peers, acclaiming him to be the “Father of Modern Science” (Finocchiaro, 2007:602). As far as the moral of the story goes, it is hoped that the lesson learned in the 17th century with *Messenger from the Stars (1611)* would not be forgotten in the 19th with Charles Darwin’s *Origin*. But this common interpretation, which owes its popularity in part to the hagiographies written by several early biographers⁷, grossly oversimplifies and misrepresents the nature of the real conflict that took place. Schirrmacher (2000:91) has challenged this depiction of the Galileo affair arguing instead in 15 theses that,

“both Galileo and the Copernican system were well regarded by Church officials. Galileo was the victim of his own arrogance, the envy of his colleagues, and the politics of Pope Urban VIII. He was not accused of criticising the Bible, but disobeying a papal decree.”

Finocchiaro (2007:128) has supported this assessment, arguing that, “the trial of Galileo exhibits the deep structure of nothing less, and nothing more, than the conflict between conservation and innovation”. Stark (2003:165) adds that, “while Pope Urban VIII’s religious views may have caused Galileo to suffer for his scientific views, Galileo’s science did not suffer *because of his own religious views*” (emphasis mine).

Significantly, Copernicus was a devout priest and canon in the church, and his magnum opus was dedicated to none other than Pope Paul III himself (Galilei, 1957:178). Contrary to common opinion, as Galileo himself testified, Copernicus’s book was readily accepted and read by the church, “without the faintest hint of any objection ever being conceived against its doctrines” (Galilei, 1957:178-179). In fact, Galileo recounted that Copernicus was assigned his noble astronomical task by order of the supreme pontiff himself, with the added support of the Cardinal of Capua and the Bishop of Culm (Galilei, 1957:178-179). In this regard Galileo experienced much the same. He also received enthusiastic support from both his peers and the church when he first made and published his astronomical discoveries in 1611. Koestler tells us, “Pope Paul V welcomed him in friendly audience, and the Jesuit Roman College honoured him with various ceremonies which lasted a whole day.” (cited in Schirrmacher, 2000:92).

In addition to being outstanding scientists, Copernicus, Galileo, Kepler and Newton were all devout Christians who never saw their own research as conflicting with scripture. The real conflict of the day was with the Aristotelian science, epitomised by the Ptolemaic system, which had hindered scientific progress for nearly two millennia, finally culminating in the aftermath of the Protestant Reformation (cf. Sarfati, 2008:29). Stark (2003:154) supports this notion:

⁷ Specifically: Johannes Hemleben, Ernst Schmutzer and Wilhelm Schütz

“Greek learning was a barrier to the rise of science! It did not lead to science among the Greeks or the Romans, and it stifled intellectual progress in Islam.”

Therefore we find that the Copernican or Scientific Revolution is important to our discussion of Darwin because of the way it has been used by him and his contemporaries during the time of the “Darwinian Revolution”. Unfortunately, this prejudicial interpretation of the Copernican Revolution set the precedent for how science was to relate to scripture in future conflicts. But Galileo was not the only scientist from this period to prepare the way for Darwin’s ideas.

Francis Bacon (1561-1626), another prominent contemporary of Galileo, constructed and proposed an epistemological framework to resolve the conflict between science and scripture. In his earlier years, Darwin studied the Baconian method in John Herschel’s *Preliminary Discourse on the Study of Natural Philosophy* and applied it rigorously, “following Hershel’s rules exactly”, in his *Origin of Species* (Thomson, 2005:5). Bacon’s influence upon Darwin can also be ascertained from the admission he made in his autobiography where he wrote, “I worked on true Baconian principles, and without any theory collected facts on a wholesale scale” (Darwin, 1958:98).

Both Bacon and Galileo addressed the relationship between science and scripture, and it has been common practice to defer to their theological writings for wisdom on such matters. The scientific competence of both men gave greater credibility to their *theological* views which had direct ramifications in later years on the reception of Darwin’s thesis.

2.3.5 THE TWO BOOKS OF REVELATION

In the minds of both Bacon and Galileo, they had a problem to resolve. The Copernican Revolution had introduced fundamental philosophical questions about the relationship between God’s world and his word. How could truth be determined when the teaching of scripture contradicted the results of science? The solution they envisaged was a simple one. Bacon and Galileo promoted the separation of scripture from science (Mortenson, 2004b:21). If it could be believed that scripture and science encompassed entirely different domains, then any conflict between the two would only be superficial. Independently, they each suggested a “two book” or “two truths” approach to revelation (Bacon, 1502:71; Galilei, 1957:186). God speaks not only through the book of the Bible, but he also speaks through the book of creation. So Bacon and Galileo contended that scientists should study the book of creation whilst theologians study the book of Scripture. Together, the truth of reality could be constructed as the complement of these two ventures. Galileo⁸ quoted an “eminent ecclesiastic” in this regard whose witticism has endured: “the intention of the Holy Ghost is to teach us how one goes to heaven not how

⁸ Hannam (2009:315) has shown that this aphorism was not original with Galileo but rather William of Conches who lived four centuries before him.

heaven goes.” (Galilei, 1957:186). Both men argued strongly against the notion that the Bible could be used to support a scientific conclusion.

But their epistemic paradigm was naïve. By separating God’s revelation into two distinct spheres they had effectively placed the scientific method entirely outside the realm of the Bible’s legislative domain. In this respect, Galileo wrote, “in discussions of physical problems *we ought to begin not from the authority of scriptural passages* but from sense experiences and necessary demonstrations” (emphasis mine; Galilei, 1957:182). These sentiments were echoed by Bacon (1902:425):

“For they who seek a material heaven, and a material earth, in the word of God, absurdly seek for transitory things among eternal. To look for theology in philosophy is looking for the living among the dead, and to look for philosophy in theology is to look for the dead among the living.”

It is significant that in the time of the “Darwinian Revolution” this latter quote featured prominently in Adam Sedgwick’s recantation of a global flood (Clark & Hughes, 1890:370). Later, in *Novum Organum*, Bacon stated unequivocally that no natural philosophy should be built upon precepts derived from the book of Genesis (Bacon, 1901:38). Darwin used this line of reasoning in a conversation he had with the Vicar of Down:

“you are... a theologian, I am a naturalist, the lines are separate. I endeavour to discover facts without considering what is said in the Book of Genesis. I do not attack Moses, and I think Moses can take care of himself.” (Darwin, 1887b:288.)

In later years, Darwin maintained:

“*Science has nothing to do with Christ*; except in so far as the habit of scientific research makes a man cautious in admitting evidence. For myself I do not believe that there ever has been any Revelation.” (emphasis mine; Darwin, 1879.)

With the help of Bacon and Galileo, the stage had been set for a new hermeneutic to arise and gain popularity.

2.3.6 THE RISE OF A NEW HERMENEUTIC

Bacon and Galileo had effectively provided an epistemology which placed the phenomenal world entirely outside the reach of a biblical worldview. Consequently, all the passages in scripture which speak about creation were annulled. The Bible was no longer the appropriate means to understanding creation. But, inconsistently, they argued that the scientific method could and should be used in the interpretation of Scripture. So Galileo wrote, “in expounding the Bible if one were always to confine oneself to the unadorned grammatical meaning, one might fall into error.” (Galilei, 1957:181); and again, “having arrived at any certainties in physics, we ought to utilize these as the most appropriate aids in the true exposition of the Bible and in the investigation of those meanings which are necessarily contained therein, for these must be

concordant with demonstrated truths.” (Galilei, 1957:183). In fact, the emphasis placed on reason, typical to the Age of Enlightenment, can be foreseen in some of Galileo’s comments. In his letter to the Grand Duchess Christina, Galileo wanted philosophical reasoning to prevail over the interpretation of Scripture:

“We must also take heed, in handling the doctrine of Moses that we altogether avoid saying positively and confidently anything which contradicts manifest experiences and the reasoning of philosophy or the other sciences. For since every truth is in agreement with all other truth, the truth of Holy Writ *cannot be contrary to the solid reasons and experiences of human knowledge.*” (emphasis mine; citing Cardinal Baronius; Galilei, 1957:186.)

Galileo’s theological support came from Augustine, whom he quotes as saying, “If anyone shall set the authority of Holy Writ against clear and manifest reason, he who does this knows not what he has undertaken” (Galilei, 1957:186). Unfortunately, this “principle of accommodation” introduced an idea which ultimately undermined the authority and sufficiency of Scripture. Galileo’s use of Augustine was also selective. In the *City of God*, Augustine called for scripture to interpret scripture *before* appealing to “the evidence of reason” for “this is a dangerous practice” (Augustine, 1890a:903).

Therefore, even though both Galileo and Bacon believed in a literal six-day creation as described in the book of Genesis, their epistemic paradigm allowed the Genesis account of the origin of species to be challenged by Darwin two centuries later (cf. Mortenson, 2004b:23). It is with the latter in mind that Huxley challenged his readers to consider Darwin’s hypothesis,

“This hypothesis may or may not be sustainable hereafter; it may give way to something else, and higher science may reverse what science has here built up with so much skill and patience, but *its sufficiency must be tried by the tests of science alone*, if we are to maintain our position as the heirs of Bacon and the acquitters of Galileo. We must weigh this hypothesis strictly in the controversy which is coming, *by the only tests which are appropriate, and by no others whatsoever.*” (emphasis mine; Huxley, 1859:8.)

This new hermeneutic contributed towards a further revolution in thought at the dawn of the 17th century. The stage was set for reason to contend with Scripture.

2.4 THE AGE OF “ENLIGHTENMENT”

In Isaiah 1:18, the Lord says, “Come now, let us reason together...” But reason had begun a painful divorce from revelation, waging war on the parent which had given it birth.

Towards the late 1600s this formidable shift in philosophy and the sciences gave birth to a period in history called the “Enlightenment”. The term was invented to complement and emphasise the so-called “Dark Ages” which preceded it. But as we have seen already, the very description of this era exposed a prejudiced disposition against the influence of Christianity on civilization. Stark (2003:123) argues, in fact, that the term “Enlightenment” was developed as a

“propaganda ploy by militant atheists and humanists who attempted to claim credit for the rise of science”. What this period did produce, however, was a full-scale war on the basic foundations of theology; and most notably, “a replacement of Genesis” (Manuel, 1965:4).

Philosophers, scientists and theologians alike ushered human reason onto the centre stage. The Enlightenment stimulated the development of natural theology, deism, philosophical naturalism, scientism, and the higher criticism of the Bible. To meet these demands, theologians and biblical scholars proposed a new hermeneutic: the historical-critical method (Hasel, 1972:18-19).

2.4.1 THE RISE OF RATIONALISM

In 1624, Lord Herbert of Cherbury (1582/3-1648) proposed in *De Veritate* that theology should be constructed primarily on the basis of rational truth instead of Scripture (Amos, 2007:243). With these ideas he encouraged the development of Natural Theology, and consequentially, Deism. But it was with René Descartes (1596-1650), a French philosopher from Indre-et-Loire, that a critical revolution in thinking was evoked. In 1637, Descartes wrote *Discourse de la Méthode* in which he famously proposed “I think, therefore I am” as his foundational epistemic principle (Butel, 2000:17). This new philosophical framework had a profound impact on the way future generations would think about reality. As Amos (2007:254) has observed, “Descartes’ radically new method – *dubito, cogito ergo sum* – provided a subjective, rational starting point – the intellectual fulcrum of human autonomy – that set the agenda for all future philosophical discussion.” Descartes had transplanted the roots of intellectual thought from a God-centred paradigm into a human-centred paradigm (Amos, 2007:254). It is an incredible irony that later Descartes tried to prove the existence of God on these same principles, having established the basis upon which subsequent philosophy would undermine the Christian worldview. The ramifications were obvious:

“Human reason was set up as the final criterion and chief source of knowledge, which meant that the authority of the Bible as the infallible record of divine revelation was rejected... rationalism by its very nature was led to abandon the orthodox view of the inspiration of the Bible so that ultimately the Bible became simply one of the ancient documents, to be studied as any other ancient document.” (Hasel, 1972:18-19.)

In this way, the Enlightenment began to pave the road that would ultimately lead us to Darwin and his total rejection of the Bible as a means of understanding our true origins. It is not surprising therefore that those who approved of Darwin’s thesis and his religious commitment to naturalism would also praise René Descartes for being the “Father of Modern Philosophy”. But as Gibson (1935:440) has noted, “Descartes would not have been called ‘the father of modern philosophy’ if he had not left so many problems behind him for his children.”

2.4.2 THE CHALLENGE OF EMPIRICISM

Not long after Descartes had daringly opened the door to rationalism, other philosophers and thinkers began to pour through into its gaping darkness. In England, John Locke (1632-1704) was excited by Descartes' philosophy but challenged the notion of innate ideas, proposing instead that every human mind was like a *tabula rasa* (i.e. "blank slate"). This line of thinking placed a greater emphasis on human experience and the senses, placing the epistemic focus on the empirical world instead of in the mind. Locke has been viewed as one of the single most influential thinkers in the Enlightenment. Locke even considered himself a Christian and argued for the reasonableness of the Christian system of truth. But, like Descartes, Locke subjected the claims of revelation to human reason, thereby making reason, not revelation, the standard for judging absolute truth (Amos, 2007:244-245). It is not surprising, therefore, that Locke's emphasis on the empirical gave further authority to the sciences, and consequently less authority to theology. In his *magnum opus*, *Essay Concerning Human Understanding* (1690), Locke (1824:117) wrote, "No man's knowledge here can go beyond his experience." Whereas previous rationalists had argued on the basis of *a priori* reason (the primacy of ideas), Locke and other empiricists argued on the basis of *a posteriori* reason (the primacy of experience), thereby claiming that all knowledge is derived from sensory experience not preconceived ideas (Butel, 2000:19). In turn, Locke's philosophy made a lasting impression on another great English thinker, David Hume (1711-1776). Hume took Locke's ideas to more aggressive levels, and published his own philosophical work, *An Inquiry into Human Understanding* (1748). In this work he suggested further radical and controversial ideas. Hume wrote concerning the Bible,

"It is acknowledged on all hands... that the authority, either of the scripture or of tradition, is founded merely in the testimony of the apostles, who were eye-witnesses to those miracles of our Saviour, by which he proved his divine mission. *Our evidence, then, for the truth of the Christian religion is less than the evidence for the truth of our senses*" (emphasis mine; Hume, 1912:114.)

Hume has become infamous for his scepticism, popularising the virtue of incredulity more than any other philosopher of this era (Amos, 2007:249-250). This scepticism naturally led him to reject the miraculous, along with the Biblical account of Creation, the Fall and the Flood (Hume, 1912:137). Both Charles Lyell⁹ and Darwin's grandfather, Erasmus Darwin, extended their hospitality to Hume while he was in exile from France (Butel, 2000:18). It is not surprising, therefore, that several decades later his influence continued to pervade in Charles Darwin's writings. Darwin cited Hume repeatedly in his *Notebooks on Transmutation of Species*, and later quote him in *The Descent of Man* (Huntley, 1972:470). Like many others, Charles Darwin was a typical child of the Enlightenment.

⁹ i.e. the father of Charles Lyell (1797-1875) the lawyer and geologist.

In France, a group identified as the *Philosophes* began their own campaign against religion, and promoted a materialist worldview (Butel, 2000:18). Amongst these was the infamous François Marie Arouet (1694-1778), otherwise known as Voltaire. Voltaire has been called the David Hume of France for good reason. He attacked the Christian faith on all fronts claiming that Christianity was “antithetical to rational, natural religion” (Amos, 2007:256). In his polemic, he willingly adopted the Baconian “book analogy” of creation but disregarded the book of Scripture, arguing deistically that, “The only gospel one ought to read is the great book of nature, written by the hand of God and sealed with his seal.” (cited by Amos, 2007:256). Another French Encyclopaedist, second only to Voltaire, was the atheist Jean-Jacques Rousseau (1712-1778). Some of Rousseau’s writings hinted at the common ancestry of humans and animals, anticipating Darwin’s treatment in *The Descent of Man* (Rousseau, 1761:35-36; cf. Darwin, 1882:65). During this period, Baron d’Holbach (1723-1789), a friend of Rousseau, wrote one of the most violent diatribes against Christianity in his *Système de la nature* (1770). In this book, Holbach gives us a poignant depiction of the philosophical naturalism he espoused:

“Men will always deceive themselves by abandoning experience to follow imaginary systems. Man is the work of Nature: he exists in Nature: he is submitted to her laws: he cannot deliver himself from them; nor can he step beyond them even in thought. It is in vain his mind would spring forward beyond the visible world, an imperious necessity always compels his return. For a being formed by Nature, and circumscribed by her laws, there exists nothing beyond the great whole of which he forms a part...” (Holbach, 1835:11.)

Thus in England and France, in the spirit of Enlightenment, intellectuals turned away from Scripture as the foundational authority of knowledge to pursue either rationalist or empiricist epistemologies. In Germany, having been raised by Pietist parents, Immanuel Kant (1724-1804) encountered Hume’s scepticism and was woken from his “dogmatic slumbers” (Amos, 2007:263-264). Kant applied his mind to the dialectical tension between empiricism and rationalism and constructed a synthesis of the two which he called “Transcendental Idealism” (Amos, 2007:264; Butel, 2000:19). He expressed his ideas in three major works, but answered the epistemological question, “How do we know what we know?” in the first, *Critique of Pure Reason* (1781). The motif of all Kant’s philosophy was this, that “human reason must function autonomously” (Amos, 2007:265). And so Kant gave intellectual credibility to the spirit of Enlightenment in Germany. As Hoffecker (2007:264) recounts, “By synthesizing rationalism and empiricism, Kant addressed Hume’s scepticism and eliminated any possibility of revelation as a factor in knowledge.” The consequences have been well expressed by Amos (2007:264):

“Not only did Kant give epistemic authority to science; *he left science and theology with nothing to say to each other.* Kant introduced a conflict between facts and values that continues to this day.” (emphasis mine.)

Kant, like his predecessors, had little regard for Genesis or its historicity, denying the fall, the garden, Adam and Eve, and finally the deity of Christ, whom he portrayed as merely the

“personification of moral goodness that lies resident in reason” (Amos, 2007:269). Again, it is interesting that as Kant abandoned the dogmatic theological beliefs of his childhood, looking instead to autonomous human reason, Darwin would also, in turn, abandon his faith and look to science for the answer to the origin of species.

2.4.3 THE APPEAL TO NATURAL THEOLOGY

2.4.3.1 The European Roots of Natural Theology

In an Age of Reason (as it was known in France), the only way to keep religion intellectually respectable is to construct it rationally. Manuel (1965:9) described the situation as follows, “For enlightened men natural religion was the only true religion, and that meant a religion virtually without theological dogmas or ecclesiastical establishments.” Eminent theologians were not immune to the force of the Enlightenment. John Wesley (1703-1791), who played a substantial role in the English Evangelical Awakening, also capitulated in part. While advancing some of the themes of the Reformation, Wesley’s system of theology departed from the principle *sola scriptura* and in its place he proposed a four-fold epistemology derived from reason, tradition, experience, and the Bible (Amos, 2007:251). It was not long before reason had usurped its associates. David Hume, reticent to abandon the benefits of a Christian worldview, had actually proposed what he called the “middling” way, a Christ-less Christianity, with more emphasis on being a gentleman than being a believer in Christ (Manuel, 1965:13). In England, the appeal was made to natural theology. Natural theology began with nature and reasoned its way back up to God. It also provided an easy bridge from theism to deism, and was happily endorsed in England because, pragmatically, it served as “one of the strongest bulwarks against social unrest because it reinforced ideas of stable hierarchy, a powerful antidote against civil insurgencies and rebellion” (Browne, 2002:18). Thus liberal Protestantism yielded its “moral authority to the secular state and its epistemological basis to science” (Russell, 1997:38). Christian leaders encouraged the church to embrace the stories in the Bible not as literal accounts but rather as “potent metaphors” (Browne, 2002:86). Reason had finally gained ownership of theology.

Likewise in Germany, several theologians, taking their lead more from Kant than Hume, sought to demythologize the Bible (Powell, 1860:105-107,116; Butel, 2000:21). Amongst these were the likes of Friedrich Schleiermacher (1768–1834), Ludwig Feuerbach (1804–1872), and David Friedrich Strauss (1808–1874) who each encouraged a “higher” criticism of the Bible (Manuel, 1965:10). Of relevance to the question of origins, the French-German encyclopaedist, Baron d’Holbach (mentioned earlier) wrote that:

“Some theologians have frankly confessed that the theory of the creation was founded on an hypothesis supported by very little probability, and which had been invented some centuries after Jesus Christ.” (Holbach, 1835:239.)

In a similar vein, Strauss, in his *Life of Jesus* claimed that the early church embellished the factual events concerning Jesus and wrote those myths into the gospels (Butel, 2000:21). Strauss lived long enough to read Darwin's *Origin* and made the comment,

“Darwin opened the door by which a happier coming race will cast out miracles, never to return. Everyone who knows what miracles imply will praise him, as a consequence, as one of the greatest benefactors of the human race.” (cited by Butel, 2000:21.)

2.4.3.2 William Paley's Contribution to Natural Theology

The most meticulous construction of natural theology, however, came from William Paley (1743-1805) in 1802. Paley began his studies at Cambridge, exactly fifty-five years before Darwin, where he quickly proved himself to be a capable scholar (Thomson, 2005:15). After graduating top of his class, he stayed on to lecture at the College in philosophy and Greek. His lectures were so popular that he began to compile some of his notes into book format and ended up publishing two substantial volumes, *The Principles of Moral and Political Philosophy* (1768) and *A View of the Evidences of Christianity* (1794) - two books which Darwin would later refer to as being seminal works in his own education at Cambridge (Darwin, 1958:59). But the most significant book of Paley's, at least Darwin's estimation, was *Natural Theology* (1802). He wrote, “I do not think I hardly ever admired a book more than Paley's 'Natural Theology.' I could almost formerly have said it by heart.” (in a letter to John Lubbock in 1859; Darwin, 1887b: 219). It was also one of the few books which Darwin took with him on his voyage (Bergman, 2006:28). It is striking that when Paley wrote *Natural Theology* he had the speculations of Charles Darwin's grandfather, Erasmus Darwin, in mind (Burbridge, 1998:50). This can be seen in both the manner of argument Paley deploys and the explicit references he makes to Erasmus from *The Botanic Garden* (1791) and *Phytologia* (1800) (Paley, 1809:358,362). Thus, within three generations, two Darwins had to contend with Paley's argument. Consequently, it is well-known that *Origin* was crafted with Paley in mind. Simon Conway Morris writes,

“this is a book haunted by the ghost of William Paley... *The Origin* is Darwin's riposte... but significantly Paley himself is mentioned only once. And cleverly not in the context of his ideas on organic design but in an oblique dig at the question of natural evil. First and foremost, *The Origin* is an exorcism of the doctrine of special creation, and conducted by one of the most skilled exorcists science has ever seen.” (Berry et al., 2009:102.)

2.4.3.3 Origin of Species and Natural Theology

In another way, *Origin* can be seen as a rewrite of *Natural Theology* (Bergman, 2006:29). Observing the same phenomena in nature and appealing to human reason as the final arbitrator of truth, both Paley and Darwin had applied the same Enlightenment methodology but had arrived at antithetical results. Where Paley had concluded with design and a designer; Darwin concluded with chance and natural selection. In retrospect, it was to the detriment of Paley's argument that he never appealed to an authority greater than human reason. The rational

reconciliation which Paley had sought between science and religion had failed (cf. Thomson, 2005:6).

Later, in the period from 1833 to 1836, the Earl of Bridgewater commissioned in his will a writing project to scientifically validate and illustrate the power and wisdom of God in creation (Mortenson, 2004b:39). Following Paley's example, a collection of eight treatises were compiled by prominent scientists, in which they attempted to revise the argument of *Natural Theology* with new discoveries which had been made. But without a strong scriptural base in the historicity of the fall of humanity they failed to adequately address the problem of pain, disease, suffering and death in creation. Mortenson (2004b:39) writes, "Generally, they either ignored the problem or dealt with it superficially, attributing the evil in a mysterious way to divine beneficence." This would later prove to be the Achilles' heel of Paley's argument, and would drive Darwin to his anti-theistic position:

"what advantage can there be in the sufferings of millions of the lower animals throughout almost endless time? This very old argument from the existence of suffering against the existence of an intelligent first cause seems to me a strong one; whereas, as just remarked, the presence of much suffering agrees well with the view that all organic beings have been developed through variation and natural selection." (Darwin, 1958:90.)

It is not hard to see how the theological climate of England had been carefully prepared for Darwin. In this regard, Ernst Mayr, a respected evolutionary biologist and historian of science, has admitted,

"Curiously, it was theology, in the form of natural theology, which prepared the way for evolutionary thinking to a far greater degree than philosophy." (Mayr, 1982:309.)

By the time Darwin set out to write his *Origin*, "Few people, even then, believed in the Garden of Eden as a real place." (Browne, 2002:2). In *Essays and Reviews* (1860) which was published only four months after *Origin*, we are given an insight into where contemporary theology finally wandered. Highly-esteemed clergymen in the Church of England, like the Reverend Baden Powell, had bluntly discounted the possibility of miracles, and by appealing to the Baconian division of scripture and science, proposed that Christianity be separated entirely from the physical world and relegated to the realm of blind faith (Powell, 1860:127-128,144). Darwin wrote in a letter to Baden Powell,

"I read your Philosophy of Creation with great interest: it struck me as excellently & vigorously argued & written with a clearness, which I remember excited my warmest admiration." (Darwin, 1860c.)

Another prominent churchman, Frederick Temple, who was later appointed Archbishop of Canterbury, wrote these words in the first essay of *Essays and Reviews*:

"If geology proves to us that we must not interpret the first chapters of Genesis literally; if historical investigations shall show us that inspiration, however it may protect the

doctrine, yet was not empowered to protect the narrative of the inspired writers from occasional inaccuracy; if careful criticism shall prove that there have been occasionally interpolations and forgeries in that Book, as in many others; *the results should still be welcome*... The substance of the teaching which we derive from the Bible will not really be affected by anything of this sort.” (emphasis mine; Temple, 1860:47.)

Over the first ten year period, only 8,000 copies of *Origin* were sold in Britain (Herbert, 2009:107). But *Essays and Reviews*¹⁰ sold more than 20,000 copies in two years, and initially caused more controversy than *Origin* (Herbert, 2009:112). Janet Browne informs us, “[s]urprising as it may seem, there was little sustained opposition to Darwin’s book on the grounds that it directly challenged the account of creation in Genesis.” (Browne, 2002:86). It was *not* surprising, therefore, that Darwin’s book took the world by storm.

2.4.4 THE SPECULATIONS OF SCIENCE

With the decline of biblical theology and the rise of human reason, it naturally followed that the scientific method would continue to gain epistemic popularity. In this regard, Russell (1997:71) tells us that,

“During the nineteenth century it became increasingly common to opt for scientific realism or positivism and to tolerate theology only insofar as it abandoned its proper epistemology in favour of a scientific basis.” (Russell, 1997:71.)

During these years a prominent philosopher of science, Auguste Comte (1798-1857), began to popularise Logical Positivism, a philosophy which claimed that only science could give mankind positive truth (Butel, 2000:21). In his book, *The Course of Positive Philosophy* (1830-42), Comte suggested that humanity had passed through three phases of thought: the religious phase, the philosophical phase and, finally, the scientific phase. According to Comte, man progresses towards truth by moving away from the pre-Enlightenment religious realm to the scientific. This was typical of many other Enlightenment thinkers who thought that the discovery of modern science would finally provide man with absolute truth. Comte’s influence extended specifically to John Stuart Mill (1806-1873) and Herbert Spencer (1820-1903) who were both prominent English intellectuals during Darwin’s life (Hull, 2000:51; Eisen, 1967:49). Spencer gave Darwin the famous tautology, “survival of the fittest”, to describe natural selection; and Mill gave Darwin the utilitarian means to argue for a naturalistic morality in *The Descent of Man*. In an essay¹¹ which anticipated several evolutionary ideas later employed by Darwin in *Origin*, Spencer wrote,

“Ask one of our leading geologists or physiologists whether he believes in the Mosaic account of the creation, and he will take the question as next to an insult... he will be

¹⁰ See section 2.4.3.3

¹¹ *The Development Hypothesis*, published anonymously in *The Leader* on 20 March 1852.

forced to confess that the notion was put into his mind in child hood as part of a story which he now thinks absurd.” (Spencer, 1891:6-7; cf. Darwin, 1872:16.)

Darwin was just as resolute as Spencer to expunge scripture from science and adopt Comte’s positivistic outlook. A few years after his famous Beagle voyage he was invited, at Charles Lyell’s invitation, to join the exclusive Athenaeum Club. It was here that Darwin read a review of Comte’s book and “saw the usefulness of Comte’s position in eliminating the necessity of God from the operation of a lawful universe” (Herbert, 2009:61). But these were not the only scientists of this period to pass their scientific speculations on to Darwin.

2.4.4.1 Spontaneous Generation

The idea of spontaneous generation is an old idea¹². But it is a necessary one for materialists to adopt, and so there have been many attempts historically to present it as scientifically feasible theory. In the early 17th century, Jan Baptista von Helmont (1580-1644), a Flemish scientist, suggested with some enthusiasm that mice could spontaneously arise from fermenting underwear and wheat when left in an open-mouthed jar (Werner, 2007:12). Even the prolific Scottish writer and intellectual, Alexander Ross (c. 1590-1654) berated Sir Thomas Browne for thinking otherwise, writing:

“So he may doubt whether in cheese and timber, worms are generated; or if beetles and wasps in cow’s dung; or if butter-flies, locusts, grasshoppers, shell-fish, snails, eels, and such like, be procreated of putrified matters... *To question this, is to question reason, sense, and experience.* If he doubts of this, let him go to Egypt, and there he will find the fields swarming with mice begot of the mud of Nylus, to the great calamity of the inhabitants.” (emphasis mine; quoted by Browne, 1852:378.)

Von Helmont’s speculations clearly rested on many insurmountable empirical flaws; but the desire to establish spontaneous generation persisted, and before long, some scientists had suggested that maggots could spontaneously arise from rotting meat (Werner, 2007:16). This hasty hypothesis gathered support, building on a poor understanding of the reproduction and development of flies. But in 1668, Francesco Redi (1626-1697), the famous Jesuit naturalist and poet, falsified this idea by using a piece of cheesecloth to prevent the flies from contaminating the meat (Redi, 1909:30-37). His comments concerning spontaneous generation were insightful, because they illustrate, yet again, how influential the Scriptures were to establishing sound science:

“Although content to be corrected by any one wiser than myself, if I should make erroneous statements, I shall express my belief that the Earth, *after having brought forth the first plants and animals at the beginning by order of the Supreme and Omnipotent Creator*, has never since produced any kinds of plants or animals, either perfect or imperfect; and everything which we know in past or present times that she has

¹² See section 2.2.1

produced, came solely from the true seeds of the plants and animals themselves....” (emphasis mine; Redi, 1909:26-27.)

Here we see that it was his commitment to the historical account in Genesis which drove him to disprove the possibility of spontaneous generation. But general antipathy against Scripture prevailed as “enlightened” scientists continued looking for an alternative natural history for living organisms. An English biologist, John Needham (1713-1781), constructed a number of experiments to show how a mixture of flour and water could produce life. His influence extended to Holbach who wrote the notorious *Système de la nature* (1770), otherwise known as the “Bible of Atheism” (Haber, 1959b:238). In this volume, Holbach based much of his argument for materialism on Needham’s experiment (cf. D’Holbach, 1835:20). These ideas prevailed, largely uncontested, until in 1861 Louis Pasteur (1822-1825) falsified Needham’s theory by using an s-shaped flask (Pasteur, 1879:27; Werner, 2007:19). The irony is that Needham was actually a member of *The Royal Society of London for the Improvement of Natural Knowledge*.

Many scientists remained hopeful that spontaneous generation could retain some scientific respectability. But as Pasteur (1879:33) observed, “Theories of this kind are still warmly advocated, but, to our thinking, *rather from sentimental considerations or prejudice* than from any basis of serious experimental proofs.” (emphasis mine). Thus, despite the failed attempts to establish spontaneous generation, the speculations of Anaximander, Anaximenes and Anaxagoras successfully prevailed through the Enlightenment, ultimately finding their place in some of Darwin’s suppositions:

“But if (and oh! what a big if!) we could conceive in some warm little pond, with all sorts of ammonia and phosphoric salts, light, heat, electricity, etc., present, that a proteine [*sic*] compound was chemically formed ready to undergo still more complex changes, at the present day such matter would be instantly devoured or absorbed, which would not have been the case before living creatures were formed.” (Darwin, 1887c:18.)

As MacArthur (2008:9-10) has discerned, there is a great irony to be found in the fact that Pasteur conclusively disproved abiogenesis only two years after Darwin published *Origin*.

2.4.4.2 The Antiquity of the Earth

Spontaneous generation was not the only “scientific” development of this age. Many naturalists and philosophers began to question the age of the earth. Three French scientists featured prominently in this regard: Georges Comte de Buffon (1708-1788), Pierre Laplace (1749-1827) and Jean-Baptiste Lamarck (1744-1829) (Mortenson, 2004a:74). In his *Epochs of Nature* (1778), Buffon claimed the earth was at least 75,000 years old from the “principle of refrigeration”, and had arisen due to the collision of a comet with the sun (Haber, 1959b:234; Mortenson, 2004:74). To reconcile his theory with Scripture, Buffon suggested that the “days” in Genesis should be interpreted as periods of indeterminate length, or vast epochs of time

(Haber, 1959b:233). Buffon also believed in spontaneous generation. Later, Holbach developed Buffon's philosophical naturalism even further, arguing that matter was eternal and everything was a product of time and change as nature shaped matter into new forms (Haber, 1959b:238; cf. Holbach, 1835:211.)

2.4.4.3 Uniformitarianism

Buffon's philosophical naturalism depended primarily upon the assumption of uniformitarianism: the idea that the physical processes in nature were the same in the past as they are today (Haber, 1959b:237). In 1795, James Hutton (1726-1797), a Scottish farmer and good friend of Hume, published the *Theory of the Earth* shortly before he died. Hutton proved to be one of the most influential thinkers of the Edinburgh Enlightenment (Reed, 2008:121). In *Theory of the Earth* he embraced the naturalistic vision of Buffon and developed the principle of uniformitarianism more precisely:

“In examining things present, we have data from which to reason with regard to what has been; and, from what has actually been, we have data for concluding with regard to that which is to happen hereafter.” (Hutton, 2004:8-9.)

To many subsequent scientists and historians, Hutton has been seen as the founder of the principle of uniformitarianism, and the key revolutionary who challenged the geological perception of earth history, finally putting James Ussher's (1581-1656) chronology to rest. But as Reed (2008:121) has documented, “Hutton was not a pioneer – he was just one member of the elite intellectual herd.” Unlike many of his contemporaries, Hutton believed in a cyclical view of earth history, denying an absolute beginning. Consequently, Hutton is regarded by many modern “Gaia” theorists as one of their founding fathers. (Oldroyd, 2000:197). But in 1802, John Playfair (1748-1819) popularised and re-interpreted Hutton in an illustrated version of *Theory of the Earth*. A few years later, Lamarck wrote *Zoological Philosophy* in which he also argued strongly against catastrophism (cf. Lamarck, 1963:46). His philosophy of nature was enthusiastically received by the Darwins (Erasmus and Charles). It is significant to note, therefore, Lamarck's antipathy of Christianity:

“[Lamarck] was the mortal enemy of the chemists, of experimentalists and the petty analysts, as he called them. No less severe was his philosophical hostility amounting to hatred for the tradition of the Deluge and the Biblical creation story, indeed for everything which recalled the Christian theory of nature.” (citing Sainte-Beuve, Glass et al., 1959:276-277.)

Less than thirty years later Lyell developed Hutton's ideas and wrote *Principles of Geology*, a book which finally convinced Darwin of the antiquity of nature and the principle of uniformitarianism.

2.4.4.4 Transmutation and the “Tree of Life”

Another noteworthy “scientific” development, building upon the belief in spontaneous generation, was the notion of transmutation or biological evolution. This went hand in hand with an idea which Lamarck would become famous for: the inheritance of acquired characters. One of the earliest depictions of biological evolution during the Enlightenment can be found in the writings of Benoit de Maillet (1656-1738). In his book *Telliamed*, which was published posthumously, he wrote,

“As for the origin of terrestrial animals, I observe that there are none of them, whether walking, flying, or creeping, the similar species of which are not contained in the sea; and the passage of which from one of these elements to another, is not possible and probable, but even supported by a prodigious Number of Examples... The resemblance in figure, and even inclination, observable between certain fish and some land-animals, is highly worthy of our attention; and it is surprising that no one has laboured to find out the reasons of this conformity... Who can doubt, that from the volatile fish sprung our birds, which raise themselves in the air; and that from those which creep in the sea, arose our terrestrial animals which have neither a disposition to fly, nor the art of raising themselves above the earth?” (Maillet, 1750:120-122; cf. Bergman, 2002:58.)

According to Darwin (1872:xiii), Comte de Buffon was one of the first naturalists to suggest that species might undergo modification with time. But Buffon’s speculations on the matter were vague (Packard, 1901:202). A much clearer description of common descent can be found in the writings of Immanuel Kant (1724–1804), in the *Critique of Judgement*, where he speculated as to how creatures might adapt (Bernard, 1914:337-338). The most conspicuous vestiges of Darwin’s speculations on transmutation and common descent, however, can be found in Lamarck’s *Zoological Philosophy*, in which he wrote:

“Nature has produced all the species of animals in succession, beginning with the most imperfect or simplest, and ending her work with the most perfect, so as to create a gradually increasing complexity in their organisation; these animals have spread at large throughout all the habitable regions of the globe, and every species has derived from its environment the habits that we find in it and the structural modifications which observation shows us.” (Lamarck, 1963:37; cf. Shaner, 1927:252.)

Even the analogy of a tree was utilised by Lamarck’s to describe the relationships between species foreshadowing Darwin’s own Tree of Life (Lamarck, 1963:37; cf. Shaner, 1927:252; cf. Darwin, 1859:129-130).

2.4.4.5 The Inheritance of Acquired Characters

Of all the ideas which Lamarck put into writing, it was his theory of the inheritance of acquired characters which was to find its final home in Darwin’s thesis. He developed this hypothesis under two laws to govern the development and preservation of a being’s biological features from one generation to the next (Lamarck, 1963:113; cf. Shaner, 1927:254). It was this key evolutionary concept which Charles Darwin’s grandfather, Erasmus Darwin (1731-1802),

wholeheartedly embraced to explain the naturalistic origins of life. Erasmus brought together spontaneous generation, deep time, biological transmutation and Lamarck's inheritance of acquired characters to construct a naturalistic history for the origin of species. A summary of his views can be found in *Zoönomia* (1794) where he speculated on the common ancestry of organic life (cf. Darwin, 1809:395-397). Many scientists and historians of science have wrongly attributed the theory of common descent to Charles Darwin, claiming it to be his brainchild (eg. Waters, 2009:123). But Erasmus had already suggested the concept many years before his grandson had even been born. Consider the following extract from *Zoönomia*:

“when we revolve in our minds the great similarity of structure which obtains in all the warm blooded animals, as well quadrupeds, birds, and amphibious animals, as in mankind; from the mouse and bat to the elephant and whale; one is led to conclude, that *they have alike been produced from a similar living filament.*” (emphasis mine; Darwin, 1809:395.)

On the subject of evolution, Erasmus speculated boldly and wildly. He even went so far as to theorise, via the inheritance of acquired characters, that the elephant had obtained its trunk through successive generations of nasal exercise:

“Another great want consists in the means of procuring food, which has diversified the forms of all species of animals. Thus the nose of the swine has become hard for the purpose of turning up the soil in search of insects and of roots. The trunk of the elephant is an elongation of the nose for the purpose of pulling down the branches of trees for his food, and for taking up water without bending his knees. Beasts of prey have acquired strong jaws or talons. Cattle have acquired a rough tongue and a rough palate to pull off the blades of grass, as cows and sheep.” (Darwin, 1809:396).

In later years, Erasmus penned a poem on the evolutionary origin of society, published as *The Temple of Nature*. With artistic licence, he speculated on the beginning of life by spontaneous generation from an “embryon point” or “microscopic ens” (Darwin, 1803:28). The book was later banned by the catholic church. When we consider family ties, it is not hard to see where Charles Darwin received his inspiration. As Grigg (2003:18) has observed, “Almost every topic discussed, and example given, in *Zoönomia* reappears in Charles's *Origin*.” In all these “scientific” speculations, the Enlightenment strived for one objective – to liberate humanity from the bondage of Scripture. The first task was to construct a new account of origins, a replacement of Genesis.

2.5 CONCLUSION

In this chapter, we have seen how almost every evolutionary concept employed by Darwin can be found in its seminal form dating back to at least the 7th century before Christ. As Osborn (1929) has demonstrated, elements of most, if not all, of Darwin's thesis can be found in one form or another amongst the writings of the ancient Mayans, Hindus and Greeks (cf. Bergman, 2001:79). Darwin's theories and speculations may appear to be original, but upon closer historical examination we find a strong tradition of thought which has carried evolutionary ideas

through the ages into his writings and, indeed, well into the twenty-first century. Charles Darwin, like many others, can be seen as a child of his time and a great descendant of the philosophical, theological and scientific ideas which have preceded him.

Secondly, we have also observed how key theological, philosophical and scientific developments during the Scientific Revolution and so-called “Age of Enlightenment” encouraged an epistemic compromise which divorced science from Scripture, and reason from revelation. Historical and theological enquiries into the origin of species were not considered appropriate questions for the Bible to answer. Instead the first few chapters of the Bible were actively ignored or dismissed as fable. The Enlightenment now called for scientific answers to, essentially, theological questions. Natural Theology had usurped Biblical Theology for prominence in higher academic circles. When Darwin finally wrote *Origin* in 1859 he would not have to seriously contend with the Bible in his argument. The platform upon which he would build his naturalistic edifice had been carefully prepared for him.

3. THE DEVELOPMENT OF DARWIN'S IDEAS

3.1 INTRODUCTION

It has been shown how Darwin's tree of life did not grow upon shallow soils, but instead, had its roots reaching far back into the archives of ancient ideas. In a similar vein, Darwin's own ideas did not flourish in isolation, but depended upon the careful fertilization of significant influences and events during the course of his career. In this chapter, the development of Darwin's conception of origin and species will be explored as he assembled key evolutionary mechanisms to be assimilated into his magnum opus, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*; and later, *The Descent of Man*.

3.2 THE EARLY YEARS (1809-1830)

3.2.1 THE INFLUENCE OF FAMILY

Charles Robert Darwin was born on the 12th of February 1809 in Shrewsbury and was baptised nine months later at St. Chad's Anglican Church, according to the customary pattern of British gentry (Herbert, 2009:1). Theologically and scientifically, Darwin's intellectual development owed much to his family. His grandfather, Erasmus Darwin, was the first English writer to express evolutionary ideas in print, pioneering in this regard with the controversial but popular works, *Zoönomia; or Laws of Organic Life* (1794-1796), and *The Temple of Nature* (1804). As seen in the previous chapter, Erasmus was a committed deist who sustained an unhealthy scepticism of Scripture and in many respects epitomized the English Enlightenment. Consequently, Charles Darwin's own father, Robert Darwin (1766-1848), was an outspoken atheist, and Darwin's older brother, Erasmus, even more so (Herbert, 2009:8).

The chain of unbelief, as Herbert (2009:7) observes, can be followed in Darwin's family as "the skepticism of one generation [became] more extreme in the next". On his mother's side of the family, Josiah Wedgwood (1730-1795), Darwin's other grandfather, was a close friend and supporter of Joseph Priestley (1733-1804), who enthusiastically promoted Unitarianism in England and wrote *An History of the Corruptions of Christianity* (1782) in which he denied the deity of Jesus Christ and the sacrificial atonement of his death for sin (Herbert, 2009:9). Both of Darwin's parents sat under the preaching and teaching of this man, and shared his vision to marry the rationalism of the Enlightenment to Christianity (Herbert, 2009:10-11). It is not surprising, therefore, that Darwin's intellectual pilgrimage of scepticism began with his family.

When he was eight years old, in 1817, Darwin was first sent to the Unitarian Chapel day-school in Shrewsbury where he stayed until his mother died later that year (Darwin, 1958:21-22). His

schooling recommenced at the elite Shrewsbury Grammar School, under Dr. Samuel Butler, where Darwin was encouraged to learn the classics; but showing little taste for it, he regularly evaded class with his older brother, Erasmus, to an abandoned garden tool-shed where he assisted him in various chemical experiments (Darwin, 1958:45; Herbert, 2009:14-15). At this stage in his life, Darwin considered himself a Christian (Darwin, 1958:86).

3.2.2 THE EDINBURGH INFLUENCE (1825-1827)

When Darwin was sixteen, his father sent him to Edinburgh University with the hopes of establishing his son as a doctor in the tradition of the family. Edinburgh was a “haven for religious Dissenters, Independents and atheists” and was heavily influenced by the “Enlightenment ideology of Continental Europe, especially France” (Herbert, 2009:17). Darwin’s affluent position freed him from the demands of succeeding in his medical studies and consequently gave him ample time to attend other classes of interest during his time at the university. It was here that Darwin met Robert Grant (1793-1874) who held a professorship in comparative anatomy and zoology. Grant was a passionate evolutionist and a great admirer of Jean-Baptiste Lamarck (Darwin, 1958:49). This was fortuitous because Darwin had just finished reading his grandfather’s own treatment on evolution in *Zoönomia* which he had “admired greatly” (Darwin, 1958:49). Darwin was soon invited by Grant to join a growing contingent of liberally-minded students in the Plinian Society on campus which met regularly to discuss science on strictly naturalistic terms (Herbert, 2009:18-19). It was here that he found his real passion for natural science, and permanently lost interest in medicine.

3.2.3 THE CAMBRIDGE INFLUENCE (1828-1831)

This news was soon carried to his father who realised that Darwin would be better suited to a vocation which would give him ample time to enjoy the natural sciences, while maintaining the family’s status in the aristocracy (Herbert, 2009:23). Forthwith, in 1828, he was promptly removed from Edinburgh and enrolled at Cambridge where his father proposed that Darwin become a clergyman. What should not be inferred from these changes in circumstance is that Darwin had any genuine love to serve Christ and his church (Herbert, 2009:23). The religious disposition of his family should inform us otherwise. In fact, when Darwin was asked to sign his commitment to the creeds of the church, along the lines of the *Thirty-Nine Articles*, Darwin tells us that he had problems with endorsing the dogmas of the Church of England (Darwin, 1958:57). Darwin’s love for the life of a country clergyman, however, helped him to overcome these scruples. He “soon persuaded” himself to accept the Creed, although later he was troubled by the folly of confessing belief in concepts which he deemed to be ludicrous:

“I might have said with entire truth that I had no wish to dispute any dogma; but I never was such a fool as to feel and say ‘credo quia incredibile’¹.” (Darwin, 1958:57.)

At this stage in the history of the university, for reasons discussed in the previous chapter, the emphasis on biblical training at Cambridge was weak². Mortenson (2004b:38) argues,

“Probably more than any other group, the Cambridge network contributed to the 19th century theological revolution in Britain, which saw the traditional orthodox view of Scripture held by evangelicals and high churchmen dwindle into relative insignificance.”

Consequently, the only theology which Darwin had to study was the natural theology of William Paley in *Evidences of Christianity and Moral Philosophy* (Darwin, 1958:59). But it was during this time that he met John Stevens Henslow (1796-1861) and Adam Sedgwick (1785-1873); professors of botany and geology respectively. Both these men had a marked influence on him.

3.2.3.1 The Influence of John Henslow

Henslow had such a good relationship with Darwin that he became known on campus as “the man who walks with Henslow” (Darwin, 1958:64). As his botany professor, Henslow gave him a healthy passion for the subject and introduced him to a discipline which would ultimately dominate the scientific content of his magnum opus, *Origin of Species*.

In his autobiography, Darwin described Henslow as being both “deeply religious” and “orthodox” (Darwin, 1958:64). But given the liberal disposition of the university and a paper Henslow wrote in 1823 questioning the miraculous nature of the Noahic deluge, some biographers have questioned this assessment of Henslow’s orthodoxy (Herbert, 2009:30). What does remain incontrovertible, however, was Henslow’s role in securing Darwin’s place on the *H.M.S. Beagle*, thereby sending him on a voyage which would prepare the foundations for an idea which was to shake the world (Darwin, 1958:71). The other valuable service Henslow performed was to introduce Darwin to Adam Sedgwick.

3.2.3.2 The Influence of Adam Sedgwick

Geology was the newest and most popular science of Darwin’s day (Herbert, 2009:35). As such it was also the foremost means by which the authority of Scripture was being challenged (Mortenson, 2004b:49). Sedgwick not only gave Darwin a passion for geology, but also showed him how theology ought to submit to science. This was perhaps best demonstrated in his famous “recantation” in which Sedgwick described his former belief in the global flood of Noah

¹ i.e. “I believe because it is incredible”

² At the end of Darwin’s degree, he still could not discern whether the footnote in his Bible, which quoted Bishop Ussher’s date of 4004 B.C., was inspired (cf. Darwin, 1903:31).

as a “philosophic heresy” and adopted instead the model described in Lyell’s *Principles of Geology* (Clark & Hughes, 1890:370). Ironically, in later years, Sedgwick became one of the biggest critics of Darwin’s *Origin of Species* for his extended application of Lyellian principles (Herbert, 2009:32).

3.3 THE VOYAGE OF THE H.M.S. BEAGLE (1831-1836)

The significance of Darwin’s five year voyage cannot be overestimated (cf. Browne, 2006:22). In his own evaluation, he states,

“The voyage of the Beagle has been by far the most important event in my life and has determined my whole career... I have always felt that I owe to the voyage the first real training or education of my mind.” (Darwin, 1958:77.)

Not only did the voyage stimulate Darwin’s thinking, later provoking his provocative ideas; but it also won him the acclaim of a seasoned and experienced naturalist amongst his academic peers.

Darwin was to accompany Captain Robert Fitzroy (1805-1865) as a travelling companion and naturalist on a five year voyage around the world. Their travels during this period would take them from Plymouth down to Santa Cruz, across the Atlantic and down the west coast of South America, around past Tierra del Fuego, up to the Galápagos Islands, across the Pacific to Tahiti, then Tasmania, Sydney, across the Indian Ocean to Mauritius; from there to Cape Town, back to South America, and finally back to England where they would dock in Falmouth. The *H.M.S. Beagle* left Plymouth on the 27th of December 1831.

During this time Darwin wrote extensively, eagerly collecting many artefacts, fossils, minerals and specimens wherever he ventured, whilst he began to apply his mind to the understanding of origin and species. Of all the notes kept, numbering 2530 pages, he devoted over half of them to geological observations (Herbert, 2009:49). It was from geology, not biology or botany, that Darwin found the essential principles he needed to address the problem of origin and species. These principles he learnt from Charles Lyell.

3.3.1 THE INFLUENCE OF CHARLES LYELL

It has been said that, “Without Lyell... there might not have been any Darwin” (Browne, 2002:33). Lyell was a capable man who, after studying law, applied himself to geology and ended up becoming the foremost geologist of his day and president of the Geological Society of London from 1825 to 1837 (Herbert, 2009:39). Darwin himself testified to his indebtedness to him in one of his many letters:

“I always feel as if my books came half out of Lyell’s brain, and that I never acknowledge this sufficiently... the great merit of the *Principles* was that it altered the whole tone of

one's mind, and therefore that, when seeing a thing never seen by Lyell, one yet saw it partially through his eyes." (Darwin, 1903b:117.)

In fact, Darwin dedicated his *Journal of Researches* from his voyage on the *Beagle* to Charles Lyell, in debt to his *Principles of Geology*. It would not be unreasonable to suggest that Lyell was the single greatest human influence on Darwin's life (Rajendran, 2009:855). The question which is interesting to ask, however, is in what way did Lyell influence Darwin?

Lyell was also a disciple of a long tradition of geologists who had, like him, been instrumental in sustaining and propagating the prevailing mood of the Enlightenment. In those times, as Brown (2002:31) has documented, "few geologists believed that the earth had literally been created in six days. They saw the Bible more as a metaphor..."

These natural philosophers included the likes of François-Marie Arouet, Comte de Buffon, Nicolas Desmarest, Pierre-Simon Laplace, Abraham Werner, and notably, James Hutton (Reed, 2008:122). As discussed previously, in the third volume of this work, Hutton (2007:184) prescribed a uniformitarian approach to science:

"Not only are no powers to be employed that are not natural to the globe, no action to be admitted of except those of which we know the principle, and no extraordinary events to be alleged in order to explain a common appearance..."

This is why many consider Hutton to be the 'father' of uniformitarianism and modern geology³ (Reed, 2008:122). But it was Lyell who became the "high priest of uniformitarianism" and gave Darwin the key he needed to free the concepts of origin and species from a supernatural worldview (Herbert, 2009:39). Browne (2002:30) recounts in her biography of Darwin that he was delighted by Lyell's "rejection of biblical authority as a source of geological explanation". A clear indication of Lyell's agenda can be found in a letter he wrote to George Poulett Scrope, a fellow geologist, in 1830:

"if Murray⁴ has to push my vols., and you wield the geology of the Q. R.⁵, we shall be able in a short time to work an entire change in public opinion." (Lyell, 1881b:273.)

It was not surprising therefore that *Principles of Geology* was "commonly regarded as theologically radical" (Browne, 2002:30). Thus Lyell's desire to free geology from genesis and remove scripture from science powerfully captured the imagination and zeal of young Darwin as "uniformitarianism in geology seemed to cry out for evolutionism in biology." (Gillispie, 1959:131). In this way, "Darwin became biology's Lyell by applying to organisms the geologists'

³ Although the oft-quoted epigram "the present is the key to the past" cannot be found in any of either Lyell's or Hutton's writings. Comte de Buffon, however, can be attributed with, "conclure du présent au passé" which is probably where the quote finds its origin (cf. Buffon, 1829:142).

⁴ i.e. John Murray, the publisher

⁵ i.e. Quarterly Review

way of looking at the world.” (Costa, 2009:892). Darwin now had room to speculate on the variability of species over vast ages. The first volume of *Principles of Geology* was published just in time to take aboard the *Beagle* (Darwin, 1958:77).

3.3.2 THE EXPERIENCE IN TIERRA DEL FUEGO

One of Darwin’s most impressionable and disturbing experiences on the voyage took place during their visit to Tierra del Fuego (Browne, 2002:29). The people living on this South American archipelago dwelt in a very primitive state. Darwin was struck by their nakedness and rudimentary homes. On the *Beagle* were three Fuegians who were being repatriated⁶, with the hopes that they would be instrumental in educating and civilising their fellow tribesmen. York Minster, Jemmy Button and Fuegia Basket had been strategically anglicised and exposed to what was deemed “civilised society” in England to serve a key role in the next Anglican mission to South America. The contrast between the Anglicized Fuegians and their indigenous relatives prompted Darwin to question whether such people could be classified within his own species:

“It was without exception the most curious and interesting spectacle I ever beheld: I could not have believed how wide was the difference between savage and civilized man; it is greater than between a wild and domesticated animal, inasmuch as in man there is a greater power of improvement.” (Darwin, 1845a:205.)

In his *Beagle* diary, Darwin described them in further detail:

“Viewing such men, one can hardly make oneself believe that they are fellow creatures placed in the same world. — I can scarcely imagine that there is any spectacle more interesting & worthy of reflection, than one of these unbroken savages. — It is a common subject of conjecture; what pleasure in life *some of the less gifted animals* can enjoy? How much more reasonably it may be asked with respect to these men... Here 5 or 6 human beings, naked & uncovered from the wind, rain & snow in this tempestuous climate sleep on the wet ground, *coiled up like animals*.” (emphasis mine; Darwin, 1845a:213.)

Several years later, he likened the Fuegians to other primates, writing in *Notebook M*⁷:

“Nearly all will exclaim, your arguments are good but look at the immense difference between man, forget the use of language & judge only by what you see. Compare the Fuegian & Orang-Outang, & dare to say differences so great . . .” (Darwin, 1974:296.)

These speculations finally made their way into Darwin’s treatment on the origin of human species in *The Descent of Man*, where he concluded, “there can hardly be a doubt that we are descended from barbarians.” (Darwin, 1882:618).

⁶ After a previous excursion of these islands in 1831, Captain Fitzroy had taken the three Fuegians with him back to England and presented them before King William IV and Queen Adelaide (Herbert, 2009:70-71; Barlow, 1932:501).

⁷ See section 3.2.5

Perhaps surprisingly, during the last year of the voyage, Darwin described in his diary the forests and scenery he had enjoyed, particularly in Tierra del Fuego, as “temples filled with the varied productions of the God of Nature”, to which he responded, “No one can stand unmoved in these solitudes, without feeling that there is more in man than the mere breath of his body.” (Darwin, 2001:444). But these sentiments were fleeting, and ultimately unimportant to Darwin for they never made it into his later writings.

3.3.3 THE EXPERIENCE OF THE GALÁPAGOS ISLANDS

Towards the end of the voyage, in September of 1835, the *Beagle* arrived at the Galápagos Islands. Darwin’s fascination with the Islands was two-fold: geological and biological. Geologically, he hoped to determine, by Lyell’s principles, the origin and formation of islands, and by extrapolation, continents (Browne, 1995:297). He wrote accordingly to W. D. Fox,

“I look forward to the Galapagos with more interest than any other part of the voyage. They abound with active volcanoes, and, I should hope, contain Tertiary strata.” (Darwin, 1887a:263.)

Biologically, Darwin was fascinated by the animal and plant life on the islands and how they had originated. The islands were well suited to such explorations given that they boasted a unique range of animal species including giant iguanas, tortoises, mocking birds, and perhaps most importantly, finches. Some people have been led to believe that Darwin had his eureka moment on the Galápagos islands while studying the indigenous finches (Sulloway, 1982:328). The truth of the matter was that he actually missed the significance of these finches during his time on the *Beagle* (Browne, 1995:304).

3.3.4 THE GERMINATION OF AN IDEA (1837)

Five months after the *Beagle*’s arrival back at Falmouth, John Gould, a taxonomist from the Zoological Society, studied Darwin’s specimens and grouped them by beak size into three separate species. It was only when Gould later discussed these findings with him, that Darwin suddenly realised⁸ their significance to the origin of species. The remarkable variability of the finches’ beaks provided him with the evidence he had been looking for to make a case for evolution (Brown, 2006:41). This was “the final catalyst in his conversion to the theory of evolution” (Sulloway, 1982:369). Darwin’s voyage across the oceans might have reached its end, but his intellectual voyage had just begun.

Darwin’s pilgrimage away from the nominal Christianity he had entertained as a child had been slow, but he finally rejected Christian theism, and committed himself to the idea that “species

⁸ It is also probable that Darwin first got his ideas about the adaptability and mutability of the finches’ beaks from his grandfather who had studied and documented the same phenomenon at least 50 years earlier in *Zoönomia* (Darwin, 1809:396; cf. Grigg, 2003:18).

originated without divine agency” (Browne, 2006:40; cf. Herbert, 2009:53). It is quite sobering that in the previous year, whilst abroad in New South Wales, Darwin wrote in his diary:

“Whilst thus thinking, I observed the conical pitfall of a Lion-Ant... Now what would the Disbeliever say to this? Would any two workmen ever hit on so beautiful, so simple & yet so artificial a contrivance? It cannot be thought so. The one hand has surely worked throughout the universe.” (Darwin, 2001:402-403.)

But Darwin would never look on creation as the product of God’s handiwork again. In March of that year he began taking meticulous notes in what has become known as the “Red Notebook”, later subdivided into six further books (Herbert, 2009:56). Using this each notebook to organise and structure his findings, Darwin prepared himself for a grand project, a project which sought to remove God completely from the world he had made. In his *Autobiography*, Darwin describes his antipathy against God during this period of his life:

“But I had gradually come, by this time to see that the Old Testament from its manifestly false history of the world, with the Tower of Babel, the rainbow as a sign, etc., etc., and from its attributing to God the feelings of a *vengeful tyrant*, was no more to be trusted than the sacred books of the Hindoos, or the *beliefs of any barbarian*... By further reflecting that the clearest evidence would be requisite to make any sane man believe in the miracles by which Christianity is supported... I gradually came to disbelieve in Christianity as a divine revelation... *I can hardly see how anyone ought to wish Christianity to be true*; for if so the plain language of the text seems to show that the men who do not believe, and this would include my Father, Brother and almost all my best friends, will be everlastingly punished. *And this is a damnable doctrine.*” (emphasis mine; Darwin, 1958:86-87.)

This does not mean, however, that Darwin was ever an atheist. Instead, his scepticism forced him to maintain a muddled position between Deism and Agnosticism:

“When thus reflecting I feel compelled to look to a First Cause having an intelligent mind in some degree analogous to that of man; and I deserve to be called a Theist⁹... But then arises the doubt—can the mind of man, which has, as I fully believe, been developed from a mind as low as that possessed by the lowest animal, be trusted when it draws such grand conclusions?... The mystery of the beginning of all things is insoluble by us; and I for one must be content to remain an Agnostic.” (Darwin:1958:93-94.)

Shortly after Darwin married Emma, on 29 January 1839, she beseeched him in an emotive letter to reconsider her own unitarian faith, bringing to mind the prospect of eternal consequences: “Everything that concerns you concerns me and I should be most unhappy if I thought we did not belong to each other for ever.” (Darwin, 1958:237). To which he replied, “When I am dead, know that many times, I have kissed and cried over this. C.D.” (Darwin, 1958:237). But Darwin did not change his mind. Instead, Darwin embarked on a naturalistic quest which sustained him for the rest of his life.

⁹ More precisely, a Deist. (Herbert, 2009:129).

In June of 1842, Darwin wrote out the first draft of his big idea, amounting to 35 pages. By 1844, this sketch had grown to 230 pages, which he asked Emma to publish in the event of his death (Darwin, 1958:120; Dawkins, 2009:66). When he finally put together the first edition of *Origin* in 1859, it was 502 pages long. By the end of his life he had written at least 26 books, and exchanged more than 14,000 letters with at least 1,800 correspondents from all over the known world (Herbert, 2009:91). Darwin's naturalistic pilgrimage, however, began with Thomas Malthus.

3.3.5 THOMAS MALTHUS AND THE PRINCIPLE OF POPULATION (1838)

On the 28th of September of 1838, he began reading an *Essay on the Principle of Population* (1798) by a British economist and clergyman, Thomas Malthus (1766–1834). Malthus was good friends of Rousseau and Hume, both highly instrumental in supporting the progress of the Enlightenment in Europe (Habakkuk, 1979:99). Malthus (1890:3) argued that the dominant geometric growth of the human population compared to the arithmetic growth of food would lead inevitably to a ruthless battle for resources (cf. Crowe, 2009:100-101). This line of reasoning, despite its erroneous pessimism, deeply impressed Darwin, helping him to see the “war in nature” which he later described as a “struggle for existence” or “survival of the fittest” (Habakkuk, 1979:102-103; Browne, 2006:44). Without this competition, Darwin reasoned, any species could, and ultimately would overrun the planet in a matter of years. The brutal struggle amongst species for food would only allow the strongest and fittest to survive, thereby weeding out the weaker, less-adapted beings. The net effect of this weeding process was construed by Darwin to be the dynamic principle underlying evolution. He realised that Malthusian principles could motivate and drive what he later called, “natural selection”. In his *Autobiography* he wrote, “Here, then, I had at last got a theory by which to work” (Darwin, 1958:120).

3.3.6 EDWARD BLYTH AND NATURAL SELECTION

Natural selection was a concept which was integral to Darwin's thesis. When he first started preparing his thesis, he even planned to call it “Natural Selection” (Browne, 1995:543). Unfortunately, the common misattribution made since 1859 has been that Darwin discovered it himself.

The truth of the matter is that Darwin was not the first to recognise the principle of natural selection, although he probably coined the phrase. Edward Blyth (1810-1873), an English zoologist, had written three articles in *The Magazine of Natural History* from 1835 to 1837 in which he expressed, in detail, “the leading tenets of Darwin's work – the struggle for existence, variation, natural selection and sexual selection” (Blyth, 1835:45-46; Eiseley & Grote, 1959:98,101; Grigg, 2004:39-40).

This happened to be one of the leading zoological journals of the day, and as Eiseley and Grote (1959:98) have pointed out, it would be highly improbable that Darwin had not consulted it for his research, given that his friends Lyell, Henslow, Jenyns and others had all featured articles in it. Additionally, the similarity of expression between Darwin and Blyth, and the coincidence of his research on the 'species question' beginning in 1837 has also been used to indict him with plagiarism (Eiseley & Grote, 1959:99-100; Bergman, 2002:60). But Blyth was not the only scientist to have thought of natural selection before Darwin. James Hutton, William Wells, James Prichard, and William Lawrence had all published papers on natural selection by 1813 (Morris, 2005:156). Patrick Matthew (1810-1873), a Scottish botanist, also wrote on natural selection before Darwin, publishing his paper in 1831 (Matthew, 1831:364-365; cf. Morris, 2005:156).

It is claimed by some that Darwin's genius was to impose a *unique* interpretation on natural selection, as the "creative force in evolution" to produce species as opposed to a "negative force that eliminated species" (Bergman, 2002:60). But even in this regard, his grandfather had already written on the subject in *Zoönomia*:

"The final cause of this contest amongst the males seems to be, that the strongest and most active animal should propagate the species, which should thence become improved." (Darwin, 1809:396.)

Nora Barlow, Charles Darwin's granddaughter, has made the comment,

"This might be mistaken for a sentence written by Charles himself sixty-five years later; for here Erasmus has groped towards the idea of selection." (in Darwin, 1958:151.)

It is perhaps ironic, given Darwin's dependence on Erasmus, that in later years he would look back upon his grandfather's work and write,

"At this time I admired greatly the *Zoönomia*; but on reading it a second time after an interval of ten or fifteen years, I was much disappointed, the proportion of speculation being so large to the facts given." (Darwin, 1958:49.)

In a letter to his publisher, John Murray, Darwin once mentioned how proud he was of his "child", referring to *Origin* (Darwin, 1887b:178). The question is, can Darwin be called its legitimate father? (Grigg, 2004:39)

3.3.7 ROBERT CHAMBERS AND VESTIGES OF THE NATURAL HISTORY OF CREATION (1844)

While Darwin was preparing his *magnum opus*, Robert Chambers (1802-1871) wrote a concise and controversial argument for evolution in the *Vestiges of the Natural History of Creation* which was published anonymously in 1844. In November of the same year, Darwin read it and was shocked (Browne, 1995:461). He discovered that Chambers had anticipated the essence of his own thesis: that species were not immutable. With some misgivings, Darwin called it a "grand

piece of argument against mutability of species” (Darwin, 1887a:344). Furthermore, Chambers had “also grasped the importance of Lyell’s work in describing the geological past solely in terms of present-day forces and saw, as Darwin did, the symmetry of applying this view directly to the living world.” (Browne, 1995:461). The *Vestiges* was the first book to be written in English to present an argument for evolution (Herbert, 2009:86).

The *Vestiges* had several weaknesses, however, which were also evident to Darwin; and he took heart in the fact that his own work still had its relevance. The first problem with Chambers’ book was in the paucity of scientific data used to support its many speculations: phrenology, the spontaneous generation of insects from electricity, and the evolution of humans from orang-utans (Browne, 2002:51-52). The second major problem with the book’s reception in academic circles was that its anonymous author clearly lacked scientific credibility. The third problem with *Vestiges* was that it lacked an overall mechanism to drive the evolution of species (Herbert, 2009:89). For all these reasons Chambers’ book received a lot of criticism from the academia in England, and was soundly condemned as nonsense.

In spite of the criticism, however, *Vestiges* was still a very popular book; more popular for its time, in fact, than the *Origin of Species* which was published 15 years later. More than 24 000 copies were sold in Britain alone (Herbert, 2009:89). Its success also testifies to the prevailing intellectual and theological climate of England because, “It was a book that tapped into the progressive aspirations of the age.” (Browne, 2005:51). *Vestiges* also inspired Alfred Wallace¹⁰ with the concept of transmutation (Browne, 2002:61).

Darwin’s concurrent interest in the origin of species, however, had not gone entirely unnoticed. Some of the readers of *Vestiges* assumed him to be its author. Darwin wrote in one of his letters to a W.D. Fox:

“Have you read that strange unphilosophical, but capitally-written book, the *Vestiges*, it has made more talk than any work of late, & has been by some attributed to me.—at which I ought to be much flattered & unflattered.” (Darwin, 1845b.)

He had mixed feelings about the book, but conceded that, “such a book, if it does no other good, spreads the taste for natural science.” (Darwin, 1854). The naturalistic heart of *Vestiges* warmly resonated with Darwin. So he continued to apply himself to the problem of finding a mechanism suitable enough to provide the changes he needed to drive evolution and make the mutability of species more plausible. The other decision which he made was to embark on an extensive study of barnacles.

¹⁰ See 3.4.5

Darwin realised that without experience and official training in biology, he would face the same criticisms Chambers had suffered for his biological speculations in *Vestiges*. He had seen how his old professor, Adam Sedgwick, had taken the argument in *Vestiges* to pieces, making a mockery of its anonymous author, and he had read the critique with “fear & trembling” knowing too well that it could have been a diatribe against *him* (Darwin, 1845c; Browne, 1995:469). So Darwin deliberately waited on his big idea and studied barnacles from 1846 to 1854 to gain the biological credibility he needed to write on the species question (Herbert, 2009:90). It meant that he had to sacrifice 8 years to barnacle research, amassing an estimated 10,000 specimens in the process (Herbert, 2009:91). But in the end, as Desmond and Moore have observed, “It established him as a zoological specialist, and no longer just the geological expert. More important, it was his licence to speak on species.” (quoted in Herbert, 2009:91).

3.3.8 THE DEATH OF ANNE DARWIN (1851)

The year 1851 marked a dark period for Darwin and his family. On the 23rd of April 1851, Anne, his favourite child and eldest daughter, died of fever at the age of ten. She had endured poor health and a lingering illness for many months after contracting scarlet fever in 1849 (Browne, 1995:498-499). Emma was also apart from both Darwin and Anne during her last days due to the pregnancy of their ninth child. It has been said, “One cannot read the letters that passed between Charles and Emma at this desolate time, without shedding tears with them.” (Brooke, 2009:69). These months of suffering and anxiety partially revived Darwin’s religious sentiments, and he frequently referred to God in his letters before and just after Anne’s death. He wrote on the 18th of April,

“It is now from hour to hour a struggle between life & death. *God only knows the issue...* Sometimes Dr. G. exclaims she will get through the struggle; then, I see, he doubts.— Oh my own it is very bitter indeed.— *God preserve & cherish you.*” (emphasis mine; Darwin, 1851a.)

Two days before Anne died, he wrote, “I trust in God we are nearly safe.” (Darwin, 1851b). On the day that Anne passed away, he wrote again to Emma,

“*I pray God Fanny’s note may have prepared you...* Our poor dear child has had a very short life but I trust happy, & *God only knows* what miseries might have been in store for her. She expired without a sigh... I cannot remember ever seeing the dear child naughty. *God bless her.*” (emphasis mine; Darwin, 1851c.)

But Darwin’s grief hardened his convictions against the God who had robbed him of a child. Unlike Emma, his disbelief in the afterlife left him utterly barren (Browne, 1995:502):

“The doctrines of the Bible that Emma took comfort in were hurdles he could not jump... The gradual numbing of his religious feelings over the decades... and the godless world of natural selection he was even then still creating came implacably face to face with the emptiness of bereavement. Over the following months, Darwin became more certain,

more fixed in his scepticism. Little by little, his theological doubts turned into conviction.” (Browne, 1995:503.)

So he buried himself deeper into his work, and continued on the project which, he hoped, would one day remove God entirely from the world he suffered in. “Darwin firmly drove the idea of God out of nature. As he was the first to recognise, his theory bleakly signalled the death of Adam.” (Browne, 1995:543).

3.4 THE EXECUTION OF HIS IDEA (1858-1882)

3.4.1 DARWIN’S SURPRISE: ALFRED WALLACE’S LETTER (1858)

On the 18th of June 1858, Darwin had a horrible surprise. A letter bound from a remote island in the Dutch East Indies arrived for him, in the form of an essay, entitled *On the Tendency of Varieties to Depart Indefinitely From the Original Type*, from a fellow naturalist and explorer, Alfred Russel Wallace (1823-1913). Wallace asked him to peruse the document and forward his essay on to Lyell for publishing if he approved.

In the essay, Darwin discovered that Wallace, working independently, had come to his own conclusions on natural selection and species. Unbeknownst to him, Wallace had been on a similar pilgrimage, enjoying almost all the same influences which had moulded Darwin¹¹, including Malthus’ essay on populations, Lyell’s *Principles of Geology*, and Chambers’ *Vestiges* (Browne, 2006:61; Gillispie, 1959:284). He had even been grappling with the same species problems, and had his “Malthusian moment” during a malarial fever in Papua New Guinea (Browne, 2002:62). Darwin wrote immediately to Lyell,

“I never saw a more striking coincidence; if Wallace had my MS. sketch written out in 1842, he could not have made a better short abstract!” (Darwin, 1887b:116.)

Darwin realised that he could no longer work in secret, so immediately, on both Hooker and Lyell’s advice, he attached excerpts of his own findings to accompany Wallace’s essay which was then sent to the Linnean Society of London (Browne, 2006:59). When Wallace was informed of Darwin’s earlier work on the subject he generously conceded primacy to Darwin, and together they published a joint paper for the society’s journal, under the title *On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection* (Browne, 2006:60). So Darwin could no longer postpone the publication of his masterpiece. The time had come to finalise his book and submit his ideas to the world. On the 24th of November 1859, John Murray printed 1,250 copies of *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle*

¹¹ See Chapter 2

for *Life*. Within hours they were completely sold out (Herbert, 2009:107). It seemed like the world had been waiting patiently for it.

3.4.2 DARWIN'S SYNTHESIS: THE ORIGIN OF SPECIES

Darwin was evolution's greatest synthesizer (cf. Allchin, 2009:116). His family had put evolution within his reach; his education had challenged him to consider it; his voyage had allowed him to experience it; his peers had encouraged him to pursue it; and in London, he had the time and money to devote his life in research to it. Darwin was strategically placed at the heart of industrialisation and technology, in a world where copious amounts of scientific data were pouring in from all over the known world (Rajendran, 2009:854). He had unique opportunities, and he capitalised on them, writing to more than 1,800 correspondents, exchanging some 14,000 letters with people from all walks of life (Herbert, 2009:91). It had taken him more than 20 years to construct *Origin*. It took him another 12 years to refine it. As Peckham (2006:9) has documented:

“Of the 3,878 sentences in the first edition, nearly 3,000, about 75 per cent, were rewritten from one to five times each. Over 1,500 sentences were added, and of the original and added sentences plus these, nearly 325 were dropped. Of the original and added sentences there are nearly 7,500 variants of all kinds.”

As Darwin continued to write and correspond his naturalistic agenda became more and more blatant. Only two years after publishing the first edition of *Origin*, he produced *On the various contrivances by which British and foreign orchids are fertilised by insects* (1862). Asa Gray (1810-1888), a botanist who corresponded regularly with Darwin, immediately perceived the underlying naturalistic purpose of the book and wrote to him about it. Darwin replied on 23 July 1863,

“Of all the carpenters for knocking the right nail on the head, you are the very best: no one else has perceived that my chief interest in my orchid book, has been that *it was a “flank movement” on the enemy...* I shd [sic] like to hear what you think about what I say in last Ch. of Orchid Book on the meaning & cause of the endless diversity of means for same general purpose.— It bears on design—that endless question.” (emphasis mine; Burkhardt et al., 1997:331.)

But Asa Gray, along with many others, eagerly supported Darwin's cause, and became very effective promoters of his views on the origin of species.

3.4.3 DARWIN'S SUPPORTERS: THE EVANGELISTS FOR ORIGIN OF SPECIES

Darwin was by no means a lonely soldier fighting the war against creationism. He had many faithful and influential friends who were prepared to propagate his ideas. Huxley, Spencer and Hooker all held strategic positions in both the *Royal Society of London* and the *British Association for the Advancement of Science* and were therefore able to control and promote

Darwin's evolutionary ideas from prominent positions in the higher academic circles of British society (Herbert, 2009;112-113).

3.4.3.1 Asa Gray: Darwin's theological ally

Asa Gray (1810-1888), a prominent American botanist and ardent follower of Darwin, was also a professing Christian who endeavoured to synthesize Darwin's views on origin and species with theology. He went on to develop a compromised position which strongly emphasised the theistic teleology which Darwin had avoided in *Origin* (Browne, 2006:87). This strategically provided other Christians with a model to accommodate Christianity within Darwin's evolutionary scheme. In this way Gray promoted a view which, despite being "completely antithetical to Darwin's proposal", nevertheless received much support from the church and paved the way for Darwin's reception into the theological arena (Browne, 2006:93).

3.4.3.2 Joseph Hooker: Darwin's first convert

Joseph Hooker (1814-1879) was Darwin's first convert, and most avid disciple (Herbert, 2009:99). He even went so far as to emulate his voyage, embarking on a trip to Antarctica from 1839 to 1843 on the *HMS Erebus* (Herbert, 2009:100). While John Murray was preparing to publish the *Origin of Species*, Darwin commended him to Wallace in one of his letters:

"I forget whether I told you that Hooker, who is our best British botanist and perhaps the best in the world, is a *full convert*, and is now going immediately to publish *his confession of faith*; and I expect daily to see proof-sheets." (emphasis mine; Darwin, 1903a:119.)

Darwin even shared the 1844 sketch of his thesis with Hooker, and confided with him concerning his agenda:

"... I have been now ever since my return engaged in a very presumptuous work, and I know no one individual who would not say a very foolish one... I determined to collect blindly every sort of fact, which could bear any way on what are species... At last gleams of light have come, and I am almost convinced ... that species are not (*it is like confessing a murder*) immutable." (emphasis mine; Darwin, 1887b:23.)

The close relationship between them allowed Darwin to be more open and honest about his true intentions. In their correspondence, Darwin felt free to describe himself as the "devil's chaplain" (Darwin, 1903a:94). Hooker shared his vision to remove God completely from his creation. Writing to Darwin soon after the publication of *Origin*, on 14 December 1859, he confessed:

"I am perfectly tired of marvelling at the wonderful amount of facts you have brought to bear, and your skill in marshalling them and throwing them *on the enemy*" (emphasis mine; Darwin, 1887b:242.)

In another letter to Hooker, Darwin revealed his blatantly naturalistic agenda:

“I have long regretted that I truckled to public opinion, and used the Pentateuchal term of creation, by which I really meant "appeared" by some wholly unknown process. It is mere rubbish, thinking at present of the origin of life; one might as well think of the origin of matter.” (Darwin, 1887c:18.)

But Hooker was not the only zealous disciple of Darwin.

3.4.3.3 Thomas Huxley: Darwin’s apologist

When Thomas Huxley (1825-1895) first read *Origin* he lamented, “How extremely stupid not to have thought of that!” (Darwin, 1887b:197). From that point forward he fought passionately for Darwin’s cause as his own, debating and writing in the notorious “coruscating prose” he has been remembered for (Browne, 2006:94). Huxley’s uncompromising defence of Darwin, led him to proud proclaim, “I am Darwin’s bull-dog” (Huxley, 1908b:62). In turn, Darwin referred to him as his “general agent” (Huxley, 1908a:247). Together, Huxley and Darwin made a formidable pair. While Darwin was content to sit at home writing letters, Huxley took Darwin’s evolutionary ideas, which Darwin described as “the devil’s gospel”, to the streets (Darwin, 1887b:331). His naturalistic agenda was even more conspicuous than Darwin’s. In his 1860 review of *Origin*, Huxley wrote:

“In this nineteenth century, as at the dawn of modern physical science, the cosmogony of the semi-barbarous Hebrew is the incubus of the philosopher and the opprobrium of the orthodox... *Extinguished theologians lie about the cradle of every science as the strangled snakes beside that of Hercules*; and history records that whenever science and orthodoxy have been fairly opposed, the latter has been forced to retire from the lists, bleeding and crushed if not annihilated; scotched, if not slain. But *orthodoxy is the Bourbon of the world of thought*... it is as willing as ever to insist that the first chapter of Genesis contains the beginning and the end of sound science; and to visit, with such petty thunderbolts as its half-paralysed hands can hurl, *those who refuse to degrade Nature to the level of primitive Judaism*.” (emphasis mine; Huxley, 1907:52-53.)

Huxley had good scientific credentials as a zoologist, and even wrote a section “on the nature of the differences between the brains of man and the higher apes” for Darwin’s *Descent of Man* (Darwin, 1882a:v). When Lyell refused to accept the full extent of Darwin’s treatment on the evolution of humans, it was Huxley who eagerly provided his faithful support (Browne, 2006:90). When Darwin’s views on origin and species were challenged by scientists of the British Association for the Advancement of Science, it was Huxley, again, who stepped up to debate Samuel Wilberforce (Browne, 2006:95-96). Huxley also served a key role in Darwin’s cause by ensuring that the clergy no longer controlled state education (Browne, 2006:93). He used his influence in to ensure that future education readily embraced Darwin’s ideas and based science “on rational thought untainted by religious belief” (Browne, 2006:93).

With the help of these men, it took roughly ten years for Darwin’s views on origin and species to gain full acceptance amongst the public in England. By the time he published *Descent of Man*, most people were ready to receive Darwin’s treatment on the origin of humans and incorporate

it with his larger evolutionary theory of species. From publication in 1871, it quickly sold 4,500 copies within the first two months (Herbert, 2009:123).

3.5 THE DEATH OF DARWIN, THE BIRTH OF DARWINISM (1882)

Darwin devoted the last few years of his life to studying earthworms. In 1881, the year before he died, he finished his final book, *The Formation of Vegetable Mould through the Action of Worms*. In its conclusion he wrote,

“It may be doubted whether there are many other animals which have played so important a part in the history of the world, as have these lowly organised creatures.” (Darwin, 1882b:313.)

Herbert (2009:138) asks the question as to, “why at this time of his life would a scientist of Darwin’s stature be interested in earthworms?” It seems that Darwin was contemplating the imminent reality of his death, his earthly destiny: to be eaten by worms. He had finally come to the point where he needed to face up to one of the most important ramifications of his naturalistic worldview. His grandfather, Erasmus, had also expressed a similar intimacy with ants and worms in *The Temple of Nature*, where he described them as his “brother-emmetts¹²” and “sister-worms” (Darwin, 1803:163).

A popular myth which circulates today suggests that Darwin finally recanted on his deathbed and converted to Christianity. Henrietta Litchfield, his daughter, and the rest of the family who were present with Darwin in the last few weeks of his life, strongly deny this rumour (Herbert, 2009:152). Towards the end of his life none of Darwin’s letters show any softening towards Christianity or a conviction of sin¹³. In fact, just seven weeks before he died, there is continuing evidence of his uncompromising commitment to a naturalistic worldview, revealed in a letter he wrote to Daniel Mackintosh on 28th February 1882:

“Though no evidence worth anything has as yet, in my opinion, been advanced in favour of a living being, being developed from inorganic matter, yet I cannot avoid believing the possibility of this will be proved some day in accordance with the law of continuity... If it is ever found that life can originate on this world, the vital phenomena will come under some general law of nature. Whether the existence of a conscious God can be proved from the existence of the so-called laws of nature (i.e., fixed sequence of events) is a perplexing subject, on which I have often thought, but cannot see my way clearly.” (Darwin 1903b:171; cf. Herbert, 2009:151.)

Darwin died on 19th of April 1882. To the success of his cause he was buried at Westminster Abbey (Browne, 2006:118). The church had enshrined a man whose vision was to undermine its very existence and purpose.

¹² i.e. ants

¹³ Darwin wrote to a German student in 1879, “For myself, I do not believe that there ever has been any revelation. As for a future life, every man must judge for himself between conflicting vague probabilities.” (Darwin, 1887a:307)

3.6 SUMMARY AND CONCLUSION

In essence, Darwin's life can be understood and described as a steady decline from nominal Christianity to an irreconcilable equivocation between Deism and Agnosticism. His resolve was always against the God of the Bible. Being born into the aristocracy of England, and living with the privileged minority, he could avoid the typical economic hardships of his day (Herbert, 2009:2). As such, Darwin had time to theorise and conjecture boldly, building his own edifice upon the shoulders of many others who had speculated before him. Darwin's genius lay in his ability to synthesize a formidable volume of data and centuries' worth of ideas into a workable thesis. He admitted as much himself, writing less than two months after the publication of *Origin*,

“The only novelty in my work is the attempt to explain *how* species become modified, & to a certain extent how the theory of descent explains certain large classes of facts; & in these respects I received no assistance from my predecessors.” (Darwin, 1860c.)

In his introduction to *The Descent of Man*, Darwin (1882a:2) admitted that his “work contains hardly any original facts in regard to man”. But what was the essence of his legacy?

3.6.1 DARWIN'S LEGACY

Darwin is remembered for many different reasons. What he cannot be credited for, is the concept of evolution itself and most, if not all, of the mechanisms he enrolled to support it. His grand evolutionary scheme employed the uniformitarianism of Lyell; the struggle of Malthus; the natural selection of Blyth, Wells and Matthew; the common descent and transmutations of Erasmus; the inherited characters of Lamarck; the embryology of St. Hilaire; the scepticism of Hume; the theology of Paley; and the philosophical naturalism of his own family. As mentioned already, Darwin's monumental contribution was an ingenious synthesis: one of the most rigorous and persuasive arguments for naturalistic evolution ever constructed.

Both his fame and notoriety can be found together in his boldly naturalistic agenda. Peter Lawrence writes, “In this vital mission to discredit the supernatural, nothing has proved more important than *The Origin of Species*.” (cited by Berry et al., 2009:98). There has been a tendency to ignore or overlook the worldview behind Darwin's monolithic research project; but judging from his private correspondence, autobiography and excerpts from other writings, the most predominant feature of his legacy was his attempt to expunge the idea of God completely from the natural world (Browne, 2002:2). The question which remains is, to what extent was he successful?

3.6.2 TIMELINES

3.6.2.1 Timeline of Influential Literary Works prior to Darwin

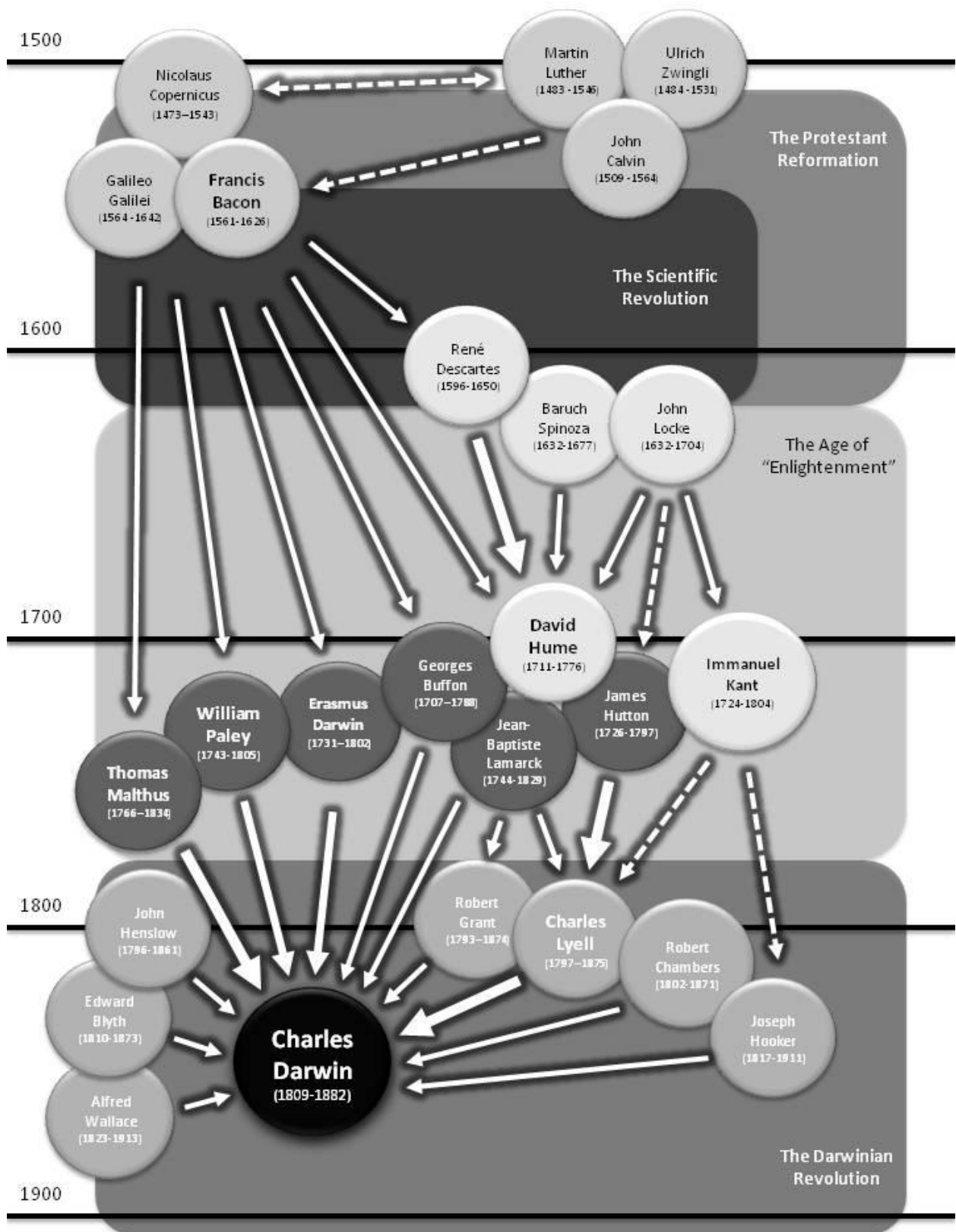
Date	Work
1543	“On the Revolutions of the Celestial Spheres” by Nicholas Copernicus (1473-1543)
1605	“Advancement of Learning” by Francis Bacon (1561-1626)
1611	“Messenger from the Stars” by Galileo Galilei (1564-1642)
1624	“De Veritate” by Lord Herbert of Cherbury (1582/3-1648)
1641	“Meditations on First Philosophy” by René Descartes (1596–1650)
1677	“Ethics” by Baruch Spinoza (1632–1677)
1690	“An Essay concerning Human Understanding” by John Locke (1632–1704)
1748	“An Enquiry concerning Human Understanding” by David Hume (1711-1776)
1778	“Les époques de la nature” by Georges-Louis Comte de Buffon (1707-1788)
1781	“Critique of Pure Reason” by Immanuel Kant (1724–1804)
1788	“Theory of the Earth” by James Hutton (1726-1797)
1794	“View of the Evidences of Christianity” by William Paley (1743-1805)
1794-1796	“Zoönomia” by Erasmus Darwin (1731-1802)
1798	“An Essay on the Principle of Population” by Thomas Malthus (1766-1834)
1801	“System of Invertebrate Animals” by Jean-Baptiste Lamarck (1744-1829)
1802	“Natural Theology” by William Paley (1743-1805)
1809	“Zoological Philosophy” by Jean-Baptiste Lamarck (1744-1829)
1830	“Principles of Geology” (Vol. 1) by Charles Lyell
1830-1842	“Cours de Philosophie Positive” by Auguste Comte (1798-1857)
1831	“Preliminary Discourse on the Study of Natural Philosophy” by John Herschel (1792-1871)

3.6.2.2 An Overview of Darwin’s Life

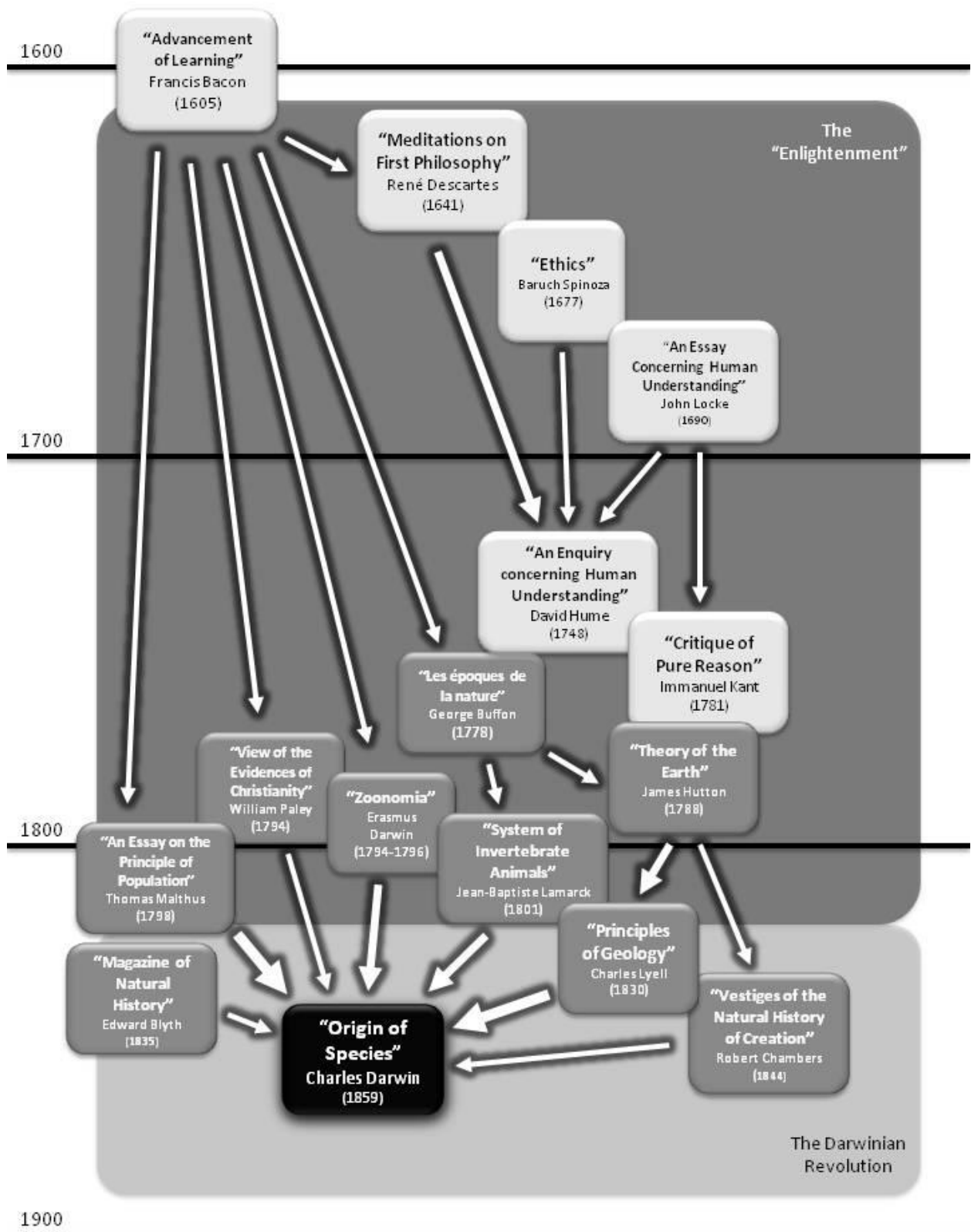
Date	Event
1809	Charles Darwin is born.
1825	Darwin goes to Edinburgh Medical School Studies under Robert Grant (1793-1874)
1828-1831	Darwin goes to Cambridge University Studies under John Stevens Henslow (professor of botany) Studies under Adam Sedgwick (professor of geology) Studied William Paley’s “Evidences of Christianity”
1830	The first volume of “Principles of Geology” is written by Charles Lyell
1831-1836	Darwin goes for his 5 year voyage on the HMS Beagle Robert Fitzroy gives Darwin “Principles of Geology” to read Darwin has a significant encounter in Tierra de Fuego with the Fuegians
1837	Darwin establishes his materialistic/naturalistic agenda
1838	Darwin reads Malthus’s “An Essay on the Principle of Population”

	Darwin develops his theory of Natural Selection based on the struggle for existence or “survival of the fittest” (coined by Herbert Spencer in 1864)
1842	Darwin writes up a rough sketch of his big idea
1844	“Vestiges of the Natural History of Creation” is written by Robert Chambers
1851	Annie, Darwin’s second child, dies of fever at the age of 10 years
1858	Alfred Wallace sends Darwin a letter with the results of his own research
1859	“The Origin of the Species” is published
1860	7 essays by Church of England churchmen are published, endorsing Darwin
1865	“Experiments on Plant Hybridisation” is written by Gregor Mendel
1871	“The Descent of Man” is published
1881	“The Formation of Vegetable Mould through the Action of Worms” is published
1882	Darwin dies.

3.6.3 CHART OF INFLUENTIAL PEOPLE



3.6.4 CHART OF INFLUENTIAL LITERARY WORKS SINCE 1600



4. ORIGIN AND SPECIES IN DARWIN

4.1 INTRODUCTION

It took 22 years for Darwin to turn a crude sketch into a book which would challenge and inspire scientists, theologians and philosophers well into the 21st century. From 1859 it took him a further 12 years, through six editions, to revise and reshape *Origin of Species* into its final form. During this time he also worked relentlessly on its sequel, *Descent of Man*, which he finished in 1871. Together they represent the full extent of his argument for the naturalistic origin of species.

Origin has endured 150 years of scientific progress, and is relevant even today in prominent institutions¹ of higher education across the world. Berry and Hoekstra, who prescribe *Origin* for their students at Harvard University, continue to maintain the importance of this work today:

“Uniquely among the sciences, evolutionary biology is dominated by the one authority, the one book. If Steve Gould hadn’t entitled his first collection of essays *Ever Since Darwin*, we would still be starting our papers with these very words... the continued relevance and freshness of *The Origin* is especially remarkable when you consider what Darwin didn’t know.” (Berry et al., 2009:104.)

This chapter will endeavour to analyse how Darwin developed the concepts of origin and species in both of his major works to argue for his naturalistic worldview, and consider why his argument was so compelling.

4.2 AN ANALYSIS OF ORIGIN OF SPECIES

The first edition of *Origin* spanned just over 500 pages. As Darwin’s book was read, reviewed and rigorously appraised, unforeseen problems came to light and he was compelled to rewrite and add new content, effectively growing the original manuscript by nearly a third over the course of 12 years (Peckham, 2006:9). Discrepancies between the six editions has led to some debate concerning which edition should be regarded as most authoritative. In later revisions, he adopted more of Lamarck’s ideas, and employed religious language in several passages. This has stirred up much controversy; and so, contrary to normal practice, many respected scientists and historians of science who are sympathetic to Darwin promote his first edition in preference to the rest (Burrow, 1968:49; Quammen, 2008:x; Berry et al., 2009:96). But this approach is unsatisfactory for at least two reasons: firstly, because it fails to appreciate the logical dependence of his argument on both Lamarck and God; and secondly, because it grossly misrepresents Darwin’s thesis.

¹ *Origin of Species* is prescribed reading at the Universities of Cambridge, Harvard, Yale, Oxford, Stanford, Alberta, and Cape Town (the professors of the respective science faculties have specifically confirmed this to me in personal email correspondence).

4.2.1 THE THESIS OF ORIGIN OF SPECIES

Darwin expressed his thesis in these words:

“species have been modified, during a long course of descent, by the preservation or the natural selection of many successive slight favourable variations.” (Darwin, 1860b:480.)

This remained the crux of his theory; but by the 6th edition, with a greater realisation of the limitations of natural selection, Darwin had to elaborate further:

“species have been modified, during a long course of descent. This has been effected chiefly through the natural selection of numerous successive, slight, favourable variations; *aided in an important manner by the inherited effects of the use and disuse of parts*; and in an unimportant manner, that is in relation to adaptive structures, whether past or present, *by the direct action of external conditions*, and by variations which seem to us *in our ignorance* to arise spontaneously.” (emphasis mine; Darwin, 1872:421.)

Natural selection remained the primary mechanism by which species had been modified, but it was by no means the only factor which had helped living beings evolve over eons of earth’s history. Darwin appealed to both Lamarckian “use and disuse” and St. Hilaire’s environmental influences to explain how species could be changed (cf. Mayr, 1982:361).

Fundamentally, however, Darwin’s thesis was the antithesis of “special creation” (Darwin, 1859:488). In the *Descent of Man*, Darwin wrote, concerning his previous work, *Origin*,

“I may be permitted to say, as some excuse, that I had two distinct objects in view; firstly, *to shew that species had not been separately created*, and secondly, that natural selection had been the chief agent of change, though largely aided by the inherited effects of habit, and slightly by the direct action of the surrounding conditions... if I have erred in giving to natural selection great power, which I am very far from admitting, or in having exaggerated its power, which is in itself probable, I have at least, as I hope, *done good service in aiding to overthrow the dogma of separate creations.*” (emphasis mine; Darwin, 1882:61.)

In fact, Mayr (1982:506) has shown how, despite differences of opinion on the means of descent, renowned evolutionists have not abandoned the anti-creation core of Darwin’s thesis (see Table 4.1).

	Common Descent	Gradualness	Population Speciation	Natural Selection
Lamarck	No	Yes	No	No
Darwin	Yes	Yes	Yes	Yes
Haeckel	Yes	Yes	?	In part
Neo-Lamarckians	Yes	Yes	Yes	No
T.H. Huxley	Yes	No	No	(No)
De Vries	Yes	No	No	No
T.H. Morgan	Yes	(No)	No	Unimportant

Table 4.1 – Darwin’s thesis in light of popular evolutionary variants (Mayr, 1982:506)

This synopsis is supported by Simon Conway Morris² who maintains:

“First and foremost, *The Origin* is an exorcism of the doctrine of special creation, and conducted by one of the most skilled exorcists science has ever seen.” (Berry et al., 2009:102.)

Janet Browne³ corroborates this:

“The essence of Darwin’s proposal was that living beings *should not be regarded as the carefully constructed creations of a divine authority* but as the products of entirely natural processes.” (emphasis mine; Browne, 2002:84; cf. Browne, 2002:66-67.)

In this regard Darwin’s underlying agenda was not original; but his argument was. And it was the argument of *Origin* which made it compelling.

4.2.2 THE ARGUMENT OF ORIGIN OF SPECIES

Although Darwin (1859:459) claimed that his book was “one long argument”, much debate has precipitated regarding the exact form of that argument (Sintonen, 1990:677). In fact, the analysis has proved to be so perplexing to some that Ruse (1975:219) has claimed that, “no one has as yet given an entirely satisfactory picture of the theory”. Others, like Mayr (1982:505), have conceded that the structure of *Origin* “strikes the modern reader as rather chaotic” such that it has become commonly recognised as a “difficult book”. Even Darwin’s close friend and faithful supporter, Thomas Huxley, wrote that *Origin* presented itself as, “a mass of facts crushed and pounded into shape, rather than held together by the ordinary medium of an obvious logical bond” (Huxley, 1907:25).

Nevertheless, three predominant views have arisen as possible candidates for the argument structure of *Origin*: the hypothetico-deductive, the inference-to-the-best-explanation, and the semantic model (Sintonen, 1990:677; Recker, 1987:147-148). Elements of all three methodologies can be found in *Origin*, but the question remains: is there really a unifying structure to his argument?

4.2.2.1 The Structure of the Argument

Darwin (1958:119) claimed in his autobiography that he had “worked on true Baconian principles, and without any theory collected facts on a wholesale scale”. But his notebooks and personal correspondence reveal a prior commitment to evolutionary theories, notably his grandfather’s, which would suggest otherwise. Darwin did not study the world without first conceiving a theory. As early as 1837, he had chosen to establish an evolutionary theory of the origin of species, and the following 22 years saw him diligently strive to prove this naturalistic

² Simon Conway Morris is Professor of Evolutionary Palaeobiology in the Earth Sciences Department at Cambridge.

³ Janet Browne is currently the Aramont Professor in the History of Science at Harvard University.

scheme. It is not surprising, therefore, that in *Origin*, both inductive *and* deductive methods of arguing can be found.

Many have attempted to identify the structure of Darwin's argument. According to Waters (2009:124), Darwin constructed his argument according to John Herschel's principles of *vera causa*⁴. Herschel proposed that, for any scientific hypothesis, a "true cause" must fulfil three criteria, or "evidential cases" (Hodge, 1992:462):

- (1) The existence of the cause
- (2) The adequacy or competence of the cause to produce the effects explained
- (3) The responsibility of the cause for the effects (Waters, 2009:124)

Waters (2009:124-125), Hodge (1992:463) and Recker (1987:165-166)⁵ have argued that Darwin's argument in *Origin* follows this pattern, such that chapters 1 to 4 seek to establish both (1) the existence, and (2) the adequacy of natural selection as a *vera causa*; whilst chapters 5 to 13 seek to demonstrate how this *vera causa*, as opposed to the theory of special creation, is (3) responsible for a wide range of phenomena. This is plausible on at least two grounds. First, a cursory study of *Origin* reveals that Darwin (1859:159,352,482) repeatedly used Herschel's language of "vera causa". And second, perhaps more persuasively, in his autobiography, Darwin (1958:68) acknowledged Herschel as the man who had, "stirred up in me a burning zeal to add even the most humble contribution to the noble structure of Natural Science", such that his book, *Introduction to the Study of Natural Philosophy*, along with Humboldt's *Personal Narrative*, stood out for Darwin (1958:67-68) as the two most influential books he studied whilst at Cambridge.

William Whewell (1794-1866), a contemporary of Darwin, also formulated a similar scientific approach based upon "the notion of *verae causae*" (Recker, 1987:164). This is significant because Darwin (1958:104) expressed a high regard for Whewell's work on the inductive sciences⁶. In *The Philosophy of the Inductive Sciences*, Whewell suggested that hypotheses should be justified in terms of their "consilience" (Recker, 1987:164). By this he meant that in true theories, there is a "convergence of inductions" inferred from "separate classes of facts" so that their coincidence suggests that the effects occur due to a common *vera causa* (Whewell, 1847b:77, 285-286). This line of reasoning describes an "inference-to-the-best-explanation"

⁴ i.e. "true cause" – a principle derived from Newton's first rule of reasoning: "We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances." (Newton, 1846:384, cf. Herschel, 1851:144).

⁵ Recker has modified this scheme slightly into three independent argument strategies: (1) Empiricist *Vera Causa* Strategy, (2) Response to Objections Strategy, and (3) Explanatory Power Strategy.

⁶ i.e. astronomy, physics, chemistry, natural history and physiology in particular (Whewell, 1847a:vi)

model and is found especially in chapters 9 to 13 in *Origin* where Darwin argued that his theory of descent was more *consilient* with the data than the theory of creation (Recker, 1987:155). In his own words, he wrote:

“I believe in the truth of [natural selection], because it collects under one point of view, and gives a rational explanation of, many apparently independent classes of facts.” (Darwin, 1868a:13-14.)

Approaching *Origin* as a whole, Matti Sintonen has provided a helpful simplification of the structure of Darwin’s argument. His scheme is appealing because it accommodates and unifies the distinctive strengths of other well-accepted models, particularly the hypothetico-deductive analyses of Mayr (1982:478) and Ruse (1975:222-223). Sintonen (1990:677) has shown how Darwin’s “one long argument” can be divided into both a long and short argument. The short argument, spanning the first four chapters of *Origin*, established the principle of natural selection (Darwin, 1859:80-81). Both Ruse and Ghiselin have identified this argument as the “deductive core” of *Origin* (Recker, 1987:149). Natural selection provided one of the key presuppositions for the long argument (Sintonen, 1990:679). The crux of the long argument was that natural selection could produce new species.

The short argument was uncontroversial, given that even Darwin’s predecessors had already acknowledged the principle of selection at work in nature (see 3.4.2). But the harder proposition which Darwin needed to prove was from the long argument: that natural selection was the *vera causa*, or origin, of new species (Sintonen, 1990:679). This would require the major portion of *Origin* to demonstrate, and depend upon many auxiliary arguments for support.

4.2.2.2 The Style of Argument

The style in which Darwin argued also deserves appraisal.

4.2.2.2.1 Darwin argued didactically

Darwin wrote in order to teach. He wanted his readers to appreciate the steps he had taken to get to his theory. Hence chapters 1 to 4 provide, in part, the history of his “theory’s genesis” (Ruse, 1975:225). He invited the reader to follow the logic of his argument in his own footsteps so that they too could arrive at the same grand conclusion. At the end of every chapter, Darwin also provided a succinct summary to recapitulate the heart of his argument. With merely the introduction or conclusion to *Origin*, a less-informed reader could easily grasp the essence of his thesis. Above all, as his prolific letter-writing proved, Darwin wanted to communicate his idea to the masses. He wanted a theory which was readily understandable.

4.2.2.2 Darwin argued tentatively

Darwin wrote with a significant degree of hesitation and caution. This can be seen from his frequent use of the subjunctive mood and a recurrent “speculative tone” in *Origin* (DeRosa, 2006:102). The speculative nature of his writing has been usefully captured by Francis Morris. An abridgement of Morris’s extracts⁷ from *Origin* include the following:

“Almost inevitably... I think... I think... probably... probably... I suspect... I think... can it be thought impossible... can one doubt... we have reason to believe... as I believe... nor do I believe... it may metaphorically be said... we must believe... probably... probably... probably... might be... might be... probably... if so... might... perhaps... may be... may be... I can see no reason to doubt... might... I strongly suspect... as I believe... as I believe... let us suppose... might be... would probably... might be... would probably... we may imagine... I presume... in imagination... to my imagination...” (Morris, 1882:76-78.)

This style of arguing has been reviewed both positively and negatively. Positively, Darwin was honest enough to express the tentativeness of his research and ideas. Negatively, his hesitation, and in some cases, ignorance, has begged the question as to the plausibility of his overall argument. As Browne (2002:69) has observed, “He depended on probabilities.”

4.2.2.3 Darwin argued analogically

Darwin appeal to several analogies to support his inferences. It could be said, therefore, that much of his reasoning depended entirely on the strength of analogy. In support, Ruse (1975:238) claims that,

“any portrayal of the ‘essential’ nature of his theory which omits all or nearly all mention of the analogy can only have purchased support for a philosophical thesis by removing...some of the best parts of Darwin’s evolutionary thought”.

Analogy formed the basis of the inference from artificial selection to natural selection. Nature selects like man selects. Similarly, the argument that species could evolve into new species was based upon the idea that varieties were analogous to species (Darwin, 1859:59). Even more generally, assuming Lyell’s principle of uniformitarianism, Darwin inferred that geological changes over time were analogous to biological changes over time. Thus species could be produced *in the same way* that rocks could be laid down in layers: gradually and sequentially (Darwin, 1872:422). And from embryology, he argued analogically to infer that species had all evolved from a simple life-form:

“Embryology rises greatly in interest, *when we look at the embryo as a picture*, more or less obscured, of the progenitor, either in its adult or larval state, of all the members of the same great class.” (emphasis mine; Darwin, 1872:396.)

⁷ Morris has filled six pages of quotations like these from *Origin*, spanning the length of the book. For brevity only a selection of these have been cited here.

4.2.2.2.4 *Darwin argued antithetically*

Darwin wanted to show how his own theory of origins excluded and replaced the biblical model. The “theory of natural selection” and the “theory of creation” were always placed in antithesis: the affirmation of the one necessarily denied and disproved the other. In this way, the reader has to choose between the two (eg. Darwin, 1859:55,95,133,194). To make such decisions easier, Darwin frequently presented the merits of natural selection against the absurdities of creation, arguing like a presuppositional apologist: from the fatuity of the contrary (cf. Van Til, 2003:129). Often he expostulated with his reader:

“Such facts... *are utterly inexplicable* on the theory of independent acts of creation.” (emphasis mine; 1859:477-478; cf. 1859:59,97,333,406,437.)

This proved to be a very effective device which he regularly employed in his argument to show that only *his* theory could explain the multifarious phenomena described.

4.2.2.2.5 *Darwin anticipated objections*

Darwin was sensitive to the reception of his argument. He anticipated, in meticulous detail, the possible objections which could be raised against him in the mind of his reader, and he systematically addressed them one by one. By the sixth edition, he had devoted two chapters to addressing some of these miscellanies. He also included three full chapters on the origin of instincts, the problem of sterility, hybridism, and the absence of transitional forms in the geological record. Stylistically this proved to be one of the most attractive features of the argument in *Origin*.

4.2.2.2.6 *Darwin used illustrations*

Finally, Darwin was a gifted illustrator with a fertile imagination⁸. As Recker (1987:156) has observed,

“Darwin, in fact, often ‘filled in gaps’ in historical information by creating ‘imaginary histories’ and then comparing them and the principles of his theory with experimental data.”

These “imaginary histories” have popularised the semantic model of Darwin’s argument which place more emphasis on the hypothetical illustration of the theory as opposed to its empirical demonstration. He had the ability to paint, in words, compelling illustrations of his grand theory. Perhaps the two most memorable concepts portrayed in *Origin* are found in Darwin’s “Tree of Life” and the principle of natural selection (Darwin, 1859:130; Waters, 2009:121). With his “Tree of Life”, Darwin left behind an image which has become one of the most memorable

⁸ Darwin (1958:23) recounted in his autobiography how, even as a “little boy”, he was “much given to inventing deliberate falsehoods, and this was always done for the sake of causing excitement”.

evolutionary icons of history: an illustration which cleverly encapsulated and related the transmutation of species (in the branches) to the concept of common descent (the trunk) so that even a child might be able to grasp the basic result of his theory (Waters, 2009:123). To motivate natural selection Darwin even personified nature in order to embellish its perceived plausibility. Through imagery and metaphor, he carefully rooted his argument in fertile soils, and left ideas which were well-equipped to grow upon receptive minds.

4.2.2.3 The Fundamental Argument

The fundamental argument of *Origin*, comprised of the short and long arguments, has been neatly summarised by Ernst Mayr⁹ (1982:478) as, “three inferences based on five facts derived in part from population ecology and in part from phenomena of inheritance.” The first three facts show Darwin’s dependence on Malthus:

- (1) all populations of species grow exponentially if allowed to reproduce
- (2) populations stay roughly the same size (although fluctuating periodically)
- (3) natural resources are limited

The first inference then follows, (A) there must be a struggle for existence amongst populations for the limited resources allowing only the fittest individuals to survive (Mayr, 1982:479-480).

The second two facts are:

- (4) individuals within species vary
- (5) variations are heritable

From (4) and (5) Darwin inferred that, (B) heritable variations will determine which individuals survive. This is what he called natural selection. He then made one further inference in his overall argument to the effect that, (C) after numerous generations, populations will be subject to gradual change leading to the production of new species (Mayr, 1982:480).

In summary, the inference of (A) struggle and (B) natural selection form the short argument to *Origin* and establish the principle of natural selection (spanning chapter 1-4). The long argument for (C) the origin of new species, however, required the greater portion of *Origin* to develop. Natural selection was a vital presupposition for this argument, but it was not sufficient on its own to prove the result which Darwin had envisioned (cf. Sintonen, 1990:681; Ruse, 1975:238). This is probably why, towards the conclusion of his chapter on natural selection, Darwin (1859:88) appealed to a principle he called “sexual selection” which depended not on “a

⁹ While he was alive, Ernst Mayr (1904-2005) was regarded as being the “greatest living evolutionary biologist” (Gould, 1984:255). Mayr’s analysis of Darwin’s core argument follows almost the same structure of the scheme proposed by Michael Ruse but with greater brevity (cf. Ruse, 1975:222-223).

struggle for existence”, but rather a “struggle between the males for possession of the females”. The principle, however, was left for future development in the *Descent of Man*. To add to these, he also suggested that the transmutation of species may be effected by “use and disuse”, the direct influence of the environment, and other factors which were unknown to him (Darwin, 1882a:61-62).

4.2.2.4 The Long Argument

Frustratingly perhaps, Darwin had no direct empirical evidence to show the action of natural selection producing new species. As a disclaimer, he wrote in the introduction to *Origin*,

“I can here give only the general conclusions at which I have arrived, with a few facts in illustration, but which, I hope, in most cases will suffice. No one can feel more sensible than I do of the necessity of hereafter publishing in detail all the facts, with references, on which my conclusions have been grounded; and I hope in a future work to do this.” (Darwin, 1859:2.)

So Darwin decided instead to illustrate his theory with two imaginary examples: of wolves and flowering plants. In the first case, Darwin imagined that wolves might evolve over time to adapt to a changing environment (1859:90-91). If the wolves’ natural diet was threatened by a depletion in prey or other limited resources, competition would allow only the fittest and strongest wolves to survive. In this manner natural selection could produce an entirely new race of wolves which were faster and more adept than their predecessors.

In the second case, Darwin imagined a scenario where plants might evolve by similar competition to secrete more nectar and produce greater flowers acting due to the demands of nectar-seeking insects (1859:91-93). Then, by consequence, the modification of these plants might also cause, through natural selection, the transmutation of the nectar-seeking insects which would have to meet the new demands of the modified plants (1859:93-95).

At this point Darwin realised that, without examples of new species originating, he needed to appeal to Lyell’s principle of uniformitarianism to explain how species might change by imperceptible increments over vast ages. On this assumption, Lyell’s theory could be applied to the biological world of species as it was to the geological world of rocks, mountains and valleys. Natural selection would have to be a “very slow process” (Darwin, 1859:108). He wrote,

“I am well aware that this doctrine of natural selection, exemplified in the above imaginary instances, is open to the same objections which were at first urged against Sir Charles Lyell's noble views on "the modern changes of the earth, as illustrative of geology;"... *Natural selection can act only by the preservation and accumulation of infinitesimally small inherited modifications*, each profitable to the preserved being; and as modern geology has almost banished such views as the excavation of a great valley by a single diluvial wave, so will natural selection, if it be a true principle, banish the belief of the continued creation of new organic beings, or of any great and sudden modification in their structure.” (emphasis mine; Darwin, 1859:95-96.)

But without any empirical demonstration of descent by natural selection, Darwin’s argument would be, at best, hypothetical; or at worst, imaginary and fictitious. Therefore he was compelled to argue, by indirect means, for his theory of descent. This formed the basis of the long argument for the origin of new species. To persuade an inquiring mind, he would have to show how evolution by natural selection was a necessary presupposition to explain various phenomena. As Sintonen (1990:680) has observed,

“What needed further justification was not the claim that natural selection operates in nature (that is, the conclusion of the short argument) but the more ambitious overall claim that this principle accounted for the origin of new species and was the main source of evolutionary change.”

Darwin also realised that not all change could be attributed to natural selection; a problem which needed a whole chapter covering the *Laws of Variation*. Therefore he invented a similar principle called “sexual selection” to account for other biological anomalies, including the differences between males and females. In distinction to natural selection, sexual selection was far less rigorous because the struggle was not for survival but to leave progeny (Darwin, 1859:88). But he left this principle for further development in the *Descent of Man*.

For the remainder of *Origin*, Darwin meticulously accumulated supporting evidence for descent by natural selection, devoting four chapters to the geological succession, geographical distribution and the mutual affinities of organic beings. As Matt Ridley has observed,

“The power of the book comes not from its relentless logic so much as its enormous reservoir of examples large and small.” (Berry et al., 2009:97.)

Evidence <i>against</i> the Theory	Reinterpreted as Evidence <i>for</i> the Theory
Absence of intermediate forms in the fossil record provide no natural history of transmutation between species.	Absence of intermediate forms indicates that evolution of incipient species is rapid and ruthless. It also means that the fossil record is an imperfect record of natural history (Darwin, 1859:280).
Paucity of living intermediate forms for the plethora of stages between distinct species suggests that species are not evolving.	The absence of living intermediate forms illustrate the power of extinction as more improved species replace/exterminate the less improved (Darwin, 1859:412).
Identical species (eg. fresh water fish) are found in geographically isolated regions (i.e. on different continents) which suggests that they did not descend from a common ancestor.	This separation can be explained by “great geographical changes” over eons of time and a glacial period which would provide ideal conditions for rapid evolution (Darwin, 1859:381,384).

Table 4.2 – Darwin’s reinterpretation of evidence

Throughout this catalogue of evidences, he continued to maintain: only on the basis of common descent by natural selection can we make sense of the phenomena we find in the natural world. Only if the theory of descent is true, can the apparent ordering of the fossil record, the

heterogeneous distribution of species, the homologous morphology and embryology of species, and the existence of rudimentary organs all be satisfactorily explained. Ingeniously, and in many places, Darwin reinterpreted evidence *against* evolution into evidence *for* evolution (see Table 4.2).

The unifying motif, however, behind these auxiliary arguments was the question of the origin of species. In the shorter argument, Darwin had shown how natural selection was analogous to artificial selection. But the power of natural selection depended upon a more important analogy: the analogy between varieties and species. This inference lay at the heart of his longer argument. The concept of species, therefore, was crucial to his theory.

4.2.3 THE DEVELOPMENT OF SPECIES IN ORIGIN OF SPECIES

Mayr (1982:251) has said,

“There is probably no other concept in biology that has remained so consistently controversial as the species concept.”

This was true in Darwin’s day, and it remains true today. The main reason why this question continues to fuel debate is because it reflects a far bigger question, the question of origin. It is not surprising, therefore, that the concept of species forms one of the central pillars of Darwin’s argument in the *Origin of Species*.

4.2.3.1 The Classification of Species prior to Darwin

John Ray (1627-1705), an English naturalist, considered by many to be the father of botany and zoology, constructed the first clear definition of species in 1686, modelling his classification on Aristotle’s taxonomy (Lamont, 1998:51-53; Glass, 1959:33-34). This definition provided the standard interpretative model of classification for roughly the next 150 years (Mayr, 1982:162). This was significant because, according to Ray, species were immutable. In antithesis, therefore, to Darwin he maintained, “one species never springs from the seed of another nor vice versa” (cited in Mayr, 1982:257).

Following from Ray, Carl Linnaeus (1707-1778), the famous Swedish zoologist, now acknowledged as the “father of taxonomy”, also popularised the fixity of species¹⁰ (Mayr, 1982:171). But Lamarck, who followed in the tradition established by Leibniz and Buffon, thought otherwise. He suggested that even the category of “species” did not exist and proposed that transmutation was possible (Mayr, 1982:182). This was contested, however, by

¹⁰ Linnaeus probably developed this conception from his dependence on the Latin Vulgate translation of Genesis, which popularised Jerome’s translation of *mîn* (kinds) into *genere* (genera) and *species* (Sarfati, 2010:30). But towards the end of his life he changed his mind and removed the statement “nullae species novae” (no new species) from the 12th edition of *Systema Naturae* (Mayr, 1982:259).

Cuvier who argued that the evidence of transmutation in the fossil record was conspicuously lacking (Mayr, 1982:213; Cuvier, 1818:119). Nevertheless, Cuvier's *Essay on the Theory of the Earth* greatly influenced the evolutionary views of Lyell, and consequently, Darwin. In that essay he argued that the species in the fossil record were laid down sequentially, and therefore the record could be interpreted as a natural history of living species (Cuvier, 1818:114).

Like Cuvier, Louis Agassiz (1807-1873), a prominent American palaeontologist and contemporary of Darwin, thought that God had repeatedly intervened at different times in history to create new species (Agassiz, 1962:64). Along with the immutability of species, this became one of the accepted views amongst Christians concerning the variety of species found as fossils and in the living world. In retrospect it was ironic that many Christians thought that by reinterpreting the biblical 'kinds'¹¹ as 'species' they would be make the Bible seem more credible (Crowe, 2009:98). Unwittingly, they had provided Darwin with the means he needed to refute the theory of creation. It is not surprising, therefore, that Darwin depicted the theory of creation in *Origin* as being one in which species were considered immutable. By demonstrating the mutability of species, he could then refute the biblical account of creation.

By the time Darwin began his study of nature, the concept of species which was generally accepted amongst naturalists could be described by four characteristics (Mayr, 1982:260):

- (1) Species consist of similar individuals sharing in the same essence
- (2) Each species is separated from all others by a sharp discontinuity
- (3) Each species is constant through time
- (4) Species can vary, but only within severe limitations

4.2.3.2 Darwin's Conception of Species

When Darwin wrote *Origin*, he found fault with the popular classification of species. He claimed that the species concept was vague (1859:44), arbitrary (1859:52), artificial (1859:485) and indistinguishable from varieties (1859:58-59). In a letter to Hooker in 1856, he even wrote that to try and define species is like "trying to define the undefinable" (Darwin, 1887b:88). At another place in *Origin*, Darwin (1859:47) suggested that the question could only be resolved by appealing to a "majority of naturalists". Yet earlier he wrote that, "every naturalist knows vaguely what he means when he speaks of a species" (1859:44). It is surprising and significant therefore that he did not define "species" in any of his completed publications. The only clear definition to be found in his writings comes from a page from *Notebook B* of his preparatory musings on transmutation in which he states:

¹¹ This misconception and poor caricature of the 'kinds' in Genesis has been dubbed the "Linnaean lawn" and continues to prevail amongst followers of Darwin even till today (Wieland, 1995:21; cf. Glass, 1959:31).

“Definition of species: one that remains at large with constant characters, together with other animals beings of very near structure.” (Darwin, 2010:213.)

In the sixth edition of *Origin*, Darwin provided a glossary of terms at the end of the book, and even here the term ‘species’ is notably missing (DeRosa, 2006:26). It seems that after eight years of studying barnacles and twelve years of perfecting his book, Darwin still did not have a clear understanding of species. Nevertheless, the concept of species was crucial to his theory.

4.2.3.3 The Development of Species in Darwin’s Argument

Darwin’s argument was built upon on his interpretation of species. This is why *Origin* begins with the problem of species and poses several questions (1859:16). What is the relationship between species and varieties? How do new varieties arise? How should species be classified in contrast to varieties? Darwin needed to show that species had not been created. To build his case, he made two critical assumptions attributed to the theory of creation:

- (1) According to creation, species had been “independently created” at different stages¹² in earth’s history as shown by the fossils geological strata (Darwin, 1859:6,465)
- (2) According to creation, species were immutable (Darwin, 1859:6; cf. Huxley, 1859:8)

If Darwin could refute these propositions, the case for special creation would be seen to collapse. The strength of his thesis would be demonstrated in the refutation of its antithesis. It was the crux upon which he could build his case *against* the theory of creation, and consequently *for* his theory of descent by modification.

4.2.3.3.1 Variation and the power of selection

Fancy pigeon breeding may not seem like the most likely place to begin a scientific treatment on the origin of species, but Darwin’s own expertise in this area made it a logical place to begin. With the results from his own experiments with pigeons he showed that artificial selection could produce impressive variation in the size, shape and colour of the beaks, skulls, feathers, skin, tails, wings, legs, toes, and eggs of domestic pigeons (Darwin, 1859:20-29). To add to this list, Darwin also included experimental work carried out on fruit, ducks, cats, sheep, pigs, dogs, silkworms, cabbages, cattle and many other creatures (Darwin, 1859:10-43). Each case presented evidence of how domestic species had been changed by the accumulation of slight successive modifications (Darwin, 1859:10-43). Clearly, he reasoned, artificial selection has the

¹² This is reminiscent of the view which Darwin was taught at Cambridge under the instruction of Adam Sedgwick who, like Georges Cuvier (1818:114) and Louis Agassiz (1962:64), held to a catastrophist interpretation of the geological record. (cf. section 3.2.3.2).

power to improve the species. This was uncontroversial. But it begged the question: by how much could species vary or be improved by selection?

4.2.3.3.2 *The struggle for existence and its consequence: natural selection*

In domestic breeding, Darwin had demonstrated how much man could change the structure of living creatures by deliberately selecting for preferred criteria. But surely, he reasoned, is not nature discriminating and selecting in the same way (1859:80)? This is what he called “natural selection”, or later, with Spencer’s inspiration, “survival of the fittest” (Darwin, 1872:49). Nature, he speculated, would select the fittest and strongest varieties whilst eliminating the weakest. And if artificial selection could cause so much modification, what would natural selection produce? Darwin (1859:61) compared the two:

Natural Selection	Artificial Selection
Discriminates by the external and internal features	Discriminates only by the external features
Selects for the good of each being	Selects for the good of man
Destroys the weak, favours the strong	Protects the weak (thereby hindering natural selection and evolutionary progress)
Criteria for selection remain constant over a long period, allowing changes to gradually accumulate.	Preferences vary over time as humans change their minds as to what qualities to select for and against.
Selection acts over eons of years.	Selection acts over a much shorter period, restricted by man’s lifespan.

Table 4.3 – A comparison between natural and artificial selection

The conclusion? Natural selection was “immeasurably superior to man’s feeble efforts” (Darwin, 1859:61). This meant that species could be modified by nature even more successfully than by man. In fact, with enough modification, over successive generations, Darwin (1859:52) claimed that incipient species would result. This is where the case became controversial. Surely, on the authority of Linnaeus and other naturalists, species are immutable? Darwin knew this was a problem, and admitted as much in a letter to G. Bentham in May of 1863:

“When we descend to details... we cannot prove that a single species has changed” (Darwin, 1887c:25.)

4.2.3.3.3 *Varieties are incipient species*

This led Darwin to suggest that there were no definite categories for species¹³. Taking this logic one step further, he inferred that all varieties were actually incipient species (Darwin, 1859:56). Therefore all species must have once existed as varieties (Darwin, 1859:58-59). If this was true, another inference could be made. Varieties would be analogous to species (Darwin,

¹³ Discussed already in 4.2.3.2

1859:59). The differences and similarities *between* distinct species would be the same as the differences and similarities *within* the same species (1859:57).

Many generations and vast ages of struggle would accumulate modifications, producing new varieties, and ultimately, new species. Since the theory of creation taught that “each species has been independently created”, he concluded that the similarities between species must provide the refutation of creation (Darwin, 1859:59).

4.2.3.3.4 *Similarity of species implied common descent*

Classification of species now became a matter of genealogical investigation (Darwin, 1859:420). Similarities between creatures which were due to their common descent were labelled “true affinities”. According to Darwin, common descent was, “the *only* known cause of the similarity of organic beings” (emphasis mine; Darwin, 1859:413). This caused difficulties, however, because not all morphological similarities could be easily attributed to common descent (for example, the similarities between whales and fish; Darwin, 1859:428). So Darwin (1859:414) thought such similarities to be coincidental, or merely “analogical”. In other words, every naturalist should be able to determine the difference between analogical similarity and “true affinity” in order to correctly classify species (Darwin, 1859:420). But Darwin prescribed no taxonomical model or basis upon which such a distinction could be made in practice.

4.2.3.3.5 *Production of new species favoured by isolation*

One of the factors which Darwin suggested would greatly encourage the development of new species was the principle of isolation. Reminiscent of his travels in the Galapagos, he argued that islands were particularly favourable to this end (Darwin, 1859:105). This is because, within an isolated population, individuals would have to compete for the same resources within a limited space (Darwin, 1859:75). The struggle would be more severe. This would allow even the slightest modifications to an individual the advantage over its peers which would “soon be exterminated” (Darwin, 1859:102).

Thus the species would improve through the progeny of the fittest, gradually producing through many generations, new species.

4.2.4 THE DEVELOPMENT OF ORIGIN IN ORIGIN OF SPECIES

Having dealt with species, Darwin considered the question of origin. This was unquestionably the most complicated and enigmatic puzzle to account for in his theory. In fact, within the first paragraph of his treatise, he acknowledged this difficulty, described in Herschel’s words as, “*that mystery of mysteries*” (1859:1). He wrote only a few pages later,

“No one ought to feel surprise at much remaining *as yet unexplained* in regard to the origin of species and varieties, if he makes due allowance for *our profound ignorance* in regard to the mutual relations of all the beings which live around us.” (emphasis mine; Darwin, 1859:6.)

4.2.4.1 Origin of Variety

Darwin’s theory of natural selection was a useful mechanism to explain the *selection* of variety, but on its own he realised that it lacked an explanation for the *origin* of variety. To his credit, Darwin was honest about his inability to fully answer the question. He also confessed that ascribing variation merely to “chance” was a “wholly incorrect expression” which he had employed because of his profound ignorance in the matter (Darwin, 1859:131,132,167). In a later passage, he wrote,

“But *we are far too ignorant to speculate* on the relative importance of the several known and unknown laws of variation... we ought not to lay too much stress on *our ignorance of the precise cause of the slight analogous differences between species.*” (emphasis mine; Darwin, 1859:198-199.)

Yet his commitment to a naturalistic scheme needed a natural explanation to describe how variation in species might originate.

4.2.4.2 Use and Disuse

Without variation, there could be nothing for natural selection to act upon; or in Darwin’s own words, “selection does nothing without variability” (1868a:6; cf. 1868a:2). This is why he devoted a whole chapter after *Natural Selection* to the *Laws of Variation*. In some analyses of *Origin*, this chapter has found little to no place at all in Darwin’s argument (eg. Recker, 1987:165). This may be understandable given that most of the Lamarckian views which Darwin expressed in this chapter have been subject to ridicule, especially after the rediscovery of Mendel’s experiments on plant hybridization (Browne, 2006:133). But he was compelled to speculate, “Something must be attributed to use and disuse.” (Darwin, 1859:43; cf. Beer, 1996:xxiii).

The phrase “use and disuse”, commonly employed by Darwin, referred to the Lamarckian notion that creatures could evolve and develop body parts simply through exercise and the influence of the conditions of life acting on the reproductive system (Darwin, 1859:134; cf. Lamarck, 1963:68). He thought that frequent use would enlarge certain parts of an animal or plant over successive generations, while disuse would diminished them. Thus bones could be shortened or flattened, new limbs could form, or wings develop out of hands (Darwin, 1872:383). Darwin reasoned that the existence of rudimentary organs in animals provided evidence for generations of disuse. He argued that diminutive tails, ears, wings, and horns were the result of animals not using those body parts over successive generations (Darwin, 1859:454). Similarly, the apparent loss of flight in birds and beetles, and loss of sight in rats and fish were also attributed

to this effect (Darwin, 1859:454). He even suggested, by these means, that a bear might evolve into a whale:

“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, 1859:184.)

4.2.4.3 Laws of Correlation

In addition to these Lamarckian ideas, Darwin (1859:86) suggested that variation could be produced by “laws of correlation” causing slight modifications in one part of a creature to affect the development of other correlated parts. For evidence of this law, Darwin cited the correlations between: blue eyes and deafness in cats, the shell colour and sex of tortoises, and the hair and teeth of the naked Turkish dog (Darwin, 1859:144).

4.2.4.4 Pangenesis

The origin of variation, however, continued to trouble Darwin. In 1868 he extended his speculations even further, and devised a mechanism in *The Variation of Animals and Plants under Domestication* by which Lamarck’s inheritance of acquired characters might be given some genetic respectability. His suggestion took the form of an hypothesis he called “pangenesis” in which “each separate atom” of any organism produced “a multitude of germs” which together determined the composition of the “fertilised seed or egg”, and thereby allowed particular features to be inherited in varying proportions depending on their “use and disuse” (cf. Darwin, 1868:357-358).

Over the subsequent 12 year period, his revisions of *Origin* slowly reflected more and more of Lamarck¹⁴. The question of origin was undoubtedly problematic for Darwin. In a few cases, he was able to ascertain, with some speculation, the origin of features like rudimentary organs or breeds of pigeon, but repeatedly he expressed his ignorance (Darwin, 1859:40). Despite this, it is interesting that Darwin continued to disparage the view that species were created with an inherent capacity to vary. In the summary to his treatment on the laws of variation he wrote,

“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... 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*” (emphasis mine; Darwin, 1859:167.)

¹⁴ For example, in the first edition the phrase “use or disuse” occurs once; but by the 6th edition, this expression occurs 7 times in the text.

Within a year or two of publication, Darwin's cousin Galton inadvertently refuted the idea of pangenesis whilst trying to prove it in an experiment with rabbits (Browne, 2006:102-103). It is hard to overlook the irony of such a result in light of the alleged "mockery and deception" of creation (Darwin, 1859:167).

But Darwin had great faith in his naturalistic worldview. In his discussion concerning the origin of instinct, Darwin (1859:235-236) felt compelled to believe that a natural cause existed despite the lack of any explanation for it. On the subject human origins, he was also completely silent, probably because he feared the public response, remembering the reception of *Vestiges* (Browne, 2002:76). Instead he wrote, "Light will be thrown on the origin of man and his history." (Darwin, 1859:488).

4.2.4.5 Ignorance

When Darwin realised he had little to offer on the subject of origins, he carefully restricted the scope of his thesis to exclude any explanation on the origin of life or the origin of the mind (Darwin, 1859:207). He even claimed that the question was hardly of any concern to his thesis (Darwin, 1859:187). But considering that the title of his book was "On the Origin of Species...", it is disappointing that he failed to address the subject. Browne has also identified this anomaly and admits,

"He had no systematic history of beginnings to offer... For a book that would claim in its title to address the origin of species, Darwin's text in fact refused to propose any theory of absolute origins." (Browne, 2002:77.)

As it stood, Darwin had to assume the origin of life and intelligence *a priori* in his argument. This is possibly why, in conclusion, Darwin deferred to a creator for the origin of life:

"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.*" (emphasis mine; Darwin, 1859:484.)

4.3 AN ANALYSIS OF DESCENT OF MAN

Sigmund Freud once wrote in a letter to *The Antiquary Hinterberger* that Darwin's *Descent of Man* should be among the "ten most significant books" ever written (Moore & Desmond, 2004:xi). Despite some optimistic aspirations, it never became as popular as *Origin*, although it did become one of the most controversial scientific treatises of the late 19th century.

Darwin began work on this project during his early years of note-taking whilst contemplating and developing his evolutionary scheme as a whole. From July 1838, he devoted two notebooks, *M* and *N*, to his musings on man, mind and materialism (Darwin, 1974:263-265). The pressure to publish prematurely and the fear of prejudice, however, made him abandon this dream and divide his research into two portions. *Origin* was carefully restricted, therefore, in application to

the general evolution of plants and animals. Only later, in the aftermath of his success, did Darwin collate his notes and lay out the fuller ramifications of his argument as applied to the human species in *Descent*¹⁵. As far as he was concerned, this was the “highest and most interesting problem for the naturalist” (Darwin, 1887b:109). In June of 1870, he wrote in a letter to B. J. Sullivan,

“I shall this autumn publish another book partly on man, which I dare say many will decry as very wicked.” (Darwin, 1887c:126.)

In February of 1871, *Descent* was published. The book faced little opposition and was generally well-received. Apparently the “clerical network saw little new in the book” (Moore & Desmond, 2004:ii).

In 1874, after three years of criticism and feedback, Darwin (1874:v) made several important corrections¹⁶ and refinements, and published a 2nd edition. Eight years later, in 1882 and shortly before he died, a final revision of *Descent* was sent to John Murray. This last edition included minor changes and a short supplemental note on sexual selection in relation to monkeys (Darwin, 1882a:620-624). This analysis will appraise the 1882 edition of *Descent* which expressed Darwin’s final, and therefore most authoritative, views on descent.

4.3.1 THE THESIS OF DESCENT OF MAN

Darwin’s objective in *Descent* was threefold, as stated in his own words:

“The sole object of this work is to consider, *firstly*, whether man, like every other species, is descended from some pre-existing form; *secondly*, the manner of his development; and *thirdly*, the value of the differences between the so-called races of man.” (emphasis mine; Darwin, 1882:2.)

The thesis of this work essentially recapitulated and concluded the agenda established in *Origin*. Darwin (1859:488) informed the world in *Origin* that, “light will be thrown on the origin of man and his history” and in *Descent* he provided it. The central claim of this sequel was that man had evolved, or descended, like any other species of animal from some lower pre-existing form by the action of natural selection, the inherited effects of use and disuse, the direct action of the environment, and lastly, by sexual selection. Sexual selection is the overarching theme of *Descent*. Simply put, where *Origin* had propounded implicitly that man was animal, *Descent* proposed it explicitly. Likewise, as *Origin* emphasised natural selection, *Descent* emphasised sexual selection. More than half of the book was devoted to demonstrating the reality of sexual selection in the animal kingdom. This was the mechanism which would hopefully explain the

¹⁵ Hereafter *Descent of Man* will be abbreviated to *Descent*.

¹⁶ Darwin lists, in a table, eighty-seven principal additions and corrections to the previous edition (1874:vii-ix).

variation of human species. But above all else, as before, Darwin wanted to refute the theory of special creation. He wrote,

“Some of those who admit the principle of evolution, but reject natural selection, seem to forget, when criticising my book¹⁷, that I had the above two objects in view; hence if I have erred in giving to natural selection great power, which I am very far from admitting, or in having exaggerated its power, which is in itself probable, *I have at least, as I hope, done good service in aiding to overthrow the dogma of separate creations.*” (emphasis mine; Darwin, 1882:61.)

With his usual dogmatism, Darwin (1882a:619) concluded that although man may appear to have a “god-like intellect” and many “noble qualities”, his body still bears the “indelible stamp of his lowly origin”. Man was just an animal, albeit an “eminently *domesticated* animal” (emphasis mine; Darwin, 1887c:96).

4.3.2 THE ARGUMENT OF DESCENT OF MAN

Darwin’s argument in *Descent* has received considerably less attention than *Origin*. In part, this was due to the overwhelming popularity of *Origin*, which its sequel hardly rivalled. The thesis of *Descent* was also less controversial by comparison, given that its substance had already been addressed by others like Karl Vogt in his *Lectures on Man* (1864); Huxley in *Evidence as to Man’s Place in Nature* (1863); Argyll in *Primeval Man* (1869); and Wallace in *The Origin of Human Races and the Antiquity of Man Deduced from the Theory of ‘Natural Selection’* (1864) (Moore & Desmond, 2004:xxxv; xxxvii). But the structure of Darwin’s argument in *Descent*, despite its lack of coherence, was easier to grasp than that of *Origin*.

4.3.2.1 The Structure of the Argument

In order to substantiate his thesis, Darwin divided his book into three parts: (1) the descent or origin of man; (2) sexual selection; and (3) sexual selection in relation to man. Treating (2) and (3) under the broader theme of sexual selection, *Descent* actually divides with greater clarity into two parts, amounting to a “strange concoction of two books, one on human evolution, the other on sexual selection” (Moore & Desmond, 2004:xvi).

In the first part of *Descent*, Darwin argued for the first two objectives of his thesis: *that* man had descended from the animals, and *how* he had descended. In the remaining two parts, he addressed the most controversial aspect of his thesis: the origin and nature of the races (or species) of man (due to sexual selection). Of this arrangement, Darwin devoted more than two thirds of his argument to establishing the operation of sexual selection in nature. This is not surprising given that it was his own unique contribution to the problem of human species and origins (Moore & Desmond, 2004:xvi-xvii). This treatment on sexual selection is placed,

¹⁷ Referring to *Origin of Species*

parenthetically, in the middle of his discourse on man's descent and the origin of human races. For more than one reason, therefore, it could be said that sexual selection was at the heart of Darwin's argument.

4.3.2.2 The Style of Argument

In most respects, the style of arguing adopted by Darwin in *Origin* was maintained in *Descent*. He argued antithetically, tentatively, imaginatively and didactically. But where he had argued analogically before, Darwin also argued anthropomorphically (Moore & Desmond, 2004:xlii). The most obvious depiction of this approach can be found in Darwin's aesthetic treatment on sexual selection. Male fish were described "polygamists" who were "mad with delight" in their "courtship", "gallant" in battle for their "bride"; and "bold and pugnacious" during their "season of love" (Darwin, 1882a:331-342). Birds were also capable of falling in love, accused of seduction, and "love at first sight" (Darwin, 1882a:415). Even in matters of religion, he ascribed "quasi-religious" sentiments to animals. He wrote, for example, "a dog looks on his master as on a god" (Darwin, 1882a:96). This was strategically useful for at least two reasons. Firstly, it naturally assumed and predicted the conclusion of his thesis in his treatment on the animal kingdom. And secondly, it portrayed the evolution of mankind from animals and birds in a more palatable manner, allowing them the dignity and respectability typically reserved for man.

4.3.2.3 The Argument for Descent

The idea that man shared a common ancestor with animals was an old view, popularised by Lamarck (Darwin, 1882a:2-3). But the theory continued to lack credibility. Darwin's argument for descent, therefore, sought to re-establish the case in the light of new scientific grounds and arguments. The argument was based on three categories of evidence: homology, embryology and rudiments (Darwin, 1882a:146).

4.3.2.3.1 Homology, Embryology and Rudiments

Arguing from homology, Darwin (1882a:6-9) claimed that humans and animals could be shown to have similar brains, tissues, sexuality, get sick from similar diseases (which can be treated with common medication), have similar tastes (eg. alcohol). With regards to man's descent from apes, he wrote,

"It is quite incredible that a man should through mere accident abnormally resemble certain apes in no less than seven of his muscles, if there had been no genetic connection between them." (1882a:43.)

Arguing from embryology, Darwin (1882a:9) claimed that the "embryo of man closely resembles that of other mammals". To illustrate this resemblance he also provided drawings of human and dog embryos for comparison. He concluded,

“No other explanation has ever been given of the marvellous fact that the embryos of a man, dog, seal, bat, reptile, &c., can at first hardly be distinguished from each other.” (Darwin, 1882a:25.)

Rudiments, according to Darwin (1882a:11-12), were organs which had been left in a primitive condition by evolution due to disuse (as explained by pangenesis). In contrast, nascent organs were organs currently undergoing evolutionary development due to extensive use. Thus the presence of rudiments in animals and plants stood as evidence for the historic action of thousands of generations of descent with modification. Even the difference between the sexes could also be accounted for by rudiments. In this case, features that had been “acquired” by one sex were “partially transmitted” to the other by inheritance (Darwin, 1882a:23). In humans, Darwin identified the following organs as rudiments:

Rudiments ¹⁸	Rationale
Muscles on the scalp	Monkeys frequently move their scalps up and down
Muscles which move the ear	Used by many animals to detect danger
Projecting point on the ear	Resembles the pointed ears of animals e.g. cats, dogs
Hair	A rudiment from the “hairy coat of the lower animals”
Os coccyx	Fully developed as a tail in monkeys, cats and other animals
Nipples	Imperfect mammary organs in males, but fully developed in females.

Table 4.4 – Darwin’s argument from rudiments

The implication of these three lines of evidence was to establish the fact that without the presupposition of common descent, such phenomena would be inexplicable. He wrote,

“If the origin of man had been wholly different from that of all other animals, *these various appearances would be mere empty deceptions*; but such an admission is incredible. These appearances, on the other hand, are intelligible, at least to a large extent, if man is the co-descendant with other mammals of some unknown and lower form.” (emphasis mine; Darwin, 1882a:146.)

The question which remained was, how did humans develop from the lower animals? To answer, Darwin appealed, as he had in *Origin*, to the effects of the environment, use and disuse of parts, cohesion of homologous parts, reversion, correlated variation, natural selection, and finally, sexual selection. To explain how man had gained the ability to walk upright, he reasoned that the great advantage of being able to do so would have driven nature to select for such a trait (Darwin, 1882a:52). To explain the relative hairlessness of man, he suggested that man could have shed his hair due to the influence of warmer climates (Darwin, 1882a:57). And

¹⁸ This is only a selection of the rudiments which Darwin mentions.

in the case of how man had lost his tail, Darwin (1882a:60) reasoned that its loss could be explained by disuse and the action of friction over multiple generations.

4.3.2.3.2 *The Challenge of Intellectual Faculties*

Having dealt with the similarities between animals and mankind, one of the biggest problems which remained was the great disparity between the mental powers of man and the lower beings. For many evolutionists, including Lyell (1863:506), the gap between man and the apes was too large to be bridged by natural processes alone. But Darwin (1882a:65) countered this with the claim that the difference between a fish and an ape was larger than the difference between the apes and man. On these grounds, if the evolution from fish to apes had been established, how less impressive the evolution from apes to man? Even within a species, a clear gradation can be found of individuals ranging from “absolute imbecility to high excellence” (Darwin, 1882a:79; cf. Lyell, 1863:503). To make his point, Darwin (1882a:127) argued that the intellectual development of a child made “evolution... at least possible”.

Objection	Rebuttal
Humans are capable of progressive improvement	Animals can learn from bad experiences (e.g. hunting traps). Domestic dogs have progressed morally from wolves and jackals (in affection, trust worthiness, temper, and general intelligence). Brain size has increased in mammals.
Humans use tools	Chimpanzees use stones to crack nuts. Monkeys use sticks to open boxes, or as weapons. The orang-utan covers herself with leaves at night – first steps towards dress.
Humans possess property	Dogs hide their bones, birds have their nests.
Humans use language	Dogs bark in at least 5 different ways and understand many sentences. Dogs can be compared to infants – being able to understand more than they can communicate. Bird songs are also equivalent to language, hence this is “no proof that they owe their origin to a special act of creation”.
Humans have a sense of beauty	The objective beauty of animals proves that animals have a sense of beauty. Darwin reasoned, “they must receive some kind of pleasure from the sight of such things”. If this were not true, there would be no purpose to such beauty. The higher tastes of admiring sunsets, landscapes, music, etc have all been acquired through culture.
Humans believe in God	Religion is merely superstition of the unknown. Darwin gives the example of a dog which barks at a parasol blowing in the wind. Religious devotion can be seen in the love of a dog for its master: “a dog looks on his master as on a god”. Therefore belief in God can be compared to the “occasional mistakes of the instincts of the lower animals”.

Table 4.5 – Darwin’s argument for the higher mental powers of animals

Darwin anticipated several objections to the notion that man was just an animal, but he provided his own rebuttals (see Table 4.5), pointing out instead that there were many mental faculties which man had in common with the “higher animals” including: intuitions, sensations, passions, affections, emotions, humour, wonder, curiosity, choice, memory, imagination, and reason... “though in very different degrees” (Darwin, 1882a:79).

4.3.2.3.3 *The Challenge of Moral Faculties*

This left the origin of morality and conscience. Surely morality had forever distinguished man from the animals? But Darwin argued that morality originated from social instincts. The most basic social instinct is sympathy, the “foundation-stone” of morality. Sympathy can be seen in the animal kingdom when a dog courageously defends his master, or a monkey saves a man’s life by distracting a baboon. Man became a social animal in order to survive. This explanation also helped resolve the difficulty presented by the strength and size of man in comparison with other animals: how could natural selection have produced such a “weak creature” (Darwin, 1882a:64)? Thus the argument followed:

- (1) Weaker creatures would need to become social in order to survive.
- (2) Becoming social would require the development of “higher mental qualities”
- (3) Man is physically weaker than many other creatures (e.g. gorillas or bears)

Therefore his brain must have acquired “higher mental qualities” in order to survive. (Darwin, 1882a:63-64). The golden rule was merely a product of natural selection: living in community is safer, and therefore more conducive to survival (Darwin, 1882a:126). There were no objective standards for morality. He illustrated why:

“If, for instance, to take an extreme case, men were reared under precisely the same conditions as hive-bees, there can hardly be a doubt that our unmarried females would, like the worker-bees, think it a sacred duty to kill their brothers, and mothers would strive to kill their fertile daughters; and no one would think of interfering.” (Darwin, 1882a:99.)

But how could altruism be explained? Darwin considered the case of an heroic man risking his life to rescue another. In this case the man must have ignored his instinct of self-preservation in favour of a stronger social or maternal instinct. The governing factor is: which instinct is most beneficial to the species? Religious motives are not necessary to have morals. For example, monkeys have been known to rescue other monkeys from danger, which is equally praiseworthy and moral. Virtuous tendencies, such as these, have been inherited by us over many generations. Thus Darwin (1882a:125) inferred, “the standard of morality has risen since an early period in the history of man.” From humble beginnings man had risen to attain the “highest standard... in knowledge, morals and religion” (Darwin, 1882a:145). Theologically, Darwin had no regard for the fall of man, which he claimed, “is a pitifully low view of human nature” (Darwin, 1882a:145). He optimistically prophesied, “we may expect that virtuous habits

will grow stronger... virtue will be triumphant” (Darwin, 1882a:125). Historically however, Darwin conceded that morality had been an impediment to natural selection and consequently, the progress of evolution. This is because the “instinct of sympathy”, albeit the “noblest part of our nature”, has overcome the “evil” benefit of culling the weakest (Darwin, 1882a:134). Thus Darwin (1882a:134) lamented, “We must therefore bear the undoubtedly bad effects of the weak surviving and propagating their kind.” By Darwin’s theology, evil and death had an important role to play in nature if evolutionary progress was to be made:

“But as man suffers from the same physical evils as the lower animals, *he has no right to expect an immunity from the evils consequent on the struggle for existence*. Had he not been subjected during primeval times to natural selection, *assuredly he would never have attained to his present rank.*” (emphasis mine; Darwin, 1882:142.)

4.3.2.4 The Argument for Sexual Selection

When it came to the human race, Darwin faced another challenge. How could all the differences between races be accounted for by the direct action of the environment, effects of use and disuse, correlation of parts, or natural selection (1882a:198)? Darwin suggested a natural mechanism called “sexual selection”. Ruse (1975:240) has neatly summarised the logic of sexual selection as follows:

Premise 1: There is a struggle for mates.

Premise 2: Some organisms have useful variations

Premise 3: Some organisms have sexually injurious variations.

Premise 4: Organisms with sexually useful variations have a better chance of reproducing than organisms with sexually injurious variations.

Conclusion: Sexual Selection: Organisms with sexually useful variations have a better chance of reproducing than organisms with sexually injurious variations.

But to establish this principle as a *vera causa* for man, Darwin first needed to illustrate its working effects in the animal kingdom. The second section of *Descent*, therefore, catalogued an extensive treatment on the sexuality of insects, fishes, amphibians, reptiles, birds and mammals. There were three types of features which he specifically wanted to draw attention to in this study:

- (1) Special weapons – body parts which had been developed by sexual selection to assist males in the battle for females (e.g. the horns of bulls and rams, etc.).
- (2) Ornaments – body parts which had been developed to attract the opposite sex
- (3) Song – the language which animals had developed to attract the opposite sex

So Darwin conducted an extensive review of animal ornaments, weapons and noises. For each feature he speculated on its sexual value for selection. When it came to beauty and song, he found the greatest support for his principle in birds, which led him to write four whole chapters,

and devote more than a quarter of his treatment on sexual selection to them. Darwin (1882a:359) explained this disproportion on the grounds that birds were the “most aesthetic” animals with an almost equal appreciation for beauty as man.

On naturalistic principles, the beauty found in nature could only be accounted for through sexual selection. Without this explanatory principle, he reasoned, animals would have been “ornamented to no purpose” (Darwin, 1882a:317; 400). The case rested on the fact that each animal had its own subjective taste for beauty. Darwin anticipated that this might be called into question so he argued from the impossibility of the contrary:

“To suppose that the females do not appreciate the beauty of the males, is to admit that their splendid decorations, all their pomp and display, are useless; and this is incredible.” (Darwin, 1882a:496; cf. 616.)

Concerning the actual development of sexual traits, he had further suggestions. The visible beauty and the melodious singing endowed by animals, he claimed, had been produced and gradually developed by males and females selecting in each other those traits which were most favoured. The evidence for this gradual progression was hard to produce, however, given that it was “obviously impossible” to observe the actual line of “extinct progenitors” (Darwin, 1882a:430). Therefore Darwin argued for this inference based on the fact that various developments of the trait were still evident in existing species. When such reasoning defied plausibility in the case of the peacock, he argued presuppositionally:

“If we admit the principle of gradual evolution, there must formerly have existed many species which presented every successive step between the wonderfully elongated tail-coverts of the peacock and the short tail-coverts of all ordinary birds...” (emphasis mine; Darwin, 1882:431.)

In this manner, Darwin built a case for sexual selection in the animal kingdom.

4.3.3 THE DEVELOPMENT OF SPECIES IN DESCENT OF MAN

With both natural and sexual selection as *verae causae*, human species could be interpreted on new grounds. In the penultimate chapters of *Descent*, Darwin applied this framework to the subjects of race, sex and breeding.

4.3.3.1 Species and Racial Inequality

The racial implications of Darwin’s naturalistic worldview had always been an integral part of his thesis. Consider that the full title of *Origin* was, “On the Origin of Species by Means of Natural Selection, or *the Preservation of Favoured Races* in the Struggle for Life” (emphasis mine). In *Descent*, he returned to this subject in full.

During the 1870s, two predominant and opposing views on the classification of human species had gained popularity (Schwartz, 1984:273). The first view, monogenesis, taught that the races

of man were varieties of a single species. The second view, polygenesis, regarded the races of man as separate species.

Given that man's purported descent from a single species, Darwin (1882a:29) found the variation amongst the "races of man" to be incredibly large. Because of this anomaly, naturalists had justifiably ranked the different "races of man" as distinct species (Darwin, 1882a:173). But he questioned this classification, given that there were good examples of interbreeding across races (for example, the "immense mongrel population of Negroes and Portuguese" in Brazil, or the "Indians and Spaniards" in Chile; Darwin, 1882a:173). Even on grounds of fertility, however, he maintained that a strong case could be made to "rank them as distinct species" (Darwin, 1882a:171). Darwin (1882a:175) settled for a compromised position, choosing the category of "sub-species" for the races because they "possess many of the characteristics of true species, but hardly deserve so high a rank". All races were not equal. He saw the greatest difference displayed between Caucasians and the Australians or negroes, who would "almost certainly" be exterminated and replaced by "the civilised races" (Darwin, 1882a:156). He found support for this synopsis in a study of the indigenous population of Tasmania, Sandwich Islands, Australia and New Zealand. The research showed how the brutal colonisation of these islands had drastically changed living conditions and had reduced the indigenous populations. He compared the native inhabitants to animals:

"Civilised races can certainly resist changes of all kinds far better than savages; and in this respect they resemble domesticated animals" (emphasis mine; Darwin, 1882:190.)

Darwin amassed further evidence for this inequality on the grounds that savages had hardly the aesthetic tastes of civilised races. Although they played music and enjoyed singing, it was in a "very rude condition", and "in most cases hideous and unmeaning" (Darwin, 1882a:270). Their ugliness was also used as a criterion for low intelligence (Darwin, 1882a:584).

But his voyage aboard the *Beagle* troubled him because he had experienced "how similar their minds were to ours", specifically the "full-blooded negro" he had befriended (Darwin, 1882:178). So it was with some hesitation that he concluded,

"But since he attained to the rank of manhood, he has diverged into distinct races, or as they may be more fitly called sub-species. Some of these, such as the Negro and European, are so distinct that, if specimens had been brought to a naturalist without any further information, they would undoubtedly have been considered by him as good and true species." (emphasis mine; Darwin, 1882:608.)

And so Darwin finally divided the races of man into separate sub-species of unequal intelligence and worth.

4.3.3.2 Species and Sexual Inequality

Darwin's application of sexual selection also created an inequality between the males and females of any species. He reasoned that man had evolved to be superior to woman because of the greater struggle which man had faced over many millennia. Man has had to compete for the "possession of the females", defend their women and children from enemies, hunt, attack, "capture wild animals", and "fashion weapons" which would require greater observation, reason, invention, and imagination (Darwin, 1882a:564). All these challenges have made man "ultimately become superior to woman." (Darwin, 1882a:565).

Therefore, it followed that, "[m]an is more powerful in body and mind than woman" (Darwin, 1882a:597). In this regard, Darwin (1882a:557) claimed:

"Man is more courageous, pugnacious and energetic than woman, and has a more inventive genius. His brain is absolutely larger, but whether or not proportionately to his larger body, has not, I believe, been fully ascertained."

For evidence of this apparent inequality, he suggested an interesting exercise. If two lists were drawn up of the "most eminent men and women" to excel in "poetry, painting, sculpture, music..., history, science, and philosophy", the comparison would obviously portray the fact that "the average... mental power in man must be above that of woman" (Darwin, 1882a:564).

Despite these disparaging admissions, Darwin (1882a:573) conceded that women have "sweeter voices" than men because they "first acquired musical powers in order to attract the other sex" (Darwin, 1882a:573). He also admitted that women serve some purpose in marriage including, amongst other things, the contribution they make as a "constant companion...friend in old age... *object to be beloved and played with... better than a dog anyhow... someone to take care of house... female chit-chat.*" (emphasis mine; Darwin, 1958:231-232).

4.3.3.3 Species and General Inequality

If naturalistic descent was true, not all humans had evolved equally either. When Darwin thought about how his species had descended from the animals he was drawn to consider the virtues of controlled breeding amongst humans. It seemed that man had impeded the progress of evolution by his kindness, not allowing the weak to be eliminated. This had undoubtedly been "highly injurious to the race of man" given that, "hardly any one is so ignorant as to allow his worst animals to breed" (Darwin, 1882a:134). Darwin (1882a:134) lamented, "We must therefore bear the undoubtedly bad effects of the weak surviving and propagating their kind".

This led him to suggest, in improvement of the human race, that laws should be instated to control who gets married and is allowed to procreate (Darwin, 1882a:617-618). In fact, science

should inform society of how to conduct relationships. Marriage was a matter of breeding. He wrote,

“When the principles of breeding and inheritance are better understood, we shall not hear ignorant members of our legislature rejecting with scorn a plan for ascertaining whether or not consanguineous marriages are injurious to man.” (Darwin, 1882a:618.)

This was an interesting proposition given that it implicated Darwin for marrying his cousin¹⁹, Emma Wedgwood. It begs the question: why had he not lived by the principles of his theory?

4.3.4 THE DEVELOPMENT OF ORIGIN IN DESCENT OF MAN

The question of origin, like species, had an integral part to play in *Descent*. In fact, Hooker had wanted Darwin to call his book, “The Origin of Man” (Moore & Desmond, 2004:xiii). But the difficulty which had arisen in *Origin* remained in *Descent*. Darwin could not account for the ultimate origin of man. Once again, he had a concession to make:

“In what manner the mental powers were first developed in the lowest organisms, is as hopeless an enquiry as how life itself first originated.” (Darwin, 1882a:66.)

Yet, in spite of this difficulty, he was determined to establish his thesis. So he rested his argument for the descent of man on the successful reception of *Origin*. Darwin hoped that the general acceptance of the thesis of *Origin* would motivate the acceptance of its sequel, *Descent*. If people could believe that species had evolved, it was a small step of faith and logic to concede the same for mankind:

“The great break in the organic chain between man and his nearest allies, which cannot be bridged over by any extinct or living species, has often been advanced as a grave objection to the belief that man is descended from some lower form; *but this objection will not appear of much weight to those who, from general reasons, believe in the general principle of evolution.*” (emphasis mine; Darwin, 1882a:156.)

Darwin also used this line of persuasion to address the origin of intelligence, morality, and beauty (1882a:609,616-617). When he felt pressed to give an account for the gradual stages necessary to produce and develop man, he admitted:

“We know not what produces the numberless slight differences between the individuals of each species, for reversion only carries the problem a few steps backwards, *but each peculiarity must have had its efficient cause.*” (emphasis mine; Darwin, 1882:61-62.)

This problem had plagued others too. Wallace was resigned to the fact that the brain could not have evolved by natural selection (Schwartz, 1984:277). Like Lyell, he was compelled to appeal to an “Overruling Intelligence” who had “directed variations” and produced “our mental and moral nature” (Wallace, 1869:394). But this explanation was antithetical to Darwin’s

¹⁹ See section 5.2.2.2 for the irony of this marriage.

naturalistic thesis (cf. Darwin, 1859:488-489). As far as Darwin (1882a:613) was concerned, people were coerced into believing in a creator because they were not prepared to accept that everything was simply the “result of blind chance”.

4.4 SUMMARY AND CONCLUSION

Darwin wrote *Origin* and *Descent* with an ambitious goal in mind. He wanted to remove the creator from his creation. To do this he argued in *Origin* that all the animals and plants on the planet had originated through entirely natural processes. The ramifications, played out in *Descent*, determined that man was merely an animal.

To provide a convincing rationale for this grand proposal, he had to make several basic assumptions to sustain the inferences which would allow his theory to work.

Fundamentally, Darwin assumed that:

- (1) Species were practically indistinguishable from varieties
- (2) Creation implied the immutability of species
- (3) Homology implied common descent
- (4) Use and disuse would cause modification
- (5) Uniformitarianism explained the geology, the fossil record and biology
- (6) The world and the first living being(s) had an origin

From these, and other phenomena, he inferred that:

- (1) Varieties were incipient species
- (2) Natural selection had produced new species
- (3) Man (with his morality and intelligence) had evolved from lower animals
- (4) Natural selection had made some races superior to others
- (5) Sexual selection had made males superior to females
- (6) The theory of creation was false

At the conclusion of *Descent*, Darwin confessed,

“Many of the views which have been advanced are highly speculative, and some no doubt will prove erroneous; but I have in every case given the reasons which have led me to one view rather than to another.” (1882a:606.)

This did not hinder him, however, from boldly proclaiming only a few sentences later that the “grounds upon which this conclusion rests will never be shaken” because of “facts which cannot be disputed” (Darwin, 1882a:606-607). Theologically, Darwin’s thesis presented several serious ramifications, which he claimed to be both “beautiful” and “wonderful” (1859:130,490). The question is, was he right?

5. AN APOLOGY TO ORIGIN AND SPECIES

5.1 INTRODUCTION

When Darwin (1882a:607) reflected on his grand hypothesis and his formidable assembly of observations and anecdotes, he wrote, “It is incredible that these facts should speak falsely.” But unfortunately, facts *cannot* speak for themselves, and facts on their own did not construct his arguments or write his books. The real question which needs considering is this: was Darwin’s *interpretation* of the facts correct?

5.2 THE PROBLEM OF SPECIES

It has been established that Darwin’s thesis was founded on the concept of species. To prove his case, he needed to demonstrate that species had originated by natural processes. To argue his case, he appealed principally to the mutability of species, natural selection and common descent. But did the impressive array of facts in *Origin* and *Descent* substantiate his claims?

5.2.1 THE MUTABILITY OF SPECIES: DOES CHANGE IMPLY EVOLUTION?

Perhaps strategically Darwin did not define what he meant by the term “species”. Instead he stressed the difficulty of classifying or distinguishing species from varieties. By employing this approach he probably hoped that his contentious assumption, *viz.* that varieties were insipient species, would appear more plausible. But this equivocation left his argument on precarious grounds. If varieties were ultimately indistinguishable from species, and species were indefinable then how could the formation of any new species be distinguished from existing varieties? In order to demonstrate that new species could form, he had to assume his conclusion at the outset to his argument, *viz.* he had to assume that varieties were incipient species in order to prove that new species were being formed from varieties: a circular argument.

Without the evidence of progressive change in *former* species leading to the production of *new* species the case for descent by modification was entirely specious. But incredibly, Darwin accused those who were sceptical in this instance of being too obsessed with a desire for empirical substantiation. He wrote,

“But 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.” (Darwin, 1859:481.)

In one of the first reviews of *Origin*, Wilberforce (1860:250) identified this anti-scientific lament and wrote in reply,

“In the 'Arabian Nights' we are not offended as at an impossibility when Amina sprinkles her husband with water and transforms him into a dog, but we cannot open the august doors of the venerable temple of scientific truth to the genii and magicians of romance. We plead guilty to Mr. Darwin's imputation that '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.'”

But because Darwin had not defined species, he could use the general phenomenon of speciation to claim that transmutation was possible. In general, speciation had been accepted by many naturalists¹, depending on how species was defined. Without a definition, however, speciation became just as nebulous as the concept of species itself. This is where one of Darwin's basic assumptions and mischaracterisations played a pivotal role. He assumed that the theory of creation upheld the fixity of species. In one sense, if “species” had been *defined* according to the “kinds” mentioned in Genesis², the fixity of species would logically follow. But naturalists had long departed from any classification based on Genesis and had defined species in much narrower terms. Darwin assumed that this general scientific conception of species applied to the creation model.

This allowed him to use evidence of the mutability of species as the refutation of creation in his argument. But all this amounted to was the refutation of a straw-man. Effectively he had pitted popular scientific classifications of “species” against the theological classification of “kinds”. Thus he wrongly inferred that the proof of the immutability of species could substantiate common descent. This resulted further in the presentation of a false dichotomy concerning the origin of species (compare figures 5.1 and 5.2).

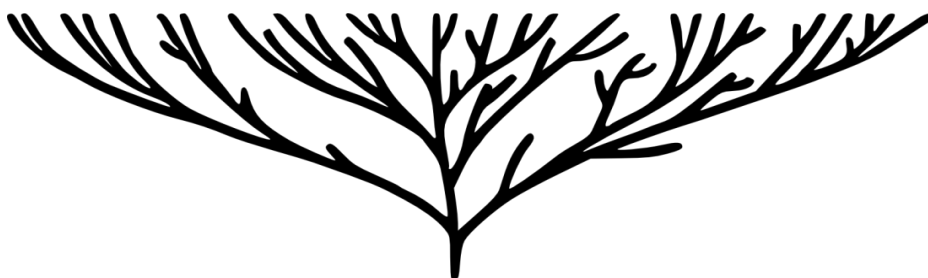


Figure 5.1 – Darwin's Tree of Life³

¹ e.g. Linnaeus (1775:231-232), Blyth (1835:40-53), and Paley (1809:65, 478).

² Refer to section 4.2.3 concerning the influence of Linnaeus in this regard.

³ Figures 5.1, 5.2 and 5.3 have been adapted from Sarfati (2010:34).

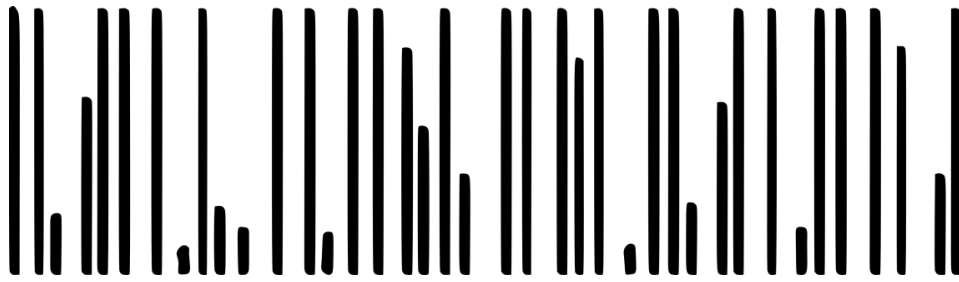


Figure 5.2 – The Linnaean Lawn

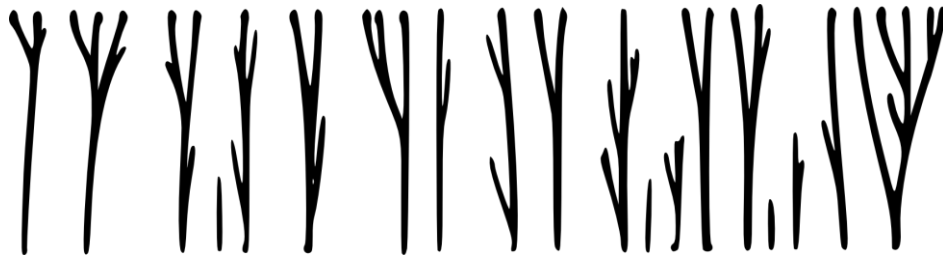


Figure 5.3 – The Biblical Orchard

The alternative option (figure 5.3), which Darwin failed to consider, was that creation could allow for the mutability of species, within the broader biblical kinds, without having to adopt an evolutionary scheme of descent (figure 5.1). Speciation did not necessarily imply common descent; and therefore speciation, by itself, could not be used as an argument against creation. If Darwin had taken the time to consult the account of creation outlined in Genesis he might have realised this misconception. But alas, his own prejudices ultimately confounded his argument.

5.2.2 NATURAL SELECTION: THE ANTITHESIS OF EVOLUTIONARY PROGRESS

Natural selection was the primary mechanism which Darwin used to explain the origin of species. As discussed previously, he argued for it in two parts. The short argument, captured essentially in chapters 1 to 4, established the principle as a *vera causa* of variation in species, but his long argument tried to establish it as the *vera causa* of the production of new species.

5.2.2.1 A Principle of Preservation or Elimination?

Darwin (1860a:127) claimed that natural selection was the “principle of preservation” which would lead to “the improvement of each creature”. But this interpretation is antithetical to the true nature of selection (Sarfati, 2010:46). The power of natural selection is derived from the battle for existence epitomised by struggle, death and extinction. As a natural phenomenon, it can only select by culling and eliminating all other creatures not fit enough to survive. It did not and could not produce or improve the creatures which were inherently fitter. Darwin’s appeal to

natural selection, therefore, as a species-generating-mechanism⁴ was entirely unfounded. As Allchin (2009:118) has observed, “Darwin transformed the cultural notion of a ‘struggle for existence’ into a creative organic force.” In reality, natural selection would actually *reduce* the amount of variation in a species by selecting only the fittest and strongest individuals. Even his ally, Lyell (1881b:442), recognised that “Progressive Development or Evolution [could not] be entirely explained by Natural Selection” and wrote to Darwin in May of 1869 with the suggestion that a “Supreme Intelligence” might instead be credited for the variation of species.

5.2.2.2 The Problems of Isolation and Inbreeding

This misconception of progress was compounded by Darwin’s appeal to isolation as a factor to promote and encourage greater productions of new species. In isolated populations (for example, on islands), inbreeding would be the norm. But inbreeding is detrimental to the health of any species⁵. Even Darwin (1859:70-71) recognised this, and suspected that the occasional intercrossing between individuals may be necessary for the species. Yet his theory of progressive improvement relied upon inbreeding to generate new species. Surprisingly in this regard, Darwin’s consanguineous marriage with his cousin actually demonstrated the detrimental effects of his theory. A recent study of the Darwin family has brought these genetic considerations to light:

“As a consequence of consanguineous marriage, Darwin's children had an increased risk of suffering the effects of detrimental recessive alleles, which is a characteristic effect of inbreeding. It is known that three of Charles Darwin's six children with long-term marriage history suffered from infertility... On the other hand, child mortality of the Darwin progeny was very high... as 3 of his 10 children died in childhood” (Berra et al., 2010:381.)

5.2.2.3 The Theological Implications

Darwin’s dependence on natural selection, despite the optimism of Haught (2003:775), had a detrimental effect on his theology. Theologically, he had reinterpreted death from being an evil consequence of the fall into being the good benefactor and creator of our species (cf. Darwin, 1859:79). Death had become, ironically, the power behind his “principle of preservation” to which each creature owed its source of improvement. The ramifications of such a worldview are disastrous to both morality and the problem of evil (to be explored further in 5.4).

⁴ i.e. assuming species = kinds (e.g. the distinction between cats and dogs). For a discussion on speciation within kinds refer to previous section 5.2.1

⁵ A rigorous scientific appraisal of the modern Darwinian Synthesis lies outside the scope of this dissertation. But, for brevity sake, subsequent genetic research has shown how inbreeding actually accelerates the number of mutations per generation leading to a greater degree of genetic entropy in the species (cf. J.C. Sanford’s work on *Genetic Entropy & the Mystery of the Genome*, 2005).

5.2.2.4 A Theory without Evidence

Darwin was able to present much evidence for variation in species, but he could produce no evidence for the natural formation of new species (i.e. new kinds of creatures; see 5.2.1). Instead he presented the evidence from about 4000 years worth of domestic selection in dogs, cats and pigeons (Darwin, 1859:27). In all this time, since the period of the fifth Egyptian dynasty, selection had not transformed any of the species in question. They had remained dogs, cats and pigeons. Yet again, there was irony in that the evidence meticulously provided by Darwin suggested the antithesis of progressive modification by selection. Four millennia of artificial selection had not transformed a single species into any other kind.

Darwin was compelled to believe, therefore, that nature was considerably more successful at modifying species than man. But this was hard to accept given that the best evidence of varieties being produced by selection came from domestication, not wild stocks. So to motivate this leap of logic, he argued from metaphorical scenarios. Herbert (2009:115) has annotated a passage from *Origin* to illustrate the type of metaphor Darwin employed for natural selection:

“It may metaphorically be said that Natural Selection is daily and hourly scrutinizing, throughout the world, the slightest variations [omnipresence]; rejecting those that are bad, preserving and adding up all that are good [omniscience]; silently and insensibly working, *whenever and wherever opportunity offers*, at the improvement of each organic being in relation to its organic and inorganic conditions of life [omnipotence]. We see nothing of these slow changes in progress, until the hand of time has marked the lapse of ages and then we see only that the forms of life are now different from what they formerly were.” (Herbert, 2009:115; cf. Darwin, 1859:63.)

Using such language, natural selection adopted both anthropomorphic and, ironically, theistic attributes. Darwin had made Nature the god of his materialistic scheme. But as a metaphor alone, how could natural selection be anything more than a religious or theological construction? He had inadvertently demonstrated once again that naturalistic science failed to provide an answer to the real origin of species.

So Darwin was forced to *assume* his thesis to be true and argue upon its results. The long argument of *Origin* had to *presuppose* that natural selection *could* produce new species. Only by careful reinterpretation could he appeal to his potpourri of chosen phenomena for evidence of natural selection. What Darwin had failed to demonstrate was that natural selection could and *had* produced new species. Likewise, in *Descent*, he had to rely upon the same tactical device: he had to *assume* that natural selection was the *vera causa* of all the species in order to make his case for man. It is not surprising that in later revisions of *Origin*, and in *Descent*, he had to incorporate the controversial views of Lamarck, and other invented measures to defend his theory.

5.2.3 COMMON DESCENT: THE ARGUMENT FROM ANALOGY

Darwin's Tree of Life has become iconic of the popular evolutionary paradigm of today. This is because it captures and capably communicates the integral concept of common descent. His rationale for organising the classification of all living creatures into this unifying scheme was based on an argument from analogy. As discussed in the last chapter, analogy proved to be a critical component to his thesis. It was on this basis that he reasoned, "all animals and plants have descended from some one prototype" (Darwin, 1859:484).

5.2.3.1 The Fallacy of Affirming the Consequent: Homology

But there was a problem with the argument from analogy. The homologous characteristics of plants and animals could just as much be used as evidence for common descent as they could for common design. Without this qualification, Darwin had committed the fallacy of affirming the consequent (Copi & Cohen, 1990:241). Just because the premise of common descent *could* account for the homology of living creatures did not mean that was the only viable explanation. His claim that common descent was, "the *only* known cause of the similarity of organic beings" was disingenuous and patently false (emphasis mine; Darwin, 1859:413). Given that Darwin had actually read Paley's *Natural Theology*, it is astonishing that he failed to even mention, let alone address, the inference to intelligence and design from comparative anatomy (cf. Paley, 1809:211).

But the argument from analogy, while used to some extent in *Origin*, became a pillar of support in *Descent*. Pages and pages of meticulously detailed similarities between animals and humans in this volume were put forward as the incontrovertible evidence for common ancestry. Using such logic, someone might have inferred, from the similarity of *Origin* and *Descent*, that they too had evolved without intelligence from a common document. Darwin never stopped to wonder whether the great affinities in creation could be attributed to a common intelligence or Creator. The fact that all animals need to breathe, eat, move, and reproduce would logically account for such similarity in their design. A large portion of Darwin's effort in *Descent* was consequently futile. He had painstakingly put forward myriads of similarities without giving any rationale as to how these similarities, on their own, could unequivocally account for the existence of the creatures themselves.

5.2.3.2 The Argument from Ignorance: Rudiments

One of Darwin's attempts to discredit the theory of creation was to invent the category of rudiments. Rudimentary organs served to show, on the assumption of a Creator, how many creatures were imperfectly designed with seemingly left-over appendages (Darwin, 1882a:11-12). The reasoning went as follows:

- (1) God, who is perfect, could never have made an imperfect world.
- (2) But the world is imperfect.
- (3) Therefore God did not make the world.

This argument was flawed in at least two ways. Firstly, it was an argument from ignorance. Just because the purpose of a particular organ is not known does not mean that it has no purpose. Secondly, it disregarded the historical and theological implications of the Fall. If Darwin had consulted Genesis, he would have realised that the world, once made perfect, was now a product of sin, disease, pain and death. Without an appreciation of sin or the fall of man, his accusation against God amounted to little more than a false caricature of the real state of affairs. Rudiments were an unnecessary and erroneous invention to try and maintain his materialistic worldview. Therefore the similarities between so-called rudimentary organs in man and animals could not be used to infer their common ancestry.

5.2.3.3 The Argument from Fraudulent Science: Embryology

Darwin's argument from embryology formed a subset of the same misleading logic. In fact, in his desire to establish his controversial thesis, he went as far as to cite Haeckel's fabricated embryological speculations from *The Natural History of Creation* (cf. Darwin, 1871:4,16-17,142 & 203). This book presented, with illustrations, a comparative study of human and animal embryos which was exposed as fraudulent⁶ in 1868, at least 3 years before *Descent* went to press (DeRosa, 2006:147; Hopwood, 2006:281-282). It is with some irony again, that the words, "analogy may be a deceitful guide" were included in Darwin's conclusion to *Origin* (Darwin, 1859:484). He wrote in summary,

"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." (emphasis mine; Darwin, 1859:484.)

When such a substantial portion of his thesis was established on this fallacy, this final inference begs us question the overall validity of Darwin's argument.

5.3 THE PROBLEM OF ORIGIN

When Darwin (1859:1) wrote *Origin* he claimed that he would "throw some light" on "that mystery of mysteries"⁷, the origin of species. But did his science really provide an answer to this mystery?

⁶ Some of Haeckel's other fabricated pseudoscience include: the first "all-embracing" phylogenetic tree; the first prehistoric man *Pithecanthropus*; and drawings of spontaneous generation from a fictitious substance called '*Monera*' (Ojala & Leisola, 2007:102-110; Mayr, 1982:621; Gould, 1977:76-85).

⁷ Quoting John Herschel.

5.3.1 METHODOLOGICAL MYOPIA: DARWIN'S NATURALISTIC BIAS

One of the biggest flaws in Darwin's whole approach to the origin of species was his disregard for theology and history (Foote, 1889:6). Instead he tried to find a scientific answer to what was essentially a theological question: the question of origins.

The true nature of science has often be poorly understood (Bauman, 1997:18-19). During the popularisation of Logical Positivism, scientists and clergymen alike had forgotten the necessary limitations of its power⁸. Science had become the greatest epistemic authority. In the process many Christians, and indeed theologians, in an endeavour to rescue theology had confused general revelation with science. But facts cannot not speak for themselves (Kulikovsky, 2009:42). All facts are interpreted (Van Til, 1967:8-9). Science depends upon philosophical and theological presuppositions (Bauman, 1997:20; Kuhn, 1996:122). It is not a neutral venture. Unfortunately, as Kulikovsky (2009:40) has noted, "Presuppositions, the need to interpret scientific data, and the selective inclusion or exclusion of data are rarely acknowledged." In Darwin's case, it would also be philosophically and theologically naïve to presume that his naturalistic agenda did not dictate the presuppositions of his science.

In principle, there are two distinct categories of science not to be confused: "operations science" and "origins science" (Kulikovsky, 2009:39). Operations science is primarily an empirical endeavour to understand the basic functionality of the universe through "observation, analysis, hypothesizing and testing" (Kulikovsky, 2009:39). Origins science, on the other hand, investigates in a forensic manner the origin of the universe and everything in it. This latter science requires greater conjecture and speculation because the past cannot be observed or studied directly. Consequently, it must employ more presuppositions, and be informed by both theological and historical considerations. This subjectivity has often been naïvely subsumed into origins science without due credit being given to its bias. Unhelpful equivocation between the *science of how things work* and the *science of where things come from* has also led to a wrong perception of the capabilities of the scientific method in general. Darwin's own science of origins was no exception. He had a religious agenda⁹. This agenda was shared with his faithful disciple, Huxley, who also followed in his wake. "Huxley saw the need to found his own church, and evolution was the ideal cornerstone. It offered a story of origins..." (Ruse, 2003:1524).

The study of origins is not theologically neutral. Darwin chose to disregard the Bible in his quest for truth, and in doing so he demonstrated his naturalistic allegiance. This is why Michael Ruse, an atheist and philosopher of science, has candidly admitted:

⁸ For substantiation of the historical developments in this section, see chapter 2.

⁹ See section 3.4

“Evolution is promulgated as an ideology, a secular religion—a full-fledged alternative to Christianity, with meaning and morality... Evolution is a religion. This was true of evolution in the beginning, and it is true of evolution still today.” (Ruse, 2000:B1,B3.)

Darwin sought to establish his own theological narrative of mankind and his history, with Nature as his god. But unlike Christian theology, he could only provide assumptions in support of his ideas.

5.3.2 A MAJOR PRESUMPTION: UNIFORMITARIANISM

The historical account in Scripture on the subject of origins was completely ignored by Darwin. Instead he took his lead from Lyell who had attempted to reconstruct a natural history of the world from geology. According to Gould,

“Lyell relied upon true bits of cunning to establish his uniformitarian views as the only true geology. First, he set up a straw man to demolish. In fact, the catastrophists were much more empirically minded than Lyell. The geologic record does seem to require catastrophes: rocks are fractured and contorted; whole faunas are wiped out. To circumvent this literal appearance, *Lyell imposed his imagination upon the evidence*. The geologic record, he argued, is extremely imperfect and we must interpolate into it what we can reasonably infer *but cannot see*.” (emphasis mine; Gould, 1975:16-17.)

Thus, on a whim of speculation driven by an antipathy of the Bible, many scientists disregarded the historicity of a global deluge to explain the fossil record: a view which had endured for more than two millennia, even since the time of Xenophanes (Hippolytus, 1990:17). Lyell’s assumption that the present was the key to the past thereby convinced many others that the principle of uniformitarianism should be used to explain geology, the fossil record, and in Darwin’s own research, biology. On these grounds, Darwin (1859:489) confidently asserted:

“As all the living forms of life are the lineal descendants of those which lived long before the Silurian epoch, we may feel certain that the ordinary succession by generation has never once been broken, and that no cataclysm has desolated the whole world.”

But this was merely an assumption. It could never be verified empirically (Anderson:450). Darwin could offer no proof that the world had never suffered a cataclysmic event. Yet his theory depended on it. In Chile, he had actually witnessed an earthquake and its geological effects first-hand, to which he described his “surprise in seeing a state of things produced in a moment of time, which one was accustomed to attribute to a succession of ages.” (Darwin, 1845a:308). If Darwin had not been so prejudiced against history and theology, this might have given him good reason to question such assumptions. But without the vast epochs of time, conveniently hidden without trace between successive layers of rocks, he would have no imaginary periods of evolutionary history to appeal to. The conspicuous lack of transitional forms, living or fossilised, would bear witness against him. Therefore it *had* to be true. He chose to completely deny the veracity of the oldest and most attested historical document this world has known, the Bible. Instead of the past being the key to the present, Darwin supposed

the present to be the key of the past (Herbert, 2004:12). Thus he boldly testified against God himself, even though the events of which he speculated had occurred, without his observation, thousands of years before he existed, and had been accepted by men and women from almost every nation since the dawn of time.

5.3.3 THE ARGUMENT FROM IGNORANCE: SPECIES WITHOUT ORIGIN

Darwin relied exclusively on nature to find answers to the question of origins. But his science could not provide the answers which he sought, so he was compelled to argue, in many cases, from his ignorance. Even though the world and the first living being(s) depended ontologically on an origin, Darwin could provide no naturalistic explanation for it. He could suggest no genesis for the inherent variety of species, beyond that of the nebulous “laws of variation”, which he described as “unknown” and “infinitely complex” (Darwin, 1859:12). Yet without the world of living creatures and their variation, his theory of natural selection could have nothing to act upon, and would leave his thesis entirely unfounded. Therefore he had to build assumptions upon assumptions. The best he could claim was that variation *did* exist, therefore nature *must* have been its source. To motivate such a leap of faith, he appealed to ignorance in support of his thesis:

“our profound ignorance... how ignorant we are... so profound is our ignorance... our ignorance... our ignorance... utterly ignorant... to acknowledge plainly our ignorance... we are profoundly ignorant... our ignorance... we are far too ignorant... we are much too ignorant... profoundly ignorant... far too ignorant... our ignorance... far too ignorant... our ignorance... our ignorance... our ignorance... due allowance for our ignorance... how profoundly ignorant we are... our ignorance... we are wholly ignorant... very ignorant... profoundly ignorant... confessedly ignorant... nor do we know how ignorant we are...” (Darwin, 1859:6-466.)

But this ignorance was presumptuous on at least two grounds. Firstly, it was presumptuous because he assumed that what was incomprehensible to himself was also universally abstruse; even though these difficulties could be easily resolved on the presupposition of creation. Secondly, it was presumptuous because Darwin considered his ignorance an appropriate absolution from the demands of rigorous scientific substantiation. Such measures made it evident that his naturalistic scheme could not account for the fundamental axioms needed to explain the origin of species.

His reasoning also committed the fallacy of appealing to ignorance, *viz.* a premise was true because it has not been proven false (Copi & Cohen, 1990:93). For example, concerning the origin and development of electric organs in fishes, Darwin (1859:193) wrote, “we must own that we are far too ignorant to argue that *no transition of any kind is possible*” (emphasis mine). But *any* claim, irrespective of its absurdity, could be made by using such an argument. Even Browne (1995:438) has admitted that, “This emphasis on negative argument was characteristic of all his work. But it was a dangerous game to play...”

5.3.4 AN UNANSWERED PROBLEM

Even though Darwin had titled his magnum opus, the “Origin of Species”, he failed to demystify “that mystery of mysteries”. In his review of this book, Whitwell Elwin wrote:

“At every page I was tantalized by the absence of proofs... It is to ask the jury for a verdict without putting witnesses into the box.” (quoted in Herbert, 2009:106.)

Even John Stuart Mill concluded that, while Darwin “had produced a very promising hypothesis”, he had proved nothing (Hull, 2000:4). Likewise, in *Descent*, he had not provided any evidence of primates evolving into people, or been able to give a rational account for the origin of the mind. Darwin (1882a:66) had to concede:

“In what manner the mental powers were first developed in the lowest organisms, is as hopeless an enquiry as how life itself first originated.”

Thousands of pages of observations, speculations and hypotheses had produced no evidence for the origin of organs, organisms, molluscs, monkeys or men. Darwin had not found the origin of species. And without origin, there could be no species.

5.4 THE PROBLEM OF RAMIFICATIONS

In Newton’s first rule of reasoning, reminiscent of Occam’s Razor¹⁰, he wrote,

“We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances.” (Newton, 1846:384.)

Darwin’s naturalistic theory of origins had failed to provide such an explanation. But even if, for argument sake, his theory had provided a veritable *vera causa*, the explanation itself created more problems than it solved. Ideas have consequences. When Darwin (1859:130) concluded the chapter on natural selection in *Origin*, he optimistically anticipated that “beautiful ramifications” would follow. Ramifications did indeed follow. But unfortunately, they were anything but beautiful. The examples which follow will illustrate why. In each case, following the general methodology proposed by Van Til (1967:10), we will consider what presuppositions are necessary in order to make morality, beauty, intelligence and science even possible; and whether Darwin’s naturalistic presuppositions could provide such preconditions.

5.4.1 NO BASIS FOR MORALITY

Darwin claimed that morality was merely a “social instinct”. Virtues were accidental by-products of gradual evolutionary changes acting over millions of years. Morality had evolved for one

¹⁰ i.e. the principle of parsimony, popularly attributed to William of Ockham (c. 1288-1348), which can be summarised as “the simplest explanation is usually the best”.

singular mercenary purpose: to preserve the species. But this created several problems. Firstly, it was unquestionably teleological. Why would undirected, haphazard fortuities value the preservation of life? What did nature have to lose by letting species go extinct? He had to assume *a priori* that the progress of the species was morally good. Secondly, if nature had succeeded so admirably in producing the prolific variety of species through eons of brutal competition, why had she impeded the heartless struggle for existence in man? Thirdly, if animal and human behaviour was derived solely from natural selection, what made one form of behaviour preferable to another? This irony is well-expressed by Skell (2005:10):

“Natural selection makes humans self-centered and aggressive – except when it makes them altruistic and peaceable. Or natural selection produces virile men who eagerly spread their seed – except when it prefers men who are faithful protectors and providers.”

Yet Darwin produced page after page of detailed anecdotes of noble characteristics in dogs, birds, baboons, monkeys and other animals, as if this proved that morality had evolved. The question was begging: by what objective standard could these behavioural expressions be called virtues? What made the so-called altruism of the “heroic little monkey”¹¹ more preferable to the infanticide of worker-bees? Alexander Tille, a Darwinian himself, wrote in 1894,

“whatever promotes the progress of the species is morally good, and whatever leads to weak or sick individuals is morally bad, despite what Christianity or any other system of ethics may say.” (cited by Weikart, 2002:326-327.)

A Darwinian worldview upholds a ruthless ethic. But even Darwin could not live by his creed. When Annie died, he quickly resorted Christian virtues to write her eulogy, describing her character as angelic, delightful, joyous, trustworthy, uncomplaining, considerate, and gentle (Darwin, 1887a:133-134). Without an established Biblical basis, however, these are only hollow words, no different from their unpleasant antonyms.

5.4.1.1 Cruelty, Death and the Problem of Evil

Darwin was confronted with much evil in the world. In a letter to Asa Gray he wrote,

“There seems to me too much misery in the world. I cannot persuade myself that a beneficent and 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.” (Darwin, 1887a:312.)

As avid naturalist, Darwin knew too well the pain and suffering which abounded in nature. Perhaps this is why he asked the question in his autobiography, “what advantage can there be

¹¹ In *Descent*, Darwin (1882a:110) recounted an incident from America in which a monkey heroically rescued its keeper from a belligerent baboon.

in the sufferings of millions of the lower animals throughout almost endless time?" (Darwin, 1958:90). He knew the world was not the way it *ought* to be, yet he chose to reject the only coherent explanation for it: the Biblical account of the Fall. Instead, he offered the problem of evil as a rationale to reject creation and the God of the Bible:

"This very old argument from the existence of suffering against the existence of an intelligent first cause seems to me a strong one; whereas, as just remarked, the presence of much suffering agrees well with the view that all organic beings have been developed through variation and natural selection." (Darwin, 1958:90.)

But by making evil a natural agent in the world, Darwin lost all moral grounds to identify or quantify suffering objectively. As Creegan (2007:503) has recognised, "With the loss of a historical Fall...all explanations for evil and tragedy become less adequate." Evil had been reduced to an impersonal law by which all creatures had actually *advanced* in progress, *viz.* "let the strongest live and the weakest die" (Darwin, 1859:243-244). This consequence, however, was never accepted in practice by Darwin. To cite a few examples:

- (1) He regretted how he once cruelly beat a puppy as a boy (Darwin, 1958:27).
- (2) He could not bring himself to place living worms upon the hook – instead he mercifully killed them with salt and water first (Darwin, 1958:27).
- (3) He once rescued a spider from a wasp which was slowly stinging it to death (Darwin, 1845a:36).
- (4) On another occasion, Darwin found a wasp which had been caught in a spider's web. He wrote, "Pitying the wasp, after allowing it to struggle for more than an hour, I killed it and put it back into the web." (Darwin, 1845a:37).
- (5) J. M. Herbert, a Cambridge friend of Darwin, reported an encounter Darwin had with a dying bird which had been recently shot: "it had made and left such a painful impression on his mind, that he could not reconcile it to his conscience to continue to derive pleasure from a sport which inflicted such cruel suffering" (Darwin, 1887a:167).
- (6) Darwin joined the *Society for the Prevention of Cruelty to Animals* and was known for the active stance he took against cock-fighting and badger-bating. He also pressed charges against a farmer who let his animals starve to death (Herbert, 2009:118).

Darwin could not live by his creed. As much as he had tried to imagine pain, suffering and cruelty on naturalistic terms; in practice, he could not endorse the moral ramifications. He accused the so-called "savage" races of immorality for the "horrid pleasure" they derived from mistreating animals (Darwin 1882:118). But on what grounds could he condemn them when cruelty was intrinsic to nature? It may be considered a great irony that Darwin once wrote in *Origin*:

“It may be difficult, but *we ought to admire the savage instinctive hatred* of the queen-bee, which urges her instantly to destroy the young queens her daughters as soon as born, or to perish herself in the combat... maternal love or maternal hatred... is all the same to the inexorable principle of natural selection.” (emphasis mine; Darwin, 1859:202-203.)

Darwin (1882a:141) was also bold enough to condemn the Catholic Church for the “Holy Inquisition” as an incalculable evil, yet on his own naturalistic presuppositions, how was this any different from natural selection? Moreover, when three of his children died successively from illness, it deserves mention that he did not ascribe their deaths to his general maxim, “let the strongest live and the weakest die” (Darwin, 1859:243-244). He realised that the world had a problem which could not simply be ascribed to nature. But the theological explanation for evil was as abhorrent to Darwin as the evil itself. It seemed that his problem with evil was, fundamentally, a problem with God.

Theologically, death is our enemy; but with Darwin’s interpretation, death became our friend. Death was the power of natural selection. Without struggle and death, there could be no evolutionary progress. He romanticised about these evils in the closing statements of *Origin*:

“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... from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.” (Darwin, 1859:490.)

It is hard to reconcile these theoretical aspirations with the tangible experience of death in the bereavement of his daughter Annie. Darwin admitted, “the death of one’s child is a sudden and dreadful wrench” (Darwin, 1887c:40). The consolation he had offered in *Origin* failed to satisfy such a loss (Darwin, 1859:79). It deserves mention that he could not even bring himself to attend the funerals of his father or daughter (Herbert, 2009:136). Despite his attempt to reinterpret death within a naturalistic worldview, it had remained his enemy. His extensive study of earthworms¹² at the end of his life revealed a final and desperate attempt to face up to death. But without God, Darwin’s quest for significance in life or death was futile. Man’s ultimate end could be described as a period of decomposition amounting in fertilizer.

5.4.3.2 Human Dignity

Darwin (1882a:165) called man, “the wonder and the glory of the universe”. Yet without the Biblical doctrine of the *imago dei*, man was just an animal (cf. Berkhof, 1976:202-210). It is interesting to note, therefore, that he still tried to salvage a high view of humanity. The most obvious example of this can be found in his sustained condemnation of slavery. Darwin maintained that, although slavery had been “beneficial during ancient times”, it was

¹² See section 3.6

nevertheless a “great crime” which he regarded as “revolting”, and the “greatest curse on earth” (Darwin, 1882a:117; 1958:113; 1887b:374). In fact, on both sides of the family, he had inherited a strong antipathy to racism (Herbert, 2009:76). But without a Biblical basis for human dignity, Darwin had no grounds to condemn either racism or slavery.

Darwin once discovered a slave-making instinct in ants. He wrote in one of his letters to Hooker, “I had such a piece of luck at Moor Park: I found the rare Slave-making Ant, & saw the little black niggers in their Master's nests” (Darwin, 1858). Referring back to same discovery several years later, in *Origin*, Darwin (1859:223) described this interesting phenomenon as “the wonderful instinct of making slaves” (emphasis mine). But if nature had produced such an instinct in ants, acquired through natural selection, upon what basis could slavery be condemned in humans? Humans who enslaved other humans were only behaving like ants. If humans were merely evolved animals, slavery was not only possible for humanity, it was also part of man’s natural heritage. Darwin’s fellow naturalist and ally, Ernst Haeckel, wrote,

“we find everywhere a struggle and a striving to annihilate neighbours and competitors. Passion and selfishness - conscious or unconscious - is everywhere the motive force of life... *Man in this respect certainly forms no exception to the rest of the animal world.*” (emphasis mine; Haeckel, 1880:20.)

It is not surprising, therefore, that Darwin’s ideas greatly encouraged racism (Gould, 1985:127). Haeckel (1880:256) predicted that all other races would ultimately be eliminated in the “struggle for life” by “white Europeans”. Francois Galton, Darwin’s own cousin, wrote,

“the average intellectual standard of the negro race is some two grades below our own... The mistakes the negroes made in their own matters were so childish, stupid, and simpleton-like, as frequently to make me ashamed of my own species.” (Galton, 1925:327-328.)

Huxley (1915:20) also considered whites to be superior and “bigger-brained”, arguing that, “No rational man, cognizant of the facts, believes that the average negro is the equal, still less the superior, of the white man.” But if man is like any other animal, there are no grounds upon which such racism can be unequivocally disputed. All dignity and values are lost when Darwinian presuppositions are affirmed. Sproul has discussed these ramifications:

“Why should we care at all about the plight of insignificant grown-up germs? What difference does it make if the white germs subjugate the black germs and make them sit at the back of the bus? Who cares if meaningless blobs of protoplasm are exploited in a steel mill or robbed in the halls of justice?... A creature with no ultimate value, one who is ultimately insignificant is not worth any sacrifice... If man is valueless then we can sleep in tomorrow morning.” (Sproul, 1983:93-94.)

Historically, such a devaluation of human life did occur. Despite Bowler’s (2009:442) claims to the contrary, Weikart (2002:323-344) has documented how, in the 60 years post-*Origin*, Darwinian ethics usurped the Judaeo-Christian basis for morality, and led to a devaluing of

human life in Germany. Darwin (1882a:134) expressed regret in *Descent* at the manner in which man had hindered nature's progress by allowing the weak to survive and propagate their kind. So Galton became a champion of this cause and the founder of eugenics. He hoped this path would lead men from savagery to civilization (Galton, 1925:337). It led instead to a history of euthanasia, eugenics, racism, abortion, infanticide, Nazi death-camps, and genocide.

5.4.1.2 Genocide

Darwin (1859:489) claimed that natural selection worked "for the good of each being", leading all living creatures closer and closer "towards perfection". But when his ideas were applied to society at large, this utopian dream became a nightmare. Karl Marx (1818-1883) was one of the first to attempt such a project. He first read *Origin* in December of 1860, and with great enthusiasm wrote to Friedrich Engels, "Darwin's book is very important and serves me as a basis in natural science for the class struggle" (Marx, cited by Colp, 1974:329). In the years which followed, they both applied Darwinian principles to the social sciences. One of Marx and Engel's most influential literary productions during this period was *The Communist Manifesto*, first published in 1848. In its 1888 revision, they wrote:

"the whole history of mankind... has been a history of class struggles, contests between exploiting and exploited, ruling and oppressed classes... This proposition... in my opinion, is destined to do for history what Darwin's theory has done for biology" (Marx & Engels, 1908:4-5.)

Their political and economic suggestions were predictably extreme:

"a class of laborers, who live only so long as they find work, and who find work only so long as their labor increases capital. These laborers, who must sell themselves piecemeal, are a commodity, like every other article of commerce, and are consequently exposed to all the vicissitudes of competition, to all the fluctuations of the market." (Marx & Engels, 1908:16.)

In 1873 Marx sent a copy of the second edition of his magnum opus, *Das Kapital* (1867), to Darwin with the following inscription inside:

"Mr. Charles Darwin/On the part of his sincere admirer/(signed) Karl Marx" (Colp, 1974:333.)

In reply, Darwin naïvely wrote back, "I believe that... this in the long run is sure to add to the happiness of Mankind." (Colp, 1974:334). Marx and Engel's communist ideas were readily embraced by many capable political leaders including Vladimir Lenin, Josif Stalin¹³, Mao Zedong, Ho Chi Minh, Fidel Castro, Maurice Thorez, Jacques Duclos, and Georges Marchais. But mankind did not experience much happiness in result. The global ramifications were

¹³ Stalin read *Origin of Species* when he was about 13 years old (Grigg, 2008:52).

devastating. Stéphane Courtois et al. have documented the atrocities perpetrated by these men and others in *The Black Book of Communism*. The table below reveals, in summary, a conservative estimate of the total death toll reached through several genocides.

Country	Death toll
U.S.S.R.	20 million
China	65 million
Vietnam	1 million
North Korea	2 million
Cambodia	2 million
Eastern Europe	1 million
Latin America	150,000
Africa	1.7 million
Afghanistan	1.5 million
Total	~ 100 million

Table 5.1 – Statistics from *The Black Book of Communism* (Courtois et al., 1999:4).

Otto Ammon (1842-1916), a German anthropologist and sociologist, also strived to systematically apply Darwin’s ideas to society. To this end, he wrote:

“In its full effect *war is a blessing for humanity*, since it offers the only means to measure the strengths of one nation to another and to grant the victory to the fittest. *War is the highest and most majestic form of the struggle for existence* and cannot be disposed of and therefore also cannot be abolished.”¹⁴ (emphasis mine; translated by Weikart, 1993:482.)

It is impossible to condemn such logic on Darwinian presuppositions. Genocide and war were simply a matter of natural selection. Adolf Hitler (1889-1945) was another disciple of Darwin’s naturalism. As Keith (1947:9) once observed, “The leader of Germany is an evolutionist not only in theory, but, as millions know to their cost, in the rigor of its practice.” It is not surprising therefore that in Hitler’s mind, “war and genocide were not only morally justifiable, but morally praiseworthy” (Weikart, 2004:209). In *Mein Kampf*, he argued rigorously for radical eugenic and racial policies:

¹⁴ In the original German: “In seiner Gesamtwirkung ist der Krieg eine Wohlthat für die Menschheit, da er das einzige Mittel bietet, um die Kräfte von Nation zu Nation zu messen und der tüchtigsten den Sieg zu verleihen. Der Krieg ist die höchste und majestätischste Form des Daseinskampfes und kann nicht entbehrt, daher auch nicht abgeschafft werden.” (Ammon, 1990:164.)

“Any crossing between two beings of not quite the same high standard... contradicts Nature’s will to breed life as a whole towards a higher level... The stronger has to rule and he is not to amalgamate with the weaker one, that he may not sacrifice his own greatness. Only the born weakling can consider this as cruel” (Hitler, 1941:390.)

Anticipating that some of his readers might object to these ruthless schemes, he followed Darwin’s example and deified Nature’s role in mankind’s progress:

“Just as little as Nature desires a mating between weaker individuals and stronger ones, far less she desires the mixing of a higher race with a lower one, as in this case her entire work of higher breeding, which has perhaps taken hundreds of thousands of years, would tumble at one blow... Man, by trying to resist this iron logic of Nature, becomes entangled in a fight against the principles to which alone he, too, owes his existence as a human being.” (Hitler, 1941:392-393; cf. Hitler, 1941:171.)

Hitler’s ethic could justify infanticide, anti-Semitism, euthanasia and genocide (Weikart, 2004:215). Tragically, he was given the power to apply this ethic to Germany at large, and “consciously sought to make the practice of Germany conform to the theory of evolution” (Keith, 1947:229). Darwin once wrote, reflecting on the social implications of his ideas, “It did not occur to me formerly that my views could be extended to such widely different, and most important, subjects.” (Darwin, 1887c:113). A prophetic understatement. Hundreds of thousands were forcibly sterilised in the United States and more than 70,000 people in Germany were deemed unfit and exterminated, “under the delusion that Darwinism could help us discover how to make the world better” (Weikart, 2004:226-227). Weikart’s (2004:233) summary deserves full quotation:

“Darwinism by itself did not produce the Holocaust, but without Darwinism, especially in its social Darwinist and eugenics permutations, neither Hitler nor his Nazi followers would have had the necessary scientific underpinnings to convince themselves and their collaborators that one of the world’s greatest atrocities was really morally praiseworthy.”

If Darwin’s thesis is maintained, there can be no basis for morality.

5.4.2 NO BASIS FOR BEAUTY

Throughout *Origin*, and particularly, *Descent*, Darwin acknowledged the beauty of creation. His language was replete with ascriptions of grandeur:

“beautifully coloured and shaped... extremely pretty... very elegant... beautifully ornamented... splendidly coloured... brilliantly coloured... No language suffices to describe the splendour... gaily decorated... wonderfully splendid... gorgeous... exotic... beautiful to an extraordinary degree... beautifully arranged... magnificently ornamented... most beautiful... beautiful beyond description... exceedingly beautiful” (Darwin, 1882a:263-371.)

Yet Darwin propounded that such beauty had arisen by entirely unintelligent and mindless processes for the sole purpose of sexual selection. He wrote,

“They believe that very many structures have been created for beauty in the eyes of man, or for mere variety. This doctrine, if true, would be absolutely fatal to my theory.” (Darwin, 1859:199.)

But this created a teleological conundrum. How could nature purposely select beauty over ugliness without the *a priori* existence of an objective and meaningful aesthetic standard? Darwin had to assume an aesthetic teleology, in contradiction to his naturalism, in order to even propose a process by which beauty could progress in excellence through successive evolutionary generations. Without a transcendent basis for beauty, he could not even use the word meaningfully (Schaeffer, 1997:96). The natural world would be as devoid of God’s art as it was of his moral standards. Yet there were two other problems which could not be resolved.

Firstly, what evolutionary advantage did man gain by being able to enjoy the beauty of other animals and plants to which he was never in sexual competition with? Why did all animals and plants exhibit attributes which were beautiful for humans to behold? Darwin was overwhelmed by the multifarious beauties of this world, yet he could give no explanation as to how it was possible.

Secondly, Darwin could not demonstrate that any beauty obvious to man was even noticed by the animals and plants possessing it. In many cases, the suggestion was so ludicrous he was compelled to admit that, “these animals have too imperfect senses and much too low mental powers, to appreciate each other’s beauty or other attractions” (Darwin, 1882a:260). It would be patently absurd to suggest that plants consciously selected their sexual partners based upon the prettiness of their adornments. Yet there are more plants on earth than animals with their own beauty to account for.

It is not surprising that towards the end of his life, Darwin’s own naturalistic worldview began to erode his appreciation for the arts. He lamented of this in his autobiography,

“I have also said that formerly pictures gave me considerable, and music very great delight. But now for many years I cannot endure to read a line of poetry: I have tried lately to read Shakespeare, and found it so intolerably dull that it nauseated me. I have also almost lost any taste for pictures or music... I retain some taste for fine scenery, but it does not cause me the exquisite delight which it formerly did... This curious and lamentable loss of the higher aesthetic tastes is all the odder... The loss of these tastes is a loss of happiness” (Darwin, 1958:138-139.)

Without the presuppositions of Biblical creation, there could be no basis for beauty.

5.4.3 NO BASIS FOR INTELLIGENCE

If the universe had arisen by chance, there could be no rational basis for intelligence either. The very possibility of rationality would be unthinkable; an inscrutable anomaly. In private correspondence, Darwin admitted that he had no answers to this difficulty:

“Nevertheless you have expressed my inward conviction, though far more vividly and clearly than I could have done, that the Universe is not the result of chance. But then with me the horrid doubt always arises whether the convictions of man's mind, which has been developed from the mind of the lower animals, are of any value or at all trustworthy. Would any one trust in the convictions of a monkey's mind, if there are any convictions in such a mind?” (Darwin, 1887a:316.)

In his autobiography he raised the same dilemma:

“can the mind of man, which has, as I fully believe, been developed from a mind as low as that possessed by the lowest animal, be trusted when it draws such grand conclusions?” (Darwin, 1958:93.)

The answer to such a rhetorical question was clearly, no. Darwin's concern anticipated the crux of C.S. Lewis' critique of materialism in his essay, *Is Theology Poetry?*, where he reasoned:

“If minds are wholly dependent on brains, and brains on biochemistry, and biochemistry (in the long run) on the meaningless flux of the atoms, I cannot understand how the thought of those minds should have any more significance than the sound of the wind in the trees.” (Lewis, 2002:21.)

It was a problem which presented catastrophic consequences to the basic foundations of intelligibility. Any idea, thought or theory would amount to nothing more than nonsensical mental fluctuations. There could be no reason to trust our minds if the thoughts they generated were merely the evolutionary by-products of other accidental causes; or as Lewis (2002:321) once put it, “I see no reason for believing that one accident should be able to give me a correct account of all the other accidents.” G.K. Chesterton (1957:46) agreed, “Evolution is a good example of, that modern intelligence which, if it destroys anything, destroys itself... it does not destroy religion but rationalism.” (cf. Haught, 2003:781). In other words, Darwin's naturalistic assumptions would be make the entire edifice of his theory unintelligible. This is why Darwin decided to avoid the question altogether and called it a hopeless enquiry (1859:207; 1882:66). But by admitting his inability to address such a quandary, he demonstrated once again how untenable his thesis was in practice. Without the Biblical doctrine of creation, there could be no basis for intelligibility.

5.4.4 NO BASIS FOR SCIENCE

The very possibility of science assumes both intelligence and morality. Without intelligence, there would be no framework within which to *think* scientifically; and without morality, there would be reason why humans *ought* to do so honestly and faithfully. Science was also impossible, therefore, on Darwinian presuppositions. But there were several other preconditions which were necessary for science. One of these preconditions was the existence of universal natural laws.

Darwin referred to the laws of nature more than one hundred and fifty times in *Origin* and one hundred and ten times in *Descent*¹⁵. In doing so, he showed his basic commitment to the uniformity of nature. Without this foundational assumption, science would be impossible. The question, however, is upon what basis could he make such an assumption? Without God's providence in creation, the world would have no architect, ruler or law-giver to maintain law and order on either a micro or macro-scale in the cosmos. Chaos would be the norm instead of uniformity. There would be no regularity or predictability in nature (Bahnsen, 2008:107). The study of such a universe would be futile. In one sense, therefore, the very possibility of science refutes philosophical naturalism. Science blossomed in the late sixteenth century because men and women realised that by studying creation they were "thinking God's thoughts after him"¹⁶. As Robert Jastrow (1984:124-125) has observed,

"For the scientist who has lived by faith in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries."

Darwin had to take the laws of nature for granted, without any basis within his worldview to sustain such an assumption. Whenever he appealed to these laws he was unwittingly appealing to the faithful providence of the Creator.

But science must acknowledge its debts¹⁷ (Bauman, 1997:24). Science would be impossible without the theological presuppositions afforded by Scripture. It is a tragedy today that, "Theology, the Queen of the Sciences, has been banished to the back of the bus by her own bigoted descendants." (Bauman, 1997:21; cf. Westermann, 1994:1). Darwin (1882a:606) once wrote, "False facts are highly injurious to the progress of science, for they often endure long". This is a prophetic irony, given that science has had to suffer his erroneous theories for decades, including: abiogenesis, pangenesis, the inheritance of acquired characteristics, embryonic recapitulation, vestigial organs¹⁸, the evolutionary tree of life¹⁹, racial inequality and sexual inequality (to name a few).

¹⁵ Counted using a standard word-search tool.

¹⁶ A phrase popularly attributed to Johannes Kepler (1571-1630).

¹⁷ See section 2.3

¹⁸ In *Descent*, Darwin (1882a:21) proposed that the vermiform caecal appendage was rudimentary, which led to the once-popular, albeit erroneous, belief that the appendix was also a vestigial organ (cf. Glover, 1988:31).

¹⁹ Lawton (2009:34-39) recently claimed that modern taxonomy cannot be reconciled with Darwin's theory of descent, and has suggested that this iconic tree be chopped down.

5.5 THE ANSWER FROM SCRIPTURE

Darwin created more problems than he solved by abandoning the Bible in his quest for historical truth. The answer to the alleged mystery posed by him at the start of *Origin* can be found, plainly stated, in the first few chapters of the book of Genesis. Unfortunately, by the time he had begun his theological studies at Cambridge, the interpretation of Genesis had become a matter of much conjecture and confusion due to the factors previously discussed in section 2.4. The orthodox or reformed interpretation of Genesis, favouring a straightforward literal reading, had been largely discredited by popular commentaries following 1830 (Hall, 2008:54). For exegetical purposes, it will be useful to briefly illustrate the veracity of the latter claim before providing the biblical account of the origin of species.

5.5.1 GENESIS PRIOR TO DARWIN: ESTABLISHING THE ORTHODOX INTERPRETATION

Two millennia worth of commentaries on the book of Genesis bear witness to the fact that the orthodox interpretation has been the straightforward, literal approach to the text, taking the creation narrative as history. Today there are many competing interpretations of Genesis. It is worth noting, therefore, that the framework hypothesis, day-age theory, gap-theory, analogical days theory, Genesis-as-myth theory, and theistic evolutionary theory all find their origin in the 19th and 20th centuries. As Hall (2008:54) and Berkhof (1976:153) have observed,

“it is a very difficult task to reproduce pre-1800 Christian literature that both employs rigorous exegetical methodology and that defends something other than a literal interpretation of Genesis 1-11.” (Hall, 2008:54.)

5.5.1.1 Genesis and the Early Church Fathers

As discussed in Chapter 2, evolutionary ideas were not original with Darwin. Even the early church had to counter the influence of naturalistic Greek philosophies which prevailed in popular culture. It is therefore quite significant that almost all the early church fathers adopted a literal reading of Genesis *in spite* of the evolutionary ideas which were enthusiastically imbibed by the intelligentsia of their day (Mook, 2008:50). For example, Lactantius (c. 250-325) contended against the Greeks, writing:

“Plato and many others of the philosophers, since they were ignorant of the origin of all things, and of that primal period at which the world was made, said that many thousands of ages had passed since this beautiful arrangement of the world was completed... But we, whom the Holy Scriptures instruct to the knowledge of the truth, know the beginning and the end of the world... God completed the world and this admirable work of nature in the space of six days” (Lactantius, 1989:211.)

Even the earliest significant commentary on genesis to contribute to the *hexaemera*²⁰, prior to Basil of Caesarea (329-379), was written by Theophilus of Antioch who maintained a straightforward interpretation of Genesis (Robbins, 1912:36). Likewise, Basil (1963:34) also held to the literal reading of the text as indicated by his reference to the days in Genesis as 24 hour periods, and his direct statements against the evolution of species:

“Therefore, there is nothing truer than this, that each plant either has seed or there exists in it some generative power. And this accounts for the expression ‘of its own kind’. For, the shoot of the reed is not productive of an olive tree, but from the reed comes another reed; and from seeds spring plants related to the seeds sown. Thus, what was put forth by the earth in its first generation has been preserved until the present time, since the species persisted through constant reproduction.” (Basil, 1963:69.)

The other church fathers, identified by Mook (2008:23-51), to promote the Genesis account as history include: Justin Martyr (c. 100-165), Theophilus of Antioch (c. 115-185), Tertullian (115-222), Irenaeus (c. 130-202), Hippolytus (c. 170-225), Hilary of Poitiers (c. 291-371), Methodius (d. 311), Victorius of Pettau (d. 304), Ephrem the Syrian (c. 306-373), Gregory of Nazianzus (329-389), Ambrose of Milan²¹ (338-397), Jerome (c. 340-420), and Procopius of Gaza (465-528).

Only three patristic fathers, of the Alexandrian school, employed an allegorical approach to Genesis: Clement, Origen and Augustine. In each case, their approach to Scripture was determined to a large extent by the influence of the Jewish Platonist, Philo (Herbert, 2004:39). In the 4th century, Ephrem the Syrian, contended against such a hermeneutic, writing in his commentary on Genesis,

“So let no one think that there is anything allegorical in the works of six days. No one can rightly say that the things that pertain to these days were symbolic, nor can one say that they were meaningless names or that other things were symbolized for us by their names.” (Ephrem, 1994:74.)

5.5.1.2 Genesis and the Reformation

The two greatest figures of the Reformation were unquestionably Martin Luther and John Calvin. Both fought tenaciously for the authority and sufficiency of Scripture in a time when the church had substituted the Bible for numerous inventions and pagan practices. They spoke out for truth when nothing was hated more by popes and priests than the Bible itself (Cobbin, 1856:xvi). With such a high view of God’s word, it is significant that both Luther and Calvin

²⁰ The *hexaemera* are a collection of theological treatises, commentaries and sermons from the period of the early church fathers which addressed the subject of the six days of creation in Genesis (Mook, 2008:30).

²¹ Although Ambrose was part of the Alexandrian (allegorical) school of interpretation, and was a mentor to Augustine, he encouraged a literal reading of Genesis (Mook, 2008:35).

strongly advocated the literal, straightforward interpretation of Genesis as history. Concerning the matter of creation, Luther (1858:25) wrote,

“if we cannot fully comprehend the days here mentioned, nor understand why God chose to use these intervals of time, let us rather confess our ignorance in the matter, than wrest the words of Moses away from the circumstances which he is recording, to a meaning, which has nothing to do with those circumstances. With respect, therefore, to this opinion of Augustine, we conclude, that Moses spoke properly and plainly, and neither allegorically nor figuratively: that is, he means, that the world, with all creatures, was created in *six days*, as he himself expresses it. And if we cannot attain unto a comprehension of the *reason why* it was so, let us still remain scholars, and leave all the preceptorship to the Holy Spirit!” (emphasis in original).

As Pelikan (1961:465) has noted, Luther was “critical of an exegesis that neglected theology for the sake of mere philology; such an exegesis failed to grasp the historical meaning of the text.” In fact, Luther (1986:28-29) spoke out against evolution itself, writing in his commentary on John’s gospel,

“It is not true, as several heretics and other vulgar persons allege, that God created everything in the beginning, and then let nature take its own independent course, so that all things now spring into being of their own power... This not only contradicts Scripture, but it also runs counter to experience.”

Calvin, following in Luther’s wake, provided further consolidation to the reformation. It is rather strange, therefore, that some theologians have tried to place Calvin as a forerunner of Darwin’s evolutionary ideas. Warfield (2000:309) has even suggested that if Calvin had extended the six days of Genesis into six periods of creation, “Calvin would have been a precursor of the modern evolutionary theorists” (Warfield, 2000:309). But these allegations cannot be further from the truth. Calvin (1847:57) explicitly referred to the Genesis account in his commentary as the “history of the creation of the world”. He also clearly established a literal reading of the text by his treatment of the days of creation as regular 24 hour periods:

“Here the error of those is manifestly refuted, who maintain that the world was made in a moment. For it is too violent a cavil to contend that Moses distributes the work which God perfected at once into six days, for the mere purpose of conveying instruction. Let us rather conclude that God himself took the space of six days, for the purpose of accommodating his works to the capacity of men.” (Calvin, 1847:78; cf. 1847:92.)

In his famous *Institutes of Christian Religion*, Calvin (1957:142) maintained his clarity on the historicity of the creation story, exhorting his readership to “willingly remain hedged in by those boundaries within which God has been pleased to confine our persons, and, as it were, enclose our minds, so as to prevent them from losing themselves by wandering unrestrained... until human reason is subdued to the obedience of faith”. Upon principles such as these, the church advocated as a rule of interpretation, *analogia scripturae* (i.e. let scripture interpret scripture, Vanhoozer et al., 2005:635).

5.5.1.3 Genesis and the Reformed Tradition

Following the Reformation, the straightforward reading of Genesis continued to prevail amongst Luther and Calvin's successors. Accordingly, Hall (2008:66) contends that,

“No reputable Reformed theologian from Calvin through 50 years after Westminster provides any theological latitude for what are now known as the gap theory, the day-age theory, the analogical days theory, or the framework hypothesis.”

Amongst these men included the famous churchmen and theologians: Hugh Latimer (1483-1546), Wolfgang Musculus (1497-1563), Peter Martyr (1499-1562), Theodore Beza (1519-1605), Francois Hotman (1524-1590), Zacharias Ursinus (1534-1583), John Diodati (1576-1649), and James Ussher (1581-1656).

Roughly a century after the start of the Reformation, many leaders of the *Dutch Reformed Church* held a National Synod in Dordrecht from 1618 to 1619. Extant documents from the synod further support the fact that reformed theologians and scholars alike continued to maintain the literal interpretation of the creation story (Hall, 2008:65). A few decades later, following Dordt, the Church of England convened for what became known as the Westminster Assembly (1643-1649). At least 23 of the Westminster Divines at this assembly explicitly or implicitly indicated their support of the straightforward, literal interpretation of Genesis (Hall, 2008:70).

Amongst the following British Puritans, Genesis was also accepted as literal history: William Ames (1576-1633), William Perkins (1558-1602), Henry Ainsworth (1571-1622), Gervase Babington (1550-1610), Andrew Willet (1562-1621), John Richardson (1580-1654), Lancelot Andrewes (1555-1626), John Owen (1616-1683), Thomas Vincent (1634-1678), Thomas Manton (1620-1677), Thomas Watson (1620-1686), Francis Turretin (1623-1687), Thomas Boston (1676-1732), William Beveridge (1637-1708), Thomas Ridgeley (1667-1734), Ezekiel Hopkins (1633-1689), Francis Roberts (1609-1675), George Hughes (1603-1667), and John Trapp (1601-1669) (Hall, 2008:67-73).

Even amongst theologians of the early 19th century, Hall (2008:73-77) has identified many who espoused a literal interpretation of Genesis including: John Wesley (1701-1791), Thomas Horne (1780-1862), Thomas Scott (1747-1821), George D'Oyly (1778-1846), Adam Clarke (1762?-1832), John Gill (1697-1771), Andrew Fuller (1754-1815), and Matthew Henry (1662-1714). Hall (2008:77) concludes:

“All these commentators held to a literal six-day creation about 4000 B.C. and a global Flood at the time of Noah. English commentaries did not abandon this view until about 1845, by which time Lyell's uniformitarian framework for interpreting the rocks was in complete control of geology.”

Thus the interpretive principle imbibed by the Reformation, and early church fathers should encourage all exegetes, scholars and theologians who approach Genesis, “to follow the plain sense of the text” (Sproul, 2006:127-128). The Bible should interpret the Bible. Francis Schaeffer (1972:15) concurs:

"What is the hermeneutical principle involved here? *Surely the Bible itself gives it.* The early chapters of Genesis are to be viewed completely as history" (emphasis mine)

Likewise, Sproul (2006:127-128) contends, “One must do a great deal of hermeneutical gymnastics to escape the plain meaning of Genesis 1-2.” Unfortunately, during the 1800s, under the influence of the Enlightenment²², the epistemic authority of science usurped that of Scripture. This encouraged many theologians and commentators to impose a scientific hermeneutic on the Bible just to salvage academic credibility. For example, Marcus Dods (1834-1909), writing only a decade after Darwin, exhorted his readers, in the opening paragraph of his commentary on Genesis to look elsewhere for answers to questions on the subject of origins:

"If any one is in search of *accurate information* regarding the age of this earth, or its relation to the sun, moon, and stars, or regarding the order in which plants and animals have appeared upon it, he is referred to recent text-books in astronomy, geology, and palaeontology. *No one for a moment dreams of referring a serious student of these subjects to the Bible as a source of information.*" (emphasis mine; Dods, 1890:1.)

Darwin inspired many, like Dods, to let God’s infallible word succumb to man’s fallible opinions. But without letting Genesis speak on its own terms²³, there could be no answer to Darwin’s most pressing question: the origin of species.

5.5.2 GENESIS: THE AUTHENTIC ORIGIN OF SPECIES

In Genesis, God is the origin of species. Each and every kind of animal, plant and human being finds its origin in the mind of God, created *ex nihilo* by the word of God. Every creature was made separately and individually to multiply and reproduce after its own kind (Calvin, 1847:83). Thus, on the basis of Genesis 1:21, Luther (1858:76-77) rightly rejected both spontaneous generation and the transmutation of species (where ‘species’, unlike in popular scientific usage, were indistinguishable from ‘kinds’). The rich diversity of life finds its authentic origin in the original kinds which God made on the 3rd, 5th and 6th days of creation. Species are not the sum of random, purposeless evolutionary fortuities adding up over eons of time, but rather the design of God himself from whom we live and move and have our being (Acts 17:28).

²² Refer to section 2.4

²³ Genesis commentaries which have departed from the orthodox or reformed interpretation, like Westermann’s (1994:176), must continue to contend with the inevitable insolubility of the so-called mystery of origins.

Man, although similar to the animals in many respects, was made distinct from them, created exclusively in the image of God himself (Genesis 1:26-27). On these grounds there is a biblical basis for the dignity of mankind; accounting for intelligence, morality, beauty, and science. Genesis teaches that the world was made good, yet man sinned and creation was cursed. Within the evolutionary worldview, pain, suffering, death and disease are intrinsic to nature: part of the Darwinian process by which beings are supposed to improve themselves and advance. According to Scripture however, these realities can be recognised as evil: a critical concept for which any worldview must give an account. Therefore the only sustainable worldview is the Christian one, based upon the straightforward interpretation of Scripture: *analogia scripturae*.

The mystery of the origin of species is no mystery to God, and he has made this mystery known to us in Genesis.

5.6 CONCLUSION

Darwin thought he had discovered a natural, uncreated origin of species. Upon closer inspection, however, as Wilberforce (1860:237) once noted, “We think it difficult to find a theory fuller of assumptions; and of assumptions not grounded upon alleged facts in nature, but which are absolutely opposed to all the facts we have been able to observe.” Or as Crowe (2009:96) puts it:

“Darwin’s Origin of Species consists of approximately four hundred pages of mostly correct observations, followed by highly speculative extrapolations presumed to explain the development of the observed species.”

Darwin could not establish his thesis. His antipathy towards both historical and theological means of investigation left his argument not only hopelessly bankrupt for lack of suitable substantiation; but it also compelled him to speculate irrationally and conjure up fantastic imaginations in their place. Wilberforce (1860:251) wrote, “[It] is indeed a sad warning how far the love of a theory may seduce even a first-rate naturalist from the very articles of his creed.”

As we have seen, the seeds of refutation can be found within Darwin’s own argument. Or as Haught (2003:781) concludes, “evolutionary naturalism logically sabotages itself”. Darwin refutes Darwin. Moreover, it was a theory he could not live by. He had to “borrow” from a Christian worldview in order to live with the blessings of morality, beauty, intelligence and science. His ideas have been appropriately described as a “universal acid” (Dennett, 1995:63) by his own disciples which, when embraced in society, have eaten away and corroded all values held dear to mankind. Three insoluble problems remain for Darwin: the problem of species, the problem of origin, and finally, the problem of ramifications.

6. SUMMARY AND CONCLUSION

6.1 EVALUATING DARWIN'S LEGACY

Charles Darwin was undoubtedly an influential scientist whose ideas well and truly “moved the world” (Warfield, 2000:32). Yet, like any distinguished intellectual, he was also a beneficiary of the philosophical, theological and scientific ideas which had preceded him. Credit should be given where credit is due. Without Erasmus Darwin, Malthus, Lyell, Blyth, Wells, Cuvier, Lamarck, Huxley, Haeckel, and Hooker, to name a few, it is unlikely that Darwin would ever have succeeded in his naturalistic quest. Most of his ideas were unoriginal. The concepts of philosophical naturalism, abiogenesis, transmutation, uniformitarianism, deep time, natural selection, pangenesis, and human evolution can all be traced back to the likes of Thales, Anaximander, Anaximenes, Anaxagoras, Empedocles, Aristotle, Democritus, Lucretius and many others who had entertained such speculations more than two thousand years earlier.

Instead, Darwin's monumental contribution lay in an ingenious synthesis which presented one of the most rigorous and persuasive arguments for evolution ever constructed. His thesis included in its arsenal: artificial and natural selection, speciation, variation, homology, the fossil record, embryology, rudiments, pangenesis, the inheritance of acquired characters and chance. And where his science was insufficient, he even argued from ignorance and doubt. His naturalistic bias stubbornly compelled him to mount supposition upon supposition to support his theory. But Darwin could establish no origin of species without the Bible.

It is no surprise that subsequent evolutionary science has also had to evolve from Darwin's original hypothesis in order to salvage the agenda for which it was invented¹. This is because the heart of Darwin's thesis on the origin of species did not lie in his science, but rather his theology. One of his most zealous propagandists continues to argue today that, “even if there were no actual evidence in favour of the Darwinian theory... we should still be justified in preferring it over all rival theories” (Dawkins, 1986:287). It was clearly Darwin's *theology* of nature, imbibing a passion to expunge the God of Scripture completely from the natural world, which has endeared him to millions over the last 150 years (cf. Herbert, 2009:86). He admitted as much in a letter written to Hooker in 1870:

"My theology is a simple muddle; I cannot look at the universe as the result of blind chance, yet I can see no evidence of beneficent design, or indeed of design of any kind, in the details." (emphasis mine; Darwin, 1903a:321.)

¹ i.e. the modern Darwinian synthesis which had to reconcile Darwin with Mendel's genetic discoveries.

6.2 CONCLUSION

Darwin's theory suffered from prejudice, speculation and presumption. In its conception it was largely unoriginal, and in its substantiation it was entirely specious. The very establishment of Darwin's hypothesis, on merely hypothetical grounds, would destroy any possible basis for morality, beauty, intelligence, and science, including the theory itself. His naturalistic worldview had to take for granted a world he could give no account for. The only presuppositions capable of providing the necessary preconditions that could justify Darwin's experience of reality and make sense of origin and species were based on Biblical Christianity: a Christianity he had set out to destroy.

Unfortunately, the ramifications of Darwin's fictive ideas have produced more than just theoretical consequences. History is replete with examples of men who have applied such logic to science and society at large, with devastating effects. In comparison to the God of Scripture, Darwin's god is a distant, cruel, and mindless entity without purpose or design. It is a great travesty that many theologians and ministers have allowed the evolutionary inventions of such a deity to impinge upon the true and faithful words of the one true God. As Spurgeon once noted,

“There is not a hair of truth upon this dog from its head to its tail, but it rends and tears the simple ones. In all its bearings upon scriptural truth the evolution theory is in direct opposition to it. If God's word be true, evolution is a lie.” (Spurgeon, 1886.)

Devoid of biblical historicity, Darwin's origin of species is as fatuous as it was ingenious.

7. BIBLIOGRAPHY

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